

Environmental Statement: Volume III

Appendix 11C: Socotec Factual Ground Investigation Report



VPI IMMINGHAM

FACTUAL REPORT ON GROUND INVESTIGATION

Report No A8015-18

August 2018






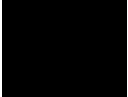
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AECOM House,
66-77 Victoria Street,
St Albans,
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Report No A8015-18

August 2018

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1 INTRODUCTION

In March 2018 SOCOTEC UK Limited was commissioned by AECOM Environmental Solutions Ltd (AECOM) on behalf of VPI Immingham, to carry out a ground investigation at Total Lindsey Oil Refinery (TLOR). The investigation was required to obtain geotechnical information for the proposed development.

The scope of the investigation was specified by AECOM and comprised cable percussion and rotary drilled boreholes, trial pits and laboratory testing. The investigation was performed in accordance with the contract specification, and the general requirements of BS 5930 (2015), BS EN 1997-2 (2007), BS EN ISO 22475-1 (2006) and other relevant related standards identified below. The fieldwork took place between 5 and 20 April.

This report presents the factual records of the fieldwork and laboratory testing. The information is also presented as digital data as defined in AGS (2017).

2 SITE SETTING

2.1 Location and Description

The site is adjacent to the east side of Total Lindsey Oil Refinery, approximately 4 km north west of Immingham town centre, Lincolnshire. The National Grid reference is TA 167 175, see Site Location Plan in Appendix A.

The site is a L-shaped parcel of land, approximately 350 by 200 m, and generally flat and level.

The majority of the site, the southern portion (about 350 by 120 m), comprises rough grass and scrub land, which is boggy in places. There are several soil mounds, up to about 5 m in height.

The north west portion is within the perimeter fence of the adjacent car park, and comprises a compacted generally flat hardcore surface with very little vegetation.

To the north the site is bound by a carpark, belonging to TLOR, and to the west is infrastructure associated with the refinery, including access roads, railway lines, plant and equipment. To the south is VPI Immingham, a power generation facility. To the east is open farmland and the Humber Estuary beyond, approximately 500 m away.

2.2 Published Geology

The published geological map for the area, BGS Sheet 90 (1990) and the BGS Geology of Britain Viewer (2018) show the site located on Glacial Till over bedrock of the Burnham Chalk Formation.

3 FIELDWORK

3.1 General

The exploratory hole locations were selected by AECOM and set out from local features. The coordinates and reduced levels were surveyed by SOCOTEC to National Grid and Ordnance Datum and the locations are shown on the Site Plan in Appendix A

3.2 Exploratory Holes

The exploratory holes are listed in the following table.

TABLE 1: SUMMARY OF EXPLORATORY HOLES

TYPE	QUANTITY	DEPTH RANGE (m)	REMARKS
Cable Percussion Boring	3	22.34 to 28.66	BH1, BH2 and BH5
Cable Percussion Boring extended by Rotary Core Drilling/Open Hole Drilling	3	28.60 to 34.60	BH3, BH4 and BH6
Dynamic Sampling	8	3.75 to 5.45	WS1 to WS8
Trial Pits/ Trenches	13	2.50 to 4.60	TP1 to TP10 and TT1 to TT3

The exploratory hole logs are presented in Appendix B. These provide information including the equipment and methods used, samples taken, tests carried out, water observations and descriptions of the strata encountered. Explanation of the terms and abbreviations used on the logs is given in the Key to Exploratory Hole Records in Appendix B, together with other explanatory information. The logging of soil and rock materials is in accordance with BS 5930 (2015).

Standard penetration tests (SPT) in the boreholes were carried out in accordance with BS EN ISO 22476-3+A1 (2011) and the SPT hammer energy ratio certificate is included in Appendix B. The SPT results are presented on the logs as uncorrected N values.

Photographs of the trial pits and rotary drilled core are presented in Appendix E.

On completion of the fieldwork geotechnical samples were transported to the Doncaster laboratory of SOCOTEC for testing and temporary retention.

3.3 Groundwater and Gas Monitoring

Instrumentation installed in the exploratory holes for groundwater and gas monitoring are shown on the logs and summarised in Appendix C. SOCOTEC were not required to undertake any post fieldwork.

4 LABORATORY TESTING

Geotechnical laboratory testing was scheduled by AECOM and was carried out in accordance with BS 1377 (1990), unless otherwise stated. The testing is summarised below and the results are presented in Appendix E.

- Moisture Content Determination
- Atterberg Limit Determination
- Particle Density
- Particle Size Distribution Analysis
- Unconsolidated Undrained Triaxial Compression Testing
- Consolidated Undrained Triaxial Compression Testing
- One Dimensional Oedometer Consolidation Testing
- Determination of Consolidation Properties Using a Hydraulic Cell
- Dry Density / Moisture Content Relationship
- California Bearing Ratio
- pH, Water Soluble Sulphate, Acid Soluble Sulphate and Total Sulphur Content of Soils Test methods are BS 1377 or others recognised in BRE Special Digest 1 (2005)
- Loss on Ignition
- Organic Matter

REFERENCES

AGS : 2017 : Electronic transfer of geotechnical and geoenvironmental data (Edition 4.0.4 February 2017). Association of Geotechnical and Geoenvironmental Specialists.

BGS England and Wales Sheet 90 : 1990 : Grimsby. 1:50,000 geological map (solid and drift). British Geological Survey.

BGS Geology of Britain Viewer : 2018. www.bgs.ac.uk. British Geological Survey.

BRE Special Digest 1 : 2005 : Concrete in aggressive ground. Building Research Establishment.

BS 1377 : 1990 : Methods of test for soils for civil engineering purposes. British Standards Institution.

BS 5930 : 2015 : Code of practice for ground investigations. British Standards Institution.

BS EN 1997-2 : 2007 : Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing. British Standards Institution.

BS EN ISO 14688-1:2002+A1 : 2013 : Geotechnical investigation and testing - Identification and classification of soil - Part 1 Identification and description. British Standards Institution.

BS EN ISO 14688-2:2004+A1 : 2013 : Geotechnical investigation and testing - Identification and classification of soil - Part 2 Principles for a classification. British Standards Institution.

BS EN ISO 14689-1 : 2003 : Geotechnical investigation and testing - Identification and classification of rock - Part 1 Identification and description. British Standards Institution.

BS EN ISO 22475-1 : 2006 : Geotechnical investigation and testing – Sampling methods and groundwater measurements - Part 1 Technical principles for execution. British Standards Institution.

BS EN ISO 22476-3:2005+A1 : 2011 : Geotechnical investigation and testing - Field testing - Part 3 Standard penetration test. British Standards Institution.

APPENDIX A
FIGURES AND DRAWINGS

Site Location Plan	A1
Site Plan	A2

Site Location Plan



Reproduced from the 2006 Ordnance Survey 1:50 000 scale Landranger map No 113 by permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office, © Crown copyright, Environmental Services Group Limited. All rights reserved. Licence Number 100006060

Notes:
Scale 1:50 000

Project VPI IMMINGHAM
Project No. A8015-18
Carried out for AECOM

Figure

A1



GENERAL NOTES

1. Reproduced from VPI Immingham's Drawing No. VP11-IMMB-CIV-CI01-0001.
2. Hole Locations to National Grid Co-ordinate Reference System.

LEGEND TO SYMBOLS

- Borehole
- Window Sample
- Trial Pit

Scale: 1:1200



x	x	x	x	x	x
Rev	Drawn	Date	Approv.	Date	Modification Details

AMENDMENTS

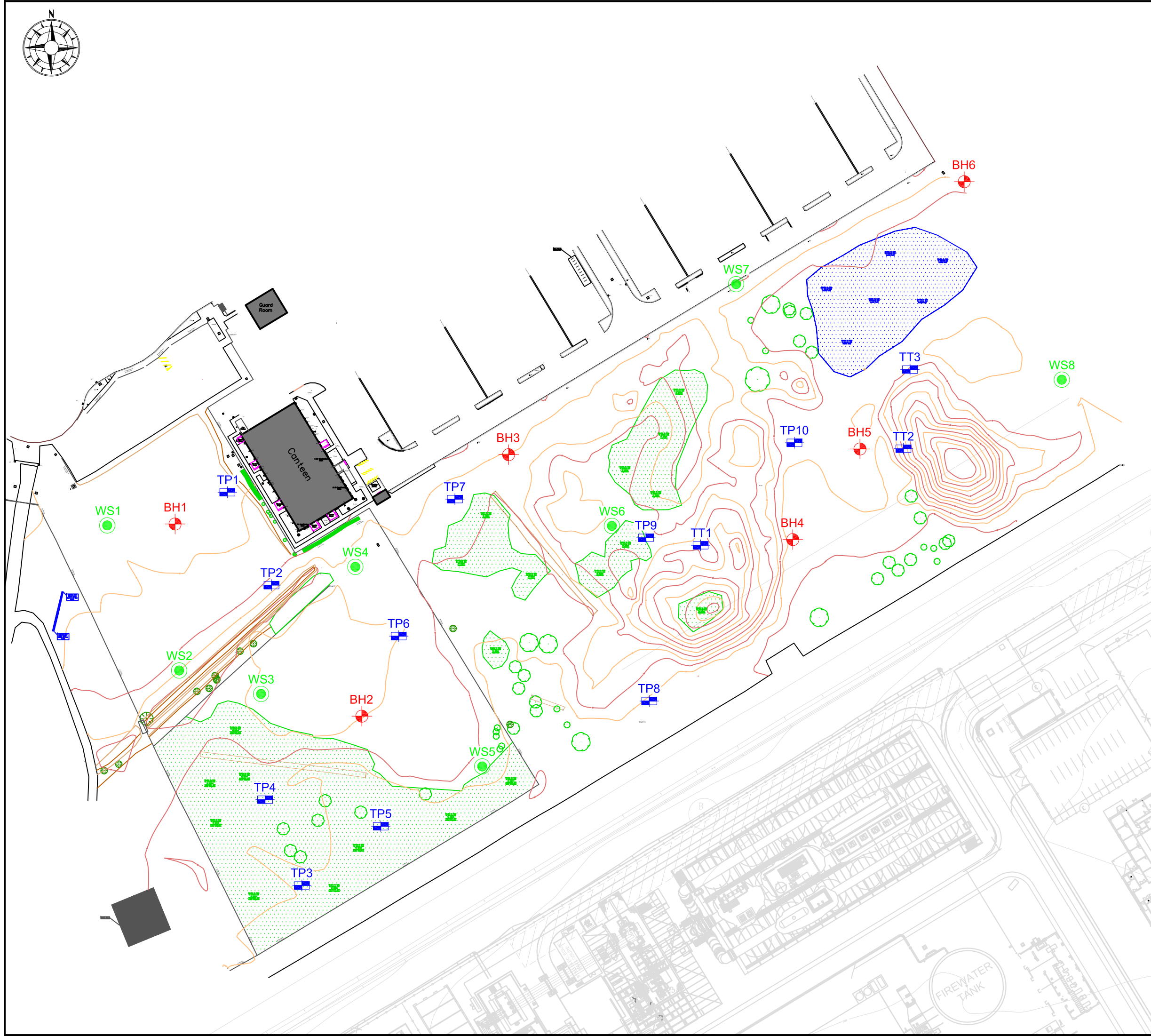
Title	SITE PLAN				
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Project	VPI IMMINGHAM				
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Client	AECOM Environmental Solution Ltd				
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Date	04/06/2018	Drawn By	BS	Approv. By	WH
Sheet Size	A3	Scale	1:1200	Project No	A8015-18
Drawing No	A2			Rev	0



APPENDIX B
EXPLORATORY HOLE RECORDS

Key to Exploratory Hole Records	Key
SPT Hammer Energy Ratio Report	SPT Hammer Reference: SW15470 AR2068 DART235
Borehole Logs	BH1 to BH6
Borehole Logs (Dynamic Sampling)	WS1 to WS8
Trial Pit and Trench Logs	TP1 to TP10 and TT1 to TT3



Key to Exploratory Hole Records

SAMPLES

Undisturbed

U	Driven tube sample	} nominally 100 mm diameter and full recovery unless otherwise stated
UT	Driven thin wall tube sample	
TW	Pushed thin wall tube sample	
P	Pushed piston sample	
L	Liner sample from dynamic (windowless) sampling. Full recovery unless otherwise stated	
CBR	CBR mould sample	
BLK	Block sample	
C / CS	Core sample (from rotary core) taken for laboratory testing.	
AMAL	Amalgamated sample	

Disturbed

D	Small sample
B	Bulk sample

Other

W	Water sample
G	Gas sample

	Environmental chemistry samples (in more than one container where appropriate)
ES	Soil sample
EW	Water sample

Comments

Sample reference numbers are assigned to every sample taken. A sample reference of 'NR' indicates that, while an attempt was made to take a tube sample, there was no recovery.

Samples taken from borehole installations (ie water or gas) after hole construction are not shown on the exploratory hole logs.

Specimens for point load testing undertaken on site (or other non-lab location) are not shown on the log.

IN SITU TESTS

SPT S or SPT C Standard Penetration Test, open shoe (S) or solid cone (C)

The Standard Penetration Test is defined in BS EN ISO 22476-3:2005+A1:2011. The incremental blow counts are given in the Field Records column; each increment is 75 mm unless stated otherwise and any penetration under self-weight in mm (SW) is noted. Where the full 300 mm test drive is achieved the total number of blows for the test drive is presented as N = ** in the Test column. Where the test drive blows reach 50 the total blow count beyond the seating drive is given (without the N = prefix).

IV	<i>in situ</i> vane shear strength, peak (p) and remoulded (r)
HV	Hand vane shear strength, peak (p) and remoulded (r)
PP	Pocket penetrometer test, converted to shear strength
KFH, KRH, KPI	Permeability tests (KFH = falling head, KRH = rising head; KPI = packer inflow); results provided in Field Records column (one value per stage for packer tests)

DRILLING RECORDS

The mechanical indices (TCR/SCR/RQD & If) are defined in BS 5930:2015

TCR	Total Core Recovery, %
SCR	Solid Core Recovery, %
RQD	Rock Quality Designation, %
If	Fracture spacing, mm. Minimum, typical and maximum spacing measurements are presented.
NI	The term non-intact (NI) is used where the core is fragmented.
NA	Used where a measurement is not applicable (eg. If, SCR and RQD in non-rock materials).

Flush returns, estimated percentage with colour where relevant, are given in the Records column

CRF	Core recovered (length in m) in the following run
AZCL	Assessed zone of core loss

GROUNDWATER

▼	Groundwater entry
▽	Depth to groundwater after standing period

Notes:

See report text for full references of standards.

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Project	VPI Immingham
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Carried out for	AECOM Environmental Solutions Ltd

Key

Key to Exploratory Hole Records

INSTALLATION

Details of standpipe/piezometer installations are given on the Record. Legend column shows installed instrument depths including slotted pipe section or tip depth, response zone filter material type and layers of backfill.

**Standpipe/
piezometer**

The type of instrument installed is indicated by a code in the Legend column at the depth of the response zone:

SP	Standpipe			
SPIE	Standpipe piezometer	Plain Pipe		
PPIE	Pneumatic piezometer			Slotted Pipe
EPIE	Electronic piezometer			Piezometer Tip

**Inclinometer or
Slip Indicator**

The installation of vertical profiling instruments is indicated on the Record. The base of tubing is shown in the Legend column.

	The type of instrument installed is indicated by a code in the Legend column at the base of the tubing:
ICE	Biaxial inclinometer
ICM	Inclinometer tubing for use with probe
SLIP	Slip indicator

**Settlement
Points or
Pressure Cells**

The installation of single point instruments is indicated on the Record. The location of the measuring device is shown in the Legend column.

	The type of instrument installed is indicated by a code in the Legend column:
ESET	Electronic settlement cell/gauge
ETM	Magnetic extensometer settlement point
EPCE	Electronic embedment pressure cell
PPCE	Electronic push in pressure cell

**INSTALLATION /
BACKFILL
LEGENDS**

A legend describing the installation is shown in the rightmost column. Legend symbols used to describe the backfill materials are indicated below.

Macadam	Concrete	Grout	Bentonite	Sand	Gravel	Arisings

**STRATUM
LEGENDS**

The legend symbols used for graphical representation of soils, rocks and other materials on the borehole logs are shown below. For soils with significant proportions of secondary soil types, a combination of two or more symbols may be used.

Macadam	Concrete	Topsoil	Made Ground / Fill	Peat	Void or No Information	
Clay	Silt	Sand	Gravel	Cobbles	Boulders	Coal
Mudstone	Siltstone	Sandstone	Conglomerate	Breccia	Limestone	Chalk
Igneous (Fine)	Igneous (Med)	Igneous (Coarse)	Metamorphic (Fine)	Metamorphic (Med)	Metamorphic (Coarse)	Tuff

Notes:

See report text for full references of standards.

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Project No. A8015-18
Carried out for AECOM Environmental Solutions Ltd

Key

Sheet 2 of 3



Key to Exploratory Hole Records

NOTES

- 1 Soils and rocks are described in accordance with BS EN ISO 14688-1:2002+A1:2013 and 14689-1:2003 respectively as amplified by BS 5930:2015.
- 2 For fine soils, consistency determined during description is reported for those strata where undisturbed samples are available. Where the logger considers that the sample may not be representative of the condition in situ, for whatever reason, the reported consistency is given in brackets. The reliability of the sample is indicated by Probably or Possibly as appropriate. Hence (Probably firm) indicates the logger is reasonably confident of the assessment, but (Possibly firm) means less certainty. Where the samples available are too disturbed to allow a reasonable assessment of the in situ condition, no consistency is given.
- 3 Evidence of the occurrence of very coarse particles (cobbles and boulders) is presented on the logs. However, because of their size in relation to the exploratory hole these records may not be fully representative of their size and frequency in the ground mass.
- 4 The declination of bedding and joints is given with respect to the normal to the core axis. Thus in a vertical borehole this will be the dip.
- 5 The assessment of SCR, RQD and Fracture Spacing excludes artificial fractures.
- 6 Observations of discernible groundwater entries during the advancement of the exploratory hole are given at the foot of the log and in the Legend column. The absence of a recorded groundwater entry should not, however, be interpreted as a groundwater level below the base of the borehole. Under certain conditions groundwater entry may not be observed, for instance, drilling with water flush or overwater, or boring at a rate faster than water can accumulate in the borehole. Similarly, where water entry observations do exist, groundwater may also be present at higher elevations in the ground than where recorded in the borehole. In addition, where appropriate, water levels in the hole at the time of recovering individual samples or carrying out in situ tests and at shift changes are given in the Records column.
- 7 The borehole logs present the results of Standard Penetration Tests recorded in the field without correction or interpretation. However, in certain ground conditions (eg high hydraulic head or where very coarse particles are present) some judgement may be necessary in considering whether the results are representative of in situ mass conditions.

REFERENCES

- 1 BS EN ISO 14688-1:2002+A1 : 2013 : Geotechnical investigation and testing - Identification and classification of soil. Part 1 Identification and description. British Standards Institution
- 2 BS EN ISO 14689-1 : 2003 : Geotechnical investigation and testing - Identification and classification of rock. Part 1 Identification and description. British Standards Institution
- 3 BS EN ISO 22476-3:2005+A1 : 2011 : Geotechnical investigation and testing - Field testing. Part 3 Standard penetration test. British Standards Institution
- 4 BS 5930 : 2015 : Code of practice for ground investigations. British Standards Institution

Notes:

See report text for full references of standards.

Updated October 2017

Project VPI Immingham
Project No. A8015-18
Carried out for AECOM Environmental Solutions Ltd

Key

Sheet 3 of 3

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

ARCHWAY ENGINEERING
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX5 9JP

SPT Hammer Ref: AR1940
Test Date: 21/09/2017
Report Date: 21/09/2017
File Name: AR1940.spt
Test Operator: SH

Instrumented Rod Data

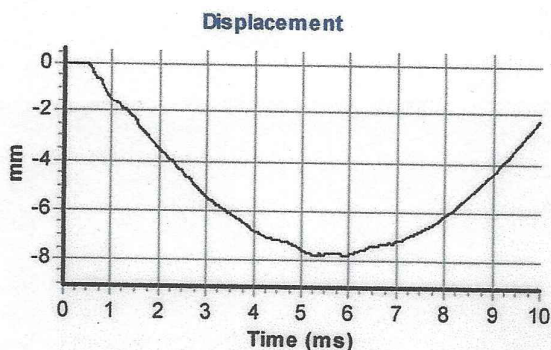
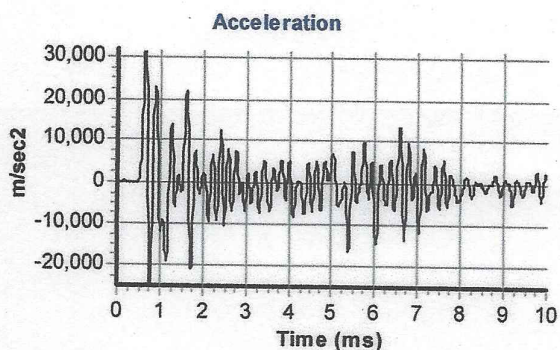
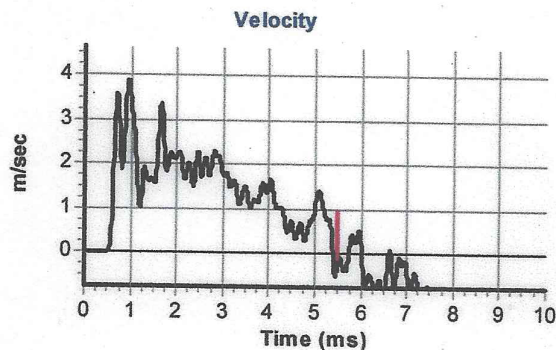
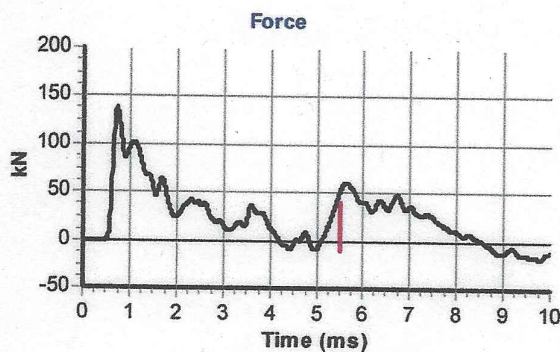
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.0
Assumed Modulus E_a (GPa): 200
Accelerometer No.1: 7080
Accelerometer No.2: 11609

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 10.0

Comments / Location

CALIBRATION



Calculations

Area of Rod A (mm²): 905
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 332

Energy Ratio E_r (%): **70**

Signed: M.GARDNER

Title: FITTER

The recommended calibration interval is 12 months

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

ARCHWAY ENGINEERING
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX5 9JP

SPT Hammer Ref: AR2068
Test Date: 15/12/2017
Report Date: 15/12/2017
File Name: AR2068.spt
Test Operator: SH

Instrumented Rod Data

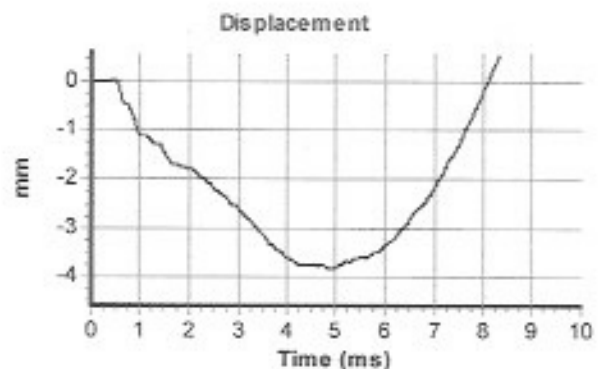
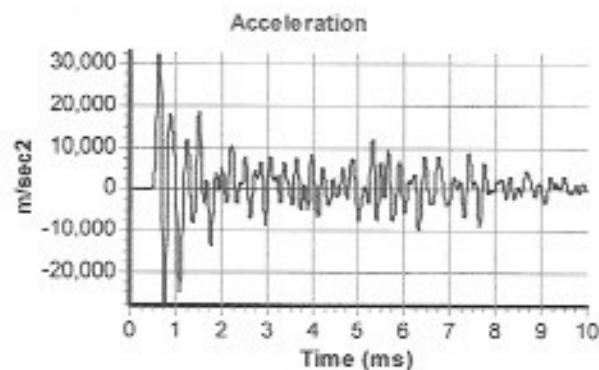
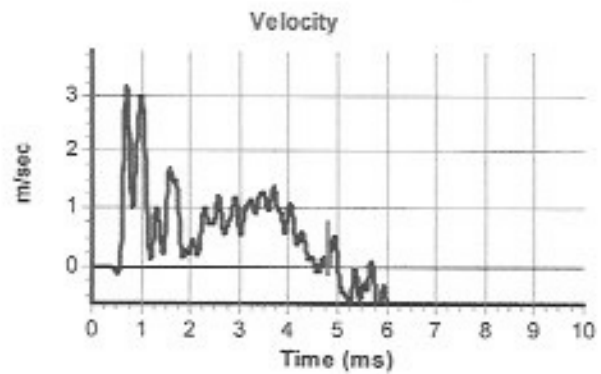
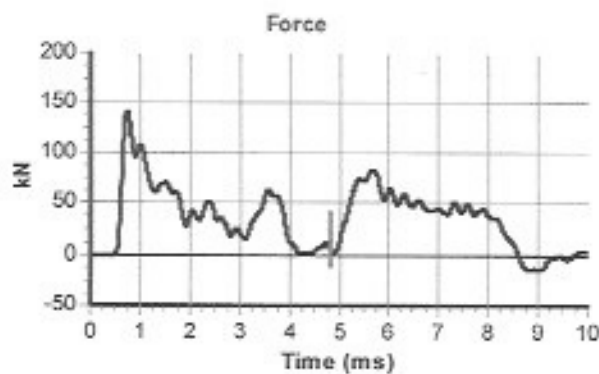
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.0
Assumed Modulus E_a (GPa): 200
Accelerometer No.1: 7080
Accelerometer No.2: 11609

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 10.0

Comments / Location

CALIBRATION



Calculations

Area of Rod A (mm^2): 905
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 296

Energy Ratio E_r (%): **63**

Signed: M.GARDNER
Title: FITTER

The recommended calibration interval is 12 months

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005

ARCHWAY ENGINEERING
AINLEYS INDUSTRIAL ESTATE
ELLAND
WEST YORKSHIRE
HX59JP

SPT Hammer Ref: DART235
Test Date: 13/04/2017
Report Date: 13/04/2017
File Name: DART235.spt
Test Operator: SH

Instrumented Rod Data

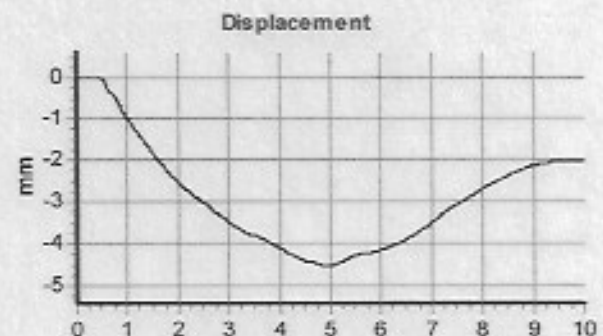
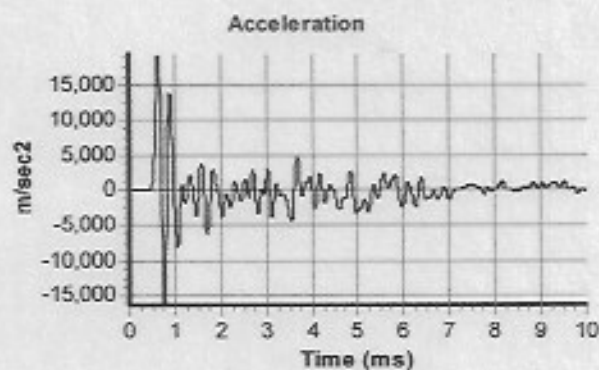
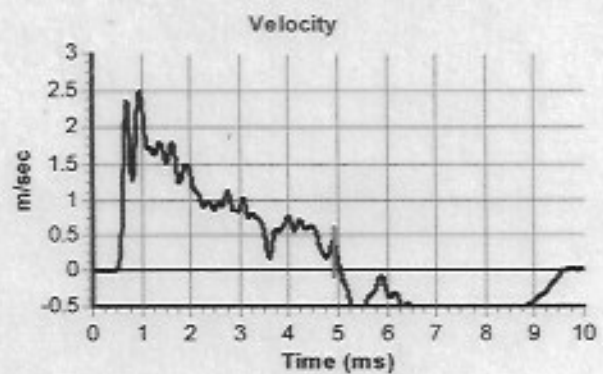
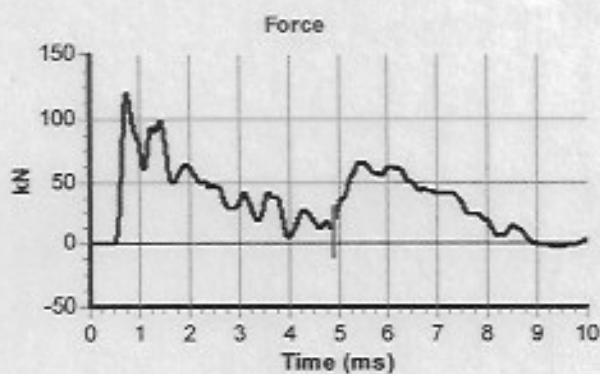
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.0
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 7080
Accelerometer No.2: 11609

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 10.0

Comments / Location

CALIBRATION



Calculations

Area of Rod A (mm²): 905
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 276

Energy Ratio E_r (%): **58**

Signed: S. HOWARTH
Title: FITTER

The recommended calibration interval is 12 months

Borehole Log



Drilled	GC	Start	Equipment, Methods and Remarks	Depth from	to	Diameter	Casing Depth	Ground Level	6.36 mOD
Logged	MJS	05/04/2018	Dando 2000. Cable percussion boring. SPT Hammer ID: AR1940, Rod type: 54mm Whitworth.	(m)	(m)	(mm)	(m)	Coordinates (m)	E 516528.04
Checked	TC	End		14.00	14.00	200	14.00	National Grid	N 417415.39
Approved	TC	11/04/2018		14.00	28.50	150	28.50		

Samples and Tests				Strata Description				Depth, Level	Legend	Backfill
Depth	Type & No.	Records	Date	Time	Main	Detail	(Thickness)			
			Casing	Water						
0.10	D 1	0.00-1.20 Hand excavated inspection pit.			Brown sandy clayey GRAVEL. Gravel is angular to subangular fine to coarse of chalk and limestone.		0.10 (0.10) +6.26			
0.20 - 0.40	B 2				(MADE GROUND)		(0.35)			
0.45	D 3				Brown, locally greyish brown, slightly sandy gravelly CLAY. Gravel is angular fine to coarse of chalk and mudstone. Strong hydrocarbon odour.		0.45 +5.91			
0.50 - 0.70	B 4				(MADE GROUND)		(0.65)			
1.00 - 1.20	B 5		05/04/18	1800	Greyish brown, locally dark grey, slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to coarse of slag, mudstone, sandstone and chalk. Strong hydrocarbon odour.	1.10-1.20 locally dark grey, occasional rootlets	1.10 +5.26			
1.20 - 1.65	UT 6	52 blows 100% rec	06/04/18	0800	(MADE GROUND)					
1.65 - 1.80	D 7				Stiff brown, locally mottled light grey, slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of quartz, mudstone, sandstone and chalk.					
2.00 - 2.45	SPTS D 8	N=25 (3,4/5,6,7,7)	1.70	Dry						
2.50 - 3.00	B 9						(2.70)			
3.00 - 3.45	UT 10	56 blows 100% rec	2.80	Dry						
3.45 - 3.60	D 11									
3.80	W 14				Thinly laminated brown, locally light grey, CLAY with frequent gravel size pockets of fine to coarse sand.		3.80 +2.56			
4.00 - 4.45	SPTS D 12	N=14 (2,2/3,3,4,4)	3.90	Dry			(0.20)			
4.00 - 4.45	B 13				Stiff, becoming very stiff, greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of chalk, sandstone, mudstone and quartz.		4.00 +2.36			
5.00 - 5.45	UT 15	50 blows 100% rec	4.70	Dry						
5.45 - 5.60	D 16									
6.50 - 6.95	SPTS D 17	N=14 (2,2/3,3,4,4)	4.70	Dry						
7.00 - 7.50	B 18									
7.20	D 19					7.10-8.40 locally sandy				
8.00 - 8.45	UT 20	38 blows 100% rec	4.70	Dry						
8.45	B 21						(9.00)			
8.50	W 21A									
9.50 - 9.95	SPTS D 22	N=14 (2,3/3,3,4,4)	9.20	Dry						
9.50 - 10.00	B 23									

Groundwater Entries				Depth Related Remarks		Hard Boring			
No.	Depth	Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used
1	3.80		Rose to 2.30 m after 20 minutes. Medium inflow	4.00					
2	8.50		Rose to 6.30 m after 20 minutes. Medium inflow	9.00					

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	VPI IMMINGHAM	Borehole	BH1
Scale 1:50	Project No.	A8015-18		
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Borehole Log



Drilled	GC	Start	Equipment, Methods and Remarks	Depth from	to	Diameter	Casing Depth	Ground Level	6.36 mOD
Logged	MJS	05/04/2018	Dando 2000. Cable percussion boring.	1.20	14.00	200	14.00	Coordinates (m)	E 516528.04
Checked	TC	End	SPT Hammer ID: AR1940, Rod type: 54mm Whitworth.	14.00	28.50	150	28.50	National Grid	N 1471415.39
Approved	TC	11/04/2018							

Samples and Tests					Strata Description				
Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
11.00 - 11.45	UT 24	40 blows 100% rec	9.20	Dry	Stiff, becoming very stiff, greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of chalk, sandstone, mudstone and quartz.				
11.45 - 11.60	D 25								
12.50 - 12.95 12.50 - 12.95	SPTS D 26	N=31 (5,5/6,7,8,10)	9.20	Dry	Medium dense brown gravelly very silty fine to coarse SAND. Gravel is angular to subrounded fine to coarse of chalk and flint.		13.00 -6.64		
13.00 13.00 - 13.50	D 28 B 27						(1.80)		
13.50	W 30								
14.00 - 14.45 14.00 - 14.45	SPTS D 29	N=10 (3,3/2,3,2,3)	9.20	10.00	Medium dense brown sandy slightly clayey GRAVEL. Gravel is angular to subangular fine to coarse of flint and chalk.				
			06/04/18 9.20	1800 10.00					
14.80	D 31		09/04/18 9.20	0800 3.80			14.80 -8.44		
15.00 - 15.50	B 32				Very stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk and rare flint.				
15.50 - 15.95 15.50 - 15.95	SPTS D 33	N=28 (3,3/5,5,8,10)	15.00	10.00				(0.90)	
16.00 - 17.00	B 34						15.70 -9.34		
17.00 - 17.45	UT 35	78 blows 100% rec	16.50	15.00		17.10 becoming greyish brown			
17.45 - 17.60	D 36								
18.50 - 18.77 18.50 - 18.77 18.50 - 19.00	SPTS D 37 B 38	50 (15,10 for 50mm/23,27 for 70mm)	18.00	17.00			(5.80)		

Groundwater Entries				Depth Related Remarks				Hard Boring			
No.	Depth	Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used		
3	13.50		Rose to 9.00 m after 20 minutes. Fast inflow				14.50 - 14.80	60	Chisel		

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	VPI IMMINGHAM	Borehole	BH1
Scale 1:50	Project No.	A8015-18		
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AGS				

Borehole Log



Drilled	GC	Start	Equipment, Methods and Remarks	Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)	Ground Level	6.36 mOD
Logged	MJS	05/04/2018	Dando 2000. Cable percussion boring.	1.20	14.00	200	14.00	Coordinates (m)	E 516528.04
Checked	TC	End	SPT Hammer ID: AR1940, Rod type: 54mm Whitworth.	14.00	28.50	150	28.50	National Grid	N 417415.39
Approved	TC	11/04/2018							

Samples and Tests				Strata Description				Depth, Level (Thickness)	Legend	Backfill
Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail				
20.00 - 20.40	UT 39	100 blows 56% rec	19.50	19.50	Very stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk and rare flint.					
20.40 - 20.50	D 40									
21.00 - 21.50	B 41				Very stiff light grey slightly sandy gravelly silty CLAY. Gravel is subangular to subrounded fine to coarse of chalk.					
21.50 - 21.79 21.50 - 21.79	SPTS D 42	50 (10,15 for 60mm/22,25,3 for 5mm)	19.50	20.00						
22.50 - 22.70 22.50 - 22.70	SPTS UT NR D 43	50 (25 for 75mm/28,22 for 55mm) 100 blows No Recovery	09/04/18 19.50	1800 20.00						
23.00 - 24.00	B 44		10/04/18 19.50	0800 9.00						
24.00 - 24.28 24.00 - 24.28	SPTS D 45	50 (15,10 for 45mm/20,27,3 for 5mm)	23.50	10.00						
25.00 - 25.22 25.00 - 25.22	SPTS D 46	50 (20,5 for 15mm/25,25 for 60mm)	24.90	8.00						
26.00 - 26.22 26.00 - 26.22 26.00 - 27.00	SPTS D 47 B 48	50 (25 for 75mm/27,23 for 65mm)	25.90 10/04/18 25.90	8.00 1700 8.00						
27.50 - 27.78 27.50 - 27.78 27.50 - 28.50	SPTS D 49 B 50	50 (15,10 for 50mm/22,24,4 for 5mm)	27.50	7.00						
28.50 - 28.66 28.50 - 28.66	SPTS D 51	50 (25 for 60mm/38,12 for 20mm)	11/04/18 28.50	1500 9.00	END OF EXPLORATORY HOLE					

Groundwater Entries			Depth Related Remarks		Hard Boring			
No.	Depth Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used
4	21.00	Rose to 19.80 m after 20 minutes. Medium inflow				24.50 - 26.00 26.50 - 27.50	180 120	Chisel Chisel

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	VPI IMMINGHAM	Borehole	BH1
Scale 1:50	Project No.	A8015-18		
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Borehole Log



Drilled	GC	Start	11/04/2018	Equipment, Methods and Remarks	Dando 2000. Cable percussion boring. SPT Hammer ID: AR1940, Rod type: 54mm Whitworth.	Depth from (m)	1.20	to (m)	14.50	Diameter (mm)	200	Casing Depth (m)	14.50	Ground Level	5.43 mOD
Logged	WH	End	16/04/2018				14.50		22.20		150		22.20	Coordinates (m)	E 516588.10
Checked	TC													National Grid	N 417353.62
Approved	TC														

Samples and Tests

Samples and Tests				Strata Description					
Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.20 0.30 - 0.50	D 1 B 2	0.00-1.20 Hand excavated inspection pit.			Dark brown sandy very gravelly CLAY with high cobble content. Gravel is subrounded fine to coarse of various lithologies including chalk, macadam and sandstone. Cobbles are subrounded of chalk.		(0.50)		
0.60 0.60 - 1.00	D 3 B 4				(MADE GROUND)		0.50 +4.93		
1.00 1.00 - 1.20 1.20 - 1.65	D 5 B 6 UT 7	30 blows 100% rec		Dry	Dark brown and black very gravelly very silty fine to coarse SAND. Gravel is subangular fine to coarse of chalk and sandstone. Strong hydrocarbon odour.		1.00 +4.43		
1.65 - 1.80	D 8				(MADE GROUND)				
1.80 - 2.25	SPTS D 9 B 10	N=13 (2,2/3,4,4)	11/04/18	1800	Firm dark greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular medium of flint and chalk.				
2.20 - 2.70	B 13 UT NR	28 blows No Recovery	12/04/18	0800					
2.25 - 2.70				2.00			(3.20)		
2.70 - 2.80	D 12								
2.80 - 3.25	SPTS D 14	N=15 (1,2/3,3,4,5)	1.70	Dry					
2.80 - 3.25									
3.30 - 3.75	UT 15	45 blows 100% rec	1.70	Dry					
3.75 - 3.90	D 16								
3.90 - 4.35	SPTS D 17 B 18	N=15 (6,7/4,3,3,5)	2.90	Dry					
3.90 - 4.35			3.90	Dry					
4.00 - 4.45	UT NR	36 blows No Recovery			Brown mottled grey CLAY.		4.20 +1.23		
4.45 - 4.60	D 20					4.45 slightly gravelly sandy, gravel is subangular fine of chalk and mudstone	(0.50)		
4.60 - 5.05	SPTS D 21 B 27	N=17 (2,2/3,4,4,6)	4.50	4.00	Stiff to very stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular fine to medium of sandstone and chalk.		4.70 -0.73		
4.60 - 5.05									
5.10 - 5.55	UT 28	38 blows 100% rec	5.00	4.80					
5.55 - 5.70	D 29								
5.70 - 6.15	SPTS D 30 B 31	N=25 (3,4/5,6,7,7)	5.60	Dry					
5.70 - 6.15									
6.50 - 6.95	UT NR B 33	48 blows No Recovery	6.00	Dry					
6.50 - 7.00									
7.10 - 7.55	SPTS D 34 B 35	N=22 (3,4/4,5,6,7)	6.00	Dry					
7.10 - 7.55									
8.00 - 8.45	UT 36	60 blows 100% rec	6.00	Dry					
8.45 - 8.60	D 37								
8.60 - 9.05	SPTS D 38 B 39	N=27 (3,4/5,7,7,8)	6.00	Dry					
8.60 - 9.05									
9.50 - 9.95	UT 40	62 blows 100% rec	6.00	Dry			(9.40)		
9.95 - 10.10	D 41								

Groundwater Entries				Depth Related Remarks				Hard Boring				
No.	Depth (m)	Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used			
1	1.80		Rose to 1.50 m after 20 minutes. Slow inflow									
2	4.20		Rose to 3.80 m after 20 minutes. Slow inflow	5.00								

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	VPI IMMINGHAM	Borehole	BH2
Scale 1:50	Project No.	A8015-18		
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Borehole Log



Drilled	GC	Start	11/04/2018	Equipment, Methods and Remarks	Dando 2000. Cable percussion boring. SPT Hammer ID: AR1940, Rod type: 54mm Whitworth.	Depth from (m)	1.20	to (m)	14.50	Diameter (mm)	200	Casing Depth (m)	14.50	Ground Level	5.43 mOD
Logged	WH	End	16/04/2018				14.50		22.20		150		22.20	Coordinates (m)	E 516588.10
Checked	TC													National Grid	N 417353.62
Approved	TC														

Samples and Tests					Strata Description				
Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
10.10 - 10.55 10.10 - 10.55 10.10 - 10.55	SPTS D 42 B 43	N=22 (3,4,4,5,6,7)	6.00	Dry	Stiff to very stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular fine to medium of sandstone and chalk.				
11.00 - 11.45	UT 44	64 blows 100% rec	6.00	Dry					
11.45 - 11.60 11.60 - 12.05 11.60 - 12.05 11.60 - 12.05	D 45 SPTS D 46 B 47	N=23 (3,4/4,5,6,8)	6.00	Dry					
12.50 - 12.95	UT 48	70 blows 100% rec	6.00	Dry					
12.95 - 13.10 13.10 - 13.55 13.10 - 13.55 13.10 - 13.55	D 49 SPTS D 50 B 51	N=30 (4,6/6,7,8,9)	6.00	Dry					
14.00 - 14.45 14.00 - 14.60 14.10	UT NR B 53 W 59	80 blows No Recovery	6.00	Dry	Firm light brown sandy very gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk and mudstone.		14.10 -8.67 (0.30) 14.40 -8.97		
14.60 - 15.05 14.60 - 15.05	SPTS D 54	N=39 (7,8/10,10,9,10)	14.50	10.00	Firm to stiff light brown sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk, mudstone and flint. Occasional gravel size pockets of fine to medium sand.				
15.20	D 55						(2.00)		
15.50 - 15.95	UT 56	70 blows 33% rec	14.50	10.00					
16.20 - 16.65 16.20 - 16.65 16.40 - 17.00	SPTS D 57 B 58	N=37 (6,8/8,9,10,10)	15.50	7.00					
17.00 - 17.45	UT 60	55 blows 56% rec	12/04/18 16.50	1800 7.00	Stiff greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to medium of chalk.		16.40 -10.97		
17.45 - 17.60 17.60 - 18.05 17.60 - 18.05	D 61 SPTS D 62	N=35 (3,5/7,8,10,10)	16.50	5.00		17.45-18.05 light grey silty fine to coarse sand	(3.10)		
18.50 - 18.95 18.50 - 19.00	UT NR B 63	60 blows No Recovery	18.40	9.00					
19.10 - 19.55 19.10 - 19.55	SPTS D 64	N=35 (4,6/7,8,9,11)	18.40	9.00					
19.50	D 65				Stiff to very stiff brownish grey slightly sandy CLAY with occasional gravel. Gravel is subangular fine to medium of chalk.		19.50 -14.07		

Groundwater Entries				Depth Related Remarks				Hard Boring				
No.	Depth	Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used			
3	14.10		Rose to 10.00 m after 20 minutes. Medium inflow									

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	VPI IMMINGHAM	Borehole	BH2
Scale 1:50	Project No.	A8015-18		
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Borehole Log



Drilled GC	Start	Equipment, Methods and Remarks	Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)	Ground Level	5.43 mOD
Logged WH	11/04/2018	Dando 2000. Cable percussion boring.	1.20	14.50	200	14.50	Coordinates (m)	E 516588.10
Checked TC	End	SPT Hammer ID: AR1940, Rod type: 54mm Whitworth.	14.50	22.20	150	22.20	National Grid	N 417353.62
Approved TC	16/04/2018							

Samples and Tests

Samples and Tests					Strata Description				
Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
20.00 - 20.45	UT 66	100 blows 56% rec	20.00	11.00	Stiff to very stiff brownish grey slightly sandy CLAY with occasional gravel. Gravel is subangular fine to medium of chalk.		(2.84)		
20.60 - 20.93 20.60 - 20.93 20.60 - 21.00	SPTS D 67 B 68	50 (12,13 for 65mm/17,21,12 for 40mm)	20.00	11.00					
21.50 - 21.64 21.50 - 21.64	SPTS D 69	50 (25 for 50mm/42,8 for 10mm)	21.00	11.00					
22.20 - 22.34 22.20 - 22.34	SPTS D 70	50 (25 for 50mm/39,11 for 15mm)	13/04/18 21.50 11.00 16/04/18 0800 21.50 6.00 16/04/18 1000 22.20 8.00						
					END OF EXPLORATORY HOLE		22.34	-16.91	

Groundwater Entries			Depth Related Remarks			Hard Boring		
No.	Depth Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used
						21.90 - 21.90	180	Chisel
						21.90 - 22.20	60	Chisel

Borehole Log



Drilled	SS/MB	Start	Equipment, Methods and Remarks	Depth from	to	Diameter	Casing Depth	Ground Level	5.43 mOD
Logged	MJS/PC	11/04/2018	Dando 175/Beretta T44. Cable percussion boring./Rotary core drilling (SWF size) using air mist flush. SPT Hammer ID: AR2068, Rod type: 54mm Whitworth.	(m)	(m)	(mm)	(m)	Coordinates (m)	E 516635.31
Checked	TC	End		28.00	28.60	200	28.00	National Grid	N 417437.68
Approved	TC	16/04/2018				146			

Samples and Tests				Strata Description				Depth, Level	Legend	Backfill
Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	(Thickness)			
0.40 - 1.20	B 1	0.00-1.20 Hand excavated inspection pit.			Firm brown, locally mottled light grey, slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of quartz, sandstone, chalk and mudstone.	0.00-1.20 occasional rootlets				
1.20 - 1.65	SPTS D 2	N=16 (3,4/4,4,4,4)	1.20	Dry			(3.00)			
1.65 - 2.00	B 3									
2.00 - 2.45	SPTS D 4	N=13 (3,3/3,4,3,3)	1.50	Dry						
2.50 - 3.00	B 5									
3.00 - 3.45	SPTS D 6	N=8 (1,2/2,2,2,2)	1.50	1.10	Firm thinly laminated brown CLAY with frequent partings of fine to medium sand.		3.00	+2.43		
3.50 - 4.00	B 7						(0.70)			
4.00 - 4.45	SPTS D 8	N=13 (2,2/3,3,3,4)	4.00	Dry	Medium dense brown slightly gravelly very silty fine to medium SAND. Gravel is angular to subrounded fine to medium of various lithologies.		3.70	+1.73		
4.50 - 5.00	B 9						(0.80)			
5.00 - 5.45	UT 10	39 blows 100% rec	4.50	Dry	Stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk, mudstone, quartz and sandstone.		4.50	-0.93		
5.45 - 5.65	D 11									
5.65 - 6.00	B 12									
6.00 - 6.45	SPTS D 13	N=22 (3,3/4,6,6,6)	6.00	Dry						
6.50 - 7.10	B 14									
7.50 - 7.95	UT 15	49 blows 100% rec	7.50	Dry		7.10-7.40 foreman reports reddish brown sand 7.40 becoming greyish brown				
7.95 - 8.15	D 16									
8.15 - 8.60	SPTS D 17	N=23 (3,3/4,5,6,8)	7.50	Dry						
8.60 - 9.00	B 18									
9.00 - 9.45	UT 19	59 blows 100% rec	9.00	Dry			(8.80)			
9.45 - 9.65	D 20									
9.65 - 10.10	SPTS D 21	N=29 (3,5/7,7,8,7)	9.50	Dry						

Groundwater Entries				Depth Related Remarks				Hard Boring		
No.	Depth	Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used	
1	3.00		Rose to 1.10 m after 20 minutes.	3.60						
2	7.10		Rose to 4.15 m after 20 minutes.	7.40						

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	VPI IMMINGHAM	Borehole	BH3
Scale 1:50	Project No.	A8015-18		Sheet 1 of 3
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Borehole Log



Drilled	SS/MB	Start	Equipment, Methods and Remarks	Depth from	to	Diameter	Casing Depth	Ground Level	5.43 mOD
Logged	MJS/PC	11/04/2018	Dando 175/Beretta T44. Cable percussion boring./Rotary core drilling (SWF size) using air mist flush. SPT Hammer ID: AR2068, Rod type: 54mm Whitworth.	(m)	(m)	(mm)	(m)	Coordinates (m)	E 516635.31
Checked	TC	End		28.00	28.00	200	28.00	National Grid	N 417437.68
Approved	TC	16/04/2018				146			

Samples and Tests				Strata Description				Depth, Level	Legend	Backfill
Depth	Type & No.	Records	Date	Time	Main	Detail	(Thickness)			
			Casing	Water						
10.00 - 10.50	B 22				Stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk, mudstone, quartz and sandstone.					
10.50 - 10.95	UT 23	76 blows 100% rec	10.50	Dry						
10.95 - 11.15 11.00 - 12.00 11.15 - 11.60 11.15 - 11.60	D 24 B 26 SPTS D 25	N=36 (4,6/7,9,11,9)	11.00	Dry						
12.00 - 12.45	UT 27	69 blows 100% rec	12.00	Dry						
12.45 - 12.65 12.65 - 13.10 12.65 - 13.10 12.80 - 13.30	D 28 SPTS D 29 B 30	N=30 (3,5/5,7,9,9)	12.00	Dry						
13.50 - 13.95 13.50 13.50 - 13.95	SPTS D 31 D 32	N=11 (1,2/2,3,3,3)	12.00	7.90	Medium dense greenish brown gravelly clayey fine to medium SAND. Gravel is angular to subrounded fine to coarse of various lithologies. Occasional gravel size pockets of clay.		13.30 (0.80)	-7.87	3	
14.10 - 15.00	B 33				Stiff greyish brown slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of chalk, quartz, sandstone and mudstone.		14.10 (1.00)	-8.67		
15.00 - 15.45 15.00 - 15.45	SPTS D 34	N=11 (2,3/2,2,3,4)	11/04/18 15.00	1700 7.00			15.10 (0.90)	-9.67		
16.00 - 16.50	B 35				Medium dense yellowish brown gravelly fine to medium SAND. Gravel is angular to subrounded fine to coarse of various lithologies. Occasional gravel size pockets of clay.		16.00 (2.70)	-10.57		
16.50 - 16.77 16.50 - 16.80	SPTS D 36	57 (10,15 for 60mm/28,29 for 60mm)	16.50	5.10	Grey slightly sandy clayey SILT. Rare subangular fine to medium gravel of chalk.					
17.00 - 18.00	B 37									
18.00 - 18.20 18.00 - 18.30	SPTS D 38	50 (15,10 for 50mm/50 for 70mm)	18.00	Dry						
18.60 - 19.50	B 39									
19.50 - 19.75 19.50 - 19.80	SPTS D 40	50 (11,14 for 50mm/22,28 for 50mm)	19.50	Dry	Very stiff light grey slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk with rare flint. Locally silty.		18.70	-13.27		

Groundwater Entries				Depth Related Remarks				Hard Boring		
No.	Depth	Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used	
3	13.30		Rose to 6.10 m after 20 minutes.	14.10						

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	VPI IMMINGHAM	Borehole	BH3
Scale 1:50	Project No.	A8015-18		
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Borehole Log



Drilled	SS/MB	Start	Equipment, Methods and Remarks	Depth from	to	Diameter	Casing Depth	Ground Level	5.43 mOD
Logged	MJS/PC	11/04/2018	Dando 175/Beretta T44. Cable percussion boring./Rotary core drilling (SWF size) using air mist flush. SPT Hammer ID: AR2068, Rod type: 54mm Whitworth.	(m)	(m)	(mm)	(m)	Coordinates (m)	E 516635.31
Checked	TC	End		28.00	28.60	200	28.00	National Grid	N 417437.68
Approved	TC	16/04/2018				146			

Samples and Tests

Samples and Tests				Strata Description				Depth, Level	Legend	Backfill
Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	(Thickness)			
20.00 - 21.00	B 41				Very stiff light grey slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk with rare flint. Locally silty.					
21.00 - 21.20 21.00 - 21.30	SPTS D 42	50 (19,6 for 10mm/31,19 for 40mm)	21.00	Dry						
22.00 - 22.50	B 43				Very stiff light grey slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk with rare flint. Locally silty.					
22.50 - 22.62 22.50 - 22.70	SPTS D 44	50 (25 for 75mm/50 for 40mm)	22.50	Dry				(8.10)		
23.00 - 24.00	B 45				Very stiff light grey slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk with rare flint. Locally silty.					
24.00 - 24.14 24.00 - 24.10	SPTS D 46		12/04/18 24.00	1700 Dry			24.00 becoming locally gravelly			
25.00 - 25.50	B 47				Very stiff light grey slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk with rare flint. Locally silty.					
25.50 - 25.62 25.50 - 25.62	SPTS D 48	50 (25 for 75mm/50 for 50mm)	25.50	Dry						
26.00 - 26.50	B 49				Very stiff light grey slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk with rare flint. Locally silty.					
26.80 - 27.02 26.80 - 27.02 27.00 - 27.50	SPTS D 50 B 51	50 (18,7 for 10mm/28,22 for 60mm)	26.50	8.70		Extremely weak white CHALK. Recovered as gravelly clay. Gravel is angular to subangular fine to coarse of chalk with rare flint.	27.00 becoming recovered as clayey angular fine to coarse gravel	26.80 -21.37 (1.20)		
28.00 - 28.10		50 (25 for 60mm/50 for 40mm)	13/04/18 28.00	1630 4.10	Medium strong white CHALK. Recovered as subangular to subrounded fine to coarse gravel.					
28.00 - 28.60	42 0 0	NI -	16/04/18 28.00	1300 0.70				28.00 -22.57 (0.60)		
		Flush: 28.00 - 28.60 Air/mist 100%	16/04/18 28.00	1700 0.70						
					END OF EXPLORATORY HOLE			28.60 -23.17		

Depth	TCR	SCR	RQD	If	Records	Date Casing	Time Water	Groundwater Entries	Depth Related Remarks	Hard Boring	Tools used
No.	Depth	Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)			
4	26.80		Rose to 8.70 m after 20 minutes.					27.60 - 28.00	60	Chisel	

Borehole Log



Drilled	SS/MB	Start	Equipment, Methods and Remarks	Depth from	to	Diameter	Casing Depth	Ground Level	4.19 mOD
Logged	WH/PC	16/04/2018	Dando 175/Beretta T44. Cable percussion boring /Rotary open hole drilling to 28.50m followed by rotary core drilling (SWF size) using air mist flush. SPT Hammer ID: AR2068, Rod type: 54mm Whitworth.	(m)	(m)	(mm)	(m)	Coordinates (m)	E 516726.70
Checked	TC	End		24.00	34.60	200	16.50	National Grid	N 417410.38
Approved	TC	20/04/2018				146	28.60		

Samples and Tests				Strata Description				Depth, Level	Legend	Backfill
Depth	Type & No.	Records	Date	Time	Main	Detail	(Thickness)			
			Casing	Water						
0.50 - 1.20	B 1	0.00-1.20 Hand excavated inspection pit.			Light brown, mottled grey, slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to medium of chalk and sandstone with frequent rootlets. (TOPSOIL)		(0.30)			
1.20 - 1.65	SPTS D 2	N=16 (2,3/4,4,4,4)	1.20	Dry	Firm brown, mottled grey and light brown, slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk, flint and sandstone.		+3.89			
1.65 - 2.00	B 3						(2.90)			
2.00 - 2.45	UT 4	59 blows 100% rec	1.50	Dry						
2.45 - 2.65	D 5									
2.65 - 3.10	SPTS D 6	N=15 (2,3/3,4,3,5)	1.50	Dry						
3.10 - 3.55	UT 7	51 blows 100% rec	3.00	Dry	Soft brown very sandy CLAY.		+0.99			
3.75 - 4.20	SPTS D 8	N=6 (1,2/1,2,1,2)	3.00	1.00		3.55 brown clayey sand	(0.95)			
4.00 - 4.50	B 9									
4.50 - 4.95	UT 10	47 blows 100% rec	4.50	Dry	Stiff dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded fine to coarse of chalk and sandstone.		+0.04			
4.95 - 5.15	D 11									
5.15 - 5.60	SPTS D 12	N=22 (2,3/4,6,6,6)	4.50	Dry						
5.50 - 6.00	B 13						(2.95)			
6.00 - 6.45	UT 14	42 blows 100% rec	6.00	Dry						
6.45 - 6.65	D 15									
6.65 - 7.10	SPTS D 16	N=24 (2,3/4,6,6,8)	6.00	Dry						
7.20 - 7.50	B 17		16/04/18 6.00	1700 2.10		7.10-7.20 fine sand and gravel	7.10			
7.50 - 7.95	UT 18	51 blows 100% rec	7.50	Dry	Stiff to very stiff dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of chalk and sandstone.		-2.91			
7.95 - 8.15	D 19									
8.15 - 8.60	SPTS D 20	N=25 (4,4/5,6,7,7)	7.50	Dry						
8.50 - 9.00	B 21									
9.00 - 9.45	UT 22	42 blows 100% rec	9.00	Dry						
9.65 - 10.10	SPTS D 23	N=23 (3,4/5,5,7,6)	9.00	Damp			(4.90)			

Groundwater Entries				Depth Related Remarks				Hard Boring		
No.	Depth	Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used	
1	3.20		Rose to 1.00 m after 20 minutes.	4.15						
2	7.40		Rose to 2.10 m after 20 minutes.	7.20						

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	VPI IMMINGHAM	Borehole	BH4
Scale 1:50	Project No.	A8015-18		
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Borehole Log



Drilled	SS/MB	Start	Equipment, Methods and Remarks	Depth from	to	Diameter	Casing Depth	Ground Level	4.19 mOD
Logged	WH/PC	16/04/2018	Dando 175/Beretta T44. Cable percussion boring./Rotary open hole drilling to 28.50m followed by rotary core drilling (SWF size) using air mist flush.	1.20	24.00	200	16.50	Coordinates (m)	E 516726.70
Checked	TC	End	SPT Hammer ID: AR2068, Rod type: 54mm Whitworth.	24.00	34.60	146	28.60	National Grid	N 417410.38
Approved	TC	20/04/2018							

Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
10.00 - 10.50	B 24				Stiff to very stiff dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of chalk and sandstone.				
10.50 - 10.95	UT 25	40 blows 100% rec	10.50	Dry					
10.95 - 11.15	D 26								
11.15 - 11.60	SPTS D 27	N=24 (3,4/5,6,6,7)	10.50	Dry					
11.50 - 12.00	B 28								
12.00 - 12.45	SPTS D 29	N=33 (4,4/6,7,9,11)	10.50	7.20	Brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of chalk, sandstone and flint.	12.00-12.30 driller notes reddish brown fine sand	12.00 -7.81		3
12.50 - 13.00	B 30					12.50 becomes light brown sandy	(1.40)		
13.50 - 13.95	SPTS D 31	N=37 (5,5/7,10,9,11)	13.50	2.10	Stiff to very stiff light yellowish brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk, mudstone, sandstone and flint.		13.40 -9.21		4
14.00 - 15.00	B 32					14.00-15.00 becoming slightly gravelly clayey sand			
15.00 - 15.45	SPTS D 33	N=16 (3,3/4,3,4,5)	15.00	1.10			(3.70)		5
15.50 - 16.00	B 34					15.50-16.00 sandy clayey gravel			
16.50 - 16.95	SPTS	N=44 (6,8/7,11,13,13)	16.50	1.30					
			17/04/18	1700					
			16.50	1.30					
17.10 - 17.50	B 36		18/04/18	0800	Dark brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to medium of chalk and sandstone.		17.10 -12.91		
			16.50	1.30			(0.70)		
18.00 - 18.45	SPTS D 37	N=13 (2,3/2,3,3,5)			Very stiff greyish brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to medium of chalk and sandstone.		17.80 -13.61		5
18.00 - 18.45	D 37						(1.30)		
18.00 - 19.00	B 38								
19.50 - 19.74	SPTS D 39				Very stiff greyish brown slightly sandy slightly gravelly CLAY with pockets of coarse gravel size extremely weak weathered chalk. Gravel is subrounded fine to coarse of chalk.		19.10 -14.91		
19.50 - 19.70	D 39								

Groundwater Entries			Depth Related Remarks			Hard Boring		
No.	Depth Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used
3	12.00	Rose to 6.95 m after 20 minutes.	12.30	13.50 - 16.50	Water added to assist boring.			
4	13.40	Rose to 4.10 m after 20 minutes.						
5	17.80	Rose to 15.10 m after 20 minutes.						

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	VPI IMMINGHAM	Borehole	BH4
Scale 1:50	Project No.	A8015-18		
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Borehole Log



Drilled	SS/MB	Start	Equipment, Methods and Remarks	Depth from	to	Diameter	Casing Depth	Ground Level	4.19 mOD
Logged	WH/PC	16/04/2018	Dando 175. Beretta T44. Cable percussion boring. Rotary open hole drilling to 28.50m followed by rotary core drilling (SWF size) using air mist flush.	(m)	(m)	(mm)	(m)	Coordinates (m)	E 516726.70
Checked	TC	End	SPT Hammer ID: AR2068, Rod type: 54mm Whitworth.	24.00	24.00	200	16.50	National Grid	N 417410.38
Approved	TC	20/04/2018		24.00	34.60	146	28.60		

Samples and Tests

Depth	TCR SCR ROD	If	Records/Samples	Date Casing	Time Water	Strata Description		Depth, Level (Thickness)	Legend	Backfill
						Main	Detail			
30.00 - 31.50	82 35 11			19/04/18 28.60	1700 0.85	Medium strong to strong white CHALK. Fractures are: 1) subhorizontal, very closely spaced, undulating, rough with occasional grey staining. 2) subvertical, undulating, rough with occasional grey staining.	30.27-30.37 recovered as subangular coarse gravel	30.65	-26.46	
31.50 - 32.10	47 12 0		Flush: 28.50 - 34.60 Air/ mist 100%	20/04/18 28.60	0800 1.00	Strong white CHALK. Fractures are subhorizontal, very closely spaced, undulating, rough with brownish grey staining and rare infill of very soft greyish brown CLAY.	30.51-30.57 recovered as subangular coarse gravel			
32.10 - 33.10	100 46 19	NI 60 180					31.50-31.81 AZCL			
33.10 - 34.10	100 44 15						32.42-32.46 recovered as subangular coarse gravel	(3.95)		
34.10 - 34.60	100 66 30			20/04/18 28.60	1700 1.00		32.64-32.75 recovered as subangular medium to coarse gravel including flint 32.77-33.00 subvertical undulating smooth fracture with clay infill 33.00-33.02 recovered as grey angular to subangular gravel of flint			
						END OF EXPLORATORY HOLE	33.40-33.42 rare subangular coarse gravel of flint 33.80-33.82 recovered as grey angular fine to medium gravel of flint	34.60	-30.41	

Groundwater Entries				Depth Related Remarks				Chiselling Details			
No.	Depth	Strike	Remarks	Depth	Sealed	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used	

Borehole Log



Drilled	GC	Start	17/04/2018	Equipment, Methods and Remarks	Dando 2000. Cable percussion boring. SPT Hammer ID: AR1940, Rod type: 54mm Whitworth.	Depth from (m)	1.20	to (m)	13.00	Diameter (mm)	200	Casing Depth (m)	13.00	Ground Level	4.65 mOD
Logged	WH	End	19/04/2018				13.00		26.10		150		26.00	Coordinates (m)	E 516748.31
Checked	TC													National Grid	N 417439.50
Approved	TC														

Samples and Tests				Strata Description				Depth, Level (Thickness)	Legend	Backfill
Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail				
0.10 - 0.40	D 1 B 2	0.00-1.20 Hand excavated inspection pit.			Dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of chalk and sandstone.		(0.40)			
0.50 - 0.80	D 3 B 4				(TOPSOIL) Firm dark brown slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium of flint.		0.40 +4.25 (0.50)			
1.00 - 1.20 1.20 - 1.65	D 5 B 6 UT 7	35 blows 89% rec		Dry	Firm brown, mottled light grey, slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of chalk, flint and mudstone.		0.90 +3.75			
1.65 - 1.80 1.80 - 2.25 1.80 - 2.25 1.80 - 2.25	D 8 SPTS D 9 B 10	N=16 (2,3/3,4,4,5)		Dry						
2.30 - 2.75	UT 11	38 blows 100% rec	1.70	Dry						
2.75 - 2.90 2.90 - 3.35 2.90 - 3.35 2.90 - 3.35	D 12 SPTS D 13 B 14	N=19 (3,4/4,5,5,5)	1.70	Dry		2.90-4.45 gravel is subangular to subrounded	(3.60)			
3.40 - 3.85	UT 15	32 blows 100% rec	3.00	Dry						
3.85 - 3.90 4.00 - 4.45 4.00 - 4.45 4.00 - 4.45	D 16 SPTS D 17 B 18	N=17 (2,3/4,4,4,5)	3.00	Dry						
4.50 - 4.95 4.50	UT 20 D 19	40 blows 100% rec	4.40	Dry	Firm to stiff dark brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine of chalk, sandstone and mudstone.		4.50 +0.15			
4.95 - 5.10 5.10 - 5.55 5.10 - 5.55 5.10 - 5.55	D 21 SPTS D 22 B 22A	N=13 (2,2/3,3,3,4)	4.40	Dry						
6.50 - 6.95	UT 23	46 blows 100% rec	4.60	Dry						
6.95 - 7.10 7.10 - 7.55 7.10 - 7.55 7.10 - 7.55	D 24 SPTS D 25 B 26	N=15 (2,3/3,4,4,4)	4.60	Dry						
8.00 - 8.45	UT 27	60 blows 100% rec	4.60	Dry						
8.45 - 8.60 8.60 - 9.05 8.60 - 9.05 8.60 - 9.05	D 28 SPTS D 29 B 30	N=29 (3,5/6,7,8,8)	4.60	Dry			(7.90)			
9.50 - 9.95	UT 31	50 blows 100% rec	4.60	Dry						
9.95 - 10.10	D 32									

Groundwater Entries			Depth Related Remarks		Hard Boring			
No.	Depth Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	VPI IMMINGHAM	Borehole	BH5
Scale 1:50	Project No.	A8015-18		
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Borehole Log



Drilled	GC	Start	17/04/2018	Equipment, Methods and Remarks	Dando 2000. Cable percussion boring. SPT Hammer ID: AR1940, Rod type: 54mm Whitworth.	Depth from (m)	1.20	to (m)	13.00	Diameter (mm)	200	Casing Depth (m)	13.00	Ground Level	4.65 mOD
Logged	WH	End	19/04/2018				13.00		26.10		150		26.00	Coordinates (m)	E 516748.31
Checked	TC													National Grid	N 417439.50
Approved	TC														

Samples and Tests					Strata Description				
Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
10.10 - 10.55 10.10 - 10.55 10.10 - 10.55	SPTS D 33 B 34	N=30 (2,4/7,7,8,8)	4.60	Dry	Firm to stiff dark brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine of chalk, sandstone and mudstone.				
11.00 - 11.45	UT 35	60 blows 100% rec	4.60	Dry					
11.45 - 11.60 11.60 - 12.05 11.60 - 12.05 11.60 - 12.05	D 36 SPTS D 37 B 38	N=31 (4,6/7,7,8,9)	4.60	Dry		11.45-12.05 dark brown, gravel is fine to medium			
12.40 12.50 - 12.95 12.50 - 12.95 12.50 - 12.95	W 41 SPTS D 39 B 40	N=32 (4,6/7,7,8,10)	4.60	Dry	Stiff light brown slightly sandy gravelly CLAY. Gravel is subrounded fine to medium of chalk, sandstone and mudstone.		12.40 -7.75		
13.00	D 42		17/04/18 4.60	1800 12.10					
14.00 - 14.45	UT 43	70 blows 100% rec	13.50				(2.10)		
14.45 - 14.60 14.60 - 15.05 14.60 - 15.05 14.60 - 15.05	D 44 SPTS D 45 B 46	N=46 (7,8/9,10,13,14)	13.50		Stiff to very stiff brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of chalk and mudstone.		14.50 -9.85		
15.50 - 15.95	UT 47	100 blows 100% rec	15.00						
15.95 - 16.10 16.10 - 16.48 16.10 - 16.48 16.10 - 16.48	D 48 SPTS D 49 B 50	50 (8,10/13,18,19 for 75mm)	15.00	Dry		16.10 becoming light grey	(3.10)		
17.00 - 17.36 17.00 - 17.36 17.00 - 17.36	SPTS D 51 B 52	50 (10,12/14,17,19 for 65mm)	15.00	Dry					
17.70 17.70 - 18.50	D 53 B 54				Very stiff light grey slightly sandy slightly gravelly CLAY with coarse gravel size pockets of extremely weak chalk. Gravel is subrounded fine to medium of chalk.		17.60 -12.95		
18.50 - 18.86 18.50 - 18.86 18.50 - 18.86	SPTS D 55 B 56	50 (11,13/15,18,17 for 65mm)	18.00	18.00	Very stiff light grey slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of chalk.		18.50 -13.85		

Groundwater Entries				Depth Related Remarks				Hard Boring			
No.	Depth (m)	Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used		
1	12.40		Rose to 12.10 m after 20 minutes. Slow inflow								
2	17.60		Rose to 16.70 m after 20 minutes. Medium inflow	18.00							

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	VPI IMMINGHAM	Borehole	BH5
Scale 1:50	Project No.	A8015-18		
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Borehole Log



Drilled	GC	Start	17/04/2018	Equipment, Methods and Remarks Dando 2000. Cable percussion boring. SPT Hammer ID: AR1940, Rod type: 54mm Whitworth.	Depth from	to	Diameter	Casing Depth	Ground Level	4.65 mOD
Logged	WH	End	19/04/2018		(m)	(m)	(mm)	(m)	Coordinates (m)	E 516748.31
Checked	TC	End	19/04/2018		13.00	26.10	200	13.00	National Grid	N 417439.50
Approved	TC	End	19/04/2018		13.00	26.10	150	26.00		

Samples and Tests					Strata Description				
Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
20.00 - 20.28 20.00 - 20.28 20.00 - 20.28	SPTS D 57 B 58	50 (12,13 for 55mm/20,30 for 75mm)	19.50	19.50	Very stiff light grey slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of chalk.				
21.50 - 21.74 21.50 - 21.74 21.50 - 21.74	SPTS D 59 B 60	50 (20,5 for 15mm/26,24 for 70mm)	21.00	21.00				(7.65)	
23.00 - 23.21 23.00 - 23.21 23.00 - 23.21	SPTS D 61 B 62	50 (18,2 for 20mm/30,20 for 40mm)	22.50	22.00			23.00-23.30 including gravel of sandstone		
24.50 - 24.62 24.50 - 24.62 24.50 - 24.62	SPTS D 63 B 64	45 (25 for 20mm/33,12 for 25mm)	23.50	24.00					
25.60 - 25.72 25.60 - 25.72	SPTS D 65	50 (25 for 50mm/50 for 70mm)	18/04/18 25.00	1800 24.00					
26.10 - 26.15	SPTC	50 (25 for 20mm/50 for 30mm)	19/04/18 26.00	0800 21.00 1530 23.00	END OF EXPLORATORY HOLE		26.15 -21.50		

Groundwater Entries			Depth Related Remarks			Hard Boring		
No.	Depth Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used
						25.40 - 25.60	60	Chisel
						25.70 - 26.10	180	Chisel

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	VPI IMMINGHAM	Borehole	BH5
Scale 1:50	Project No.	A8015-18		
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Borehole Log



Drilled	SS/MB	Start	Equipment, Methods and Remarks	Depth from	to	Diameter	Casing Depth	Ground Level	4.71 mOD
Logged	MJS/IH	05/04/2018	Dando 175/Beretta T44. Cable percussion boring./Rotary core drilling (SWF size) using air mist flush. SPT Hammer ID AR2068, Rod type: 54mm Whitworth.	(m)	(m)	(mm)	(m)	Coordinates (m)	E 516781.85
Checked	TC	End		24.60	34.50	200	24.60	National Grid	N 417525.42
Approved	TC	16/04/2018				146			

Samples and Tests				Strata Description				Depth, Level	Legend	Backfill
Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	(Thickness)			
0.00 - 0.30	B 1	0.00-1.20 Hand excavated inspection pit.			Greyish brown very sandy clayey GRAVEL. Gravel is angular to subrounded fine to coarse of mudstone, sandstone, chalk and brick. (MADE GROUND)		(0.30)			
0.30 - 0.55	B 2						0.30 +4.41			
0.55 - 1.20	B 3				Firm brown, locally greyish brown, slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk, mudstone and sandstone.		(0.30)			
1.20 - 1.65	SPTS D 4	N=14 (1,2/2,4,4,4)	1.20	Dry	Stiff to very stiff brown slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded fine to coarse of predominantly chalk, mudstone, quartz and sandstone and rare coal.		0.60 +4.11			
1.65 - 2.00	B 5									
2.00 - 2.45	UT 6	71 blows 100% rec	1.50							
2.45 - 2.65	D 7						(4.05)			
3.00 - 3.45	SPTS D 8	N=16 (3,4/3,4,4,5)	3.00	Dry						
3.00 - 3.45										
3.50 - 4.00	B 9									
4.00 - 4.45	UT 10	60 blows 100% rec	4.00							
4.45 - 4.65	D 11		05/04/18	1700						
			4.00	2.50						
5.00 - 5.45	SPTS D 12	N=10 (1,1/1,2,3,4)	06/04/18	0800	Firm thinly laminated CLAY with occasional partings of fine sand. Frequent gravel size pockets of fine to coarse sand.		4.65 +0.06			
5.00 - 5.45			4.00	2.00			(0.65)			
5.50 - 6.00	B 13				Stiff to very stiff greyish brown slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded fine to coarse of chalk, mudstone and sandstone.		5.30 -0.59			
6.00 - 6.45	UT 14	71 blows 100% rec	6.00							
6.45 - 6.65	D 15									
7.00 - 7.50	B 16									
7.50 - 7.95	SPTS D 17	N=18 (3,3/4,4,5,5)	7.50	Dry						
7.50 - 7.95										
8.00 - 9.00	B 18									
9.00 - 9.45	UT 19	61 blows 100% rec	9.00				(7.60)			
9.45 - 9.65	D 20									

Groundwater Entries				Depth Related Remarks				Hard Boring		
No.	Depth	Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used	
1	4.65		Rose to 2.50 m after 20 minutes.	5.30						

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	VPI IMMINGHAM	Borehole	BH6
Scale 1:50	Project No.	A8015-18		
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Borehole Log



Drilled	SS/MB	Start	Equipment, Methods and Remarks	Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)	Ground Level	4.71 mOD
Logged	MJS/IH	05/04/2018	Dando 175/Beretta T44. Cable percussion boring./Rotary core drilling (SWF size) using air mist flush. SPT Hammer ID AR2068, Rod type: 54mm Whitworth.	1.20	24.60	200	24.60	Coordinates (m)	E 516781.85
Checked	TC	End		24.60	34.50	146	24.60	National Grid	N 417525.42
Approved	TC	16/04/2018							

Samples and Tests				Strata Description				Depth, Level (Thickness)	Legend	Backfill
Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail				
10.00 - 10.50	B 21				Stiff to very stiff greyish brown slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded fine to coarse of chalk, mudstone and sandstone.					
10.50 - 10.95	SPTS D 22	N=18 (3,3/4,5,4,5)	10.50	Dry						
11.00 - 11.80	B 23				Brown gravelly clayey fine to coarse SAND. Gravel is subangular to subrounded fine to coarse of chalk and flint.					
12.00 - 12.45	SPTS D 24	N=21 (3,4/5,4,6,6)	12.00	4.10			11.80-12.00 occasional gravel size pockets of gravelly fine to coarse sand. Gravel is angular to subangular fine to coarse of chalk			
13.00 - 13.50	B 25				Stiff to very stiff light grey slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse of chalk and rare flint.					
13.50 - 13.95	SPTS D 26	N=4 (1,0/1,1,1,1)	13.50	9.10			13.50 SPT may be affected by groundwater disturbance at base of hole (piping)			
14.00 - 15.00	B 27									
15.00 - 15.45	SPTS D 28	N=34 (6,6/7,9,10,8)	06/04/18 15.00	1630 9.10						
15.00 - 15.45			09/04/18 15.00	0800 10.40						
15.50 - 16.50	B 29									
16.50 - 16.95	SPTS D 30	N=28 (7,7/7,7,7,7)	16.50	14.10						
17.50 - 18.00	B 31									
18.00 - 18.45	SPTS D 32	N=28 (6,7/6,7,7,8)	18.00	Dry						
18.50 - 19.50	B 33									
19.50 - 19.95	SPTS D 34	N=39 (7,8/9,10,10,10)	19.50	Dry						
19.50 - 19.95	B 35									

Groundwater Entries				Depth Related Remarks				Hard Boring		
No.	Depth Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used		
2	11.80	Rose to 3.10 m after 20 minutes.								
3	18.60	Rose to 16.60 m after 20 minutes.	18.70							

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	VPI IMMINGHAM	Borehole	BH6
Scale 1:50	Project No.	A8015-18		
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Borehole Log



Drilled	SS/MB	Start	Equipment, Methods and Remarks	Depth from	to	Diameter	Casing Depth	Ground Level	4.71 mOD
Logged	MJS/IH	05/04/2018	Dando 175/Beretta T44. Cable percussion boring./Rotary core drilling (SWF size) using air mist flush. SPT Hammer ID AR2068, Rod type: 54mm Whitworth.	(m)	(m)	(mm)	(m)	Coordinates (m)	E 516781.85
Checked	TC	End		24.60	24.60	200	24.60	National Grid	N 417525.42
Approved	TC	16/04/2018							

Samples and Tests

Depth	Type & No.	Records	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
21.00 - 21.45 21.00 - 21.45	SPTS D 36	N=33 (4,5/5,9,9,10)	21.00	Dry	Stiff to very stiff light grey slightly sandy gravelly CLAY. Gravel is angular to subangular fine to coarse of chalk and rare flint.				
21.50 - 22.50	B 37				Extremely weak cream CHALK. Recovered as gravelly clay.		21.50 -16.79	4	
22.50 - 22.95 22.50 - 22.95	SPTS D 38	N=44 (7,8/9,10,13,12)	22.00	13.00	Very weak white, locally orangish brown, CHALK. Recovered as subangular fine to coarse gravel to cobbles.		22.50 -17.79		
23.00 - 23.80	B 39		09/04/18 22.00	1700 13.00					
23.80 - 23.91	SPTC	50 (25 for 60mm/50 for 50mm)	22.50	4.00			23.80 -19.89		
24.25 - 24.30	SPTC	50 (25 for 30mm/50 for 20mm)	10/04/18 22.50	1010 4.00					
24.60 - 25.60	95 46 30		13/04/18 22.50	0800 2.60	Weak cream CHALK. Fractures are: 1. Subhorizontal, closely spaced, undulating, rough with dark brown staining. 2. Subvertical, planar, smooth with yellowish brown staining. 3. Incipient fractures are very closely spaced, stepped, striated.		24.60 -19.89		
25.60 - 27.10	95 49 37	NI 100 196				26.85-26.98 1No. subangular cobble of flint 27.02-27.30 AZCL	(2.95)		
27.10 - 28.40	80 21 8	NI NI 90			Weak cream, occasionally speckled black, CHALK. Recovered as slightly silty subangular fine to coarse gravel. Fractures are subhorizontal, closely spaced, undulating, rough with yellowish brown staining.		27.55 -22.84		
28.40 - 29.90	77 30 17	NI 120 170			Weak cream CHALK. Fractures are: 1. Subhorizontal, closely spaced, planar, rough with dark greyish brown staining. 2. Occasionally subvertical, planar, smooth. 3. Incipient fractures are subhorizontal, extremely closely spaced, stepped, rough with occasional dark grey staining.	28.34-28.60 AZCL 28.55 rare subangular coarse gravel of flint 29.59-30.66 1No. cobble of flint 29.75-29.95 AZCL	28.70 -23.99		
		Flush: 24.60 - 34.50 Air/mist 100%					(2.20)		

Depth	TCR	SCR	RQD	If	Records	Date Casing	Time Water	Groundwater Entries	Depth Related Remarks	Hard Boring	Duration (mins)	Tools used
No.	Depth	Strike (m)	Remarks	Depth Sealed (m)	Depths (m)	Remarks						
4	21.50		Rose to 16.10 m after 20 minutes.							23.80 - 24.25	60	Chisel

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	VPI IMMINGHAM	Borehole	BH6
Scale 1:50	Project No.	A8015-18		
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Borehole Log



Drilled	SS/MB	Start	Equipment, Methods and Remarks	Depth from	to	Diameter	Casing Depth	Ground Level	4.71 mOD
Logged	MJS/IH	05/04/2018	Dando 175. Beretta T44. Cable percussion boring. Rotary core drilling (SWF size) using air mist flush. SPT Hammer ID AR2068, Rod type: 54mm Whitworth.	(m)	(m)	(mm)	(m)	Coordinates (m)	E 516781.85
Checked	TC	End		24.60	24.60	200	24.60	National Grid	N 417525.42
Approved	TC	16/04/2018			34.50	146			

Samples and Tests

Depth	TCR SCR ROD	If	Records/Samples	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
29.90 - 31.40	97 63 40					Weak cream CHALK. Fractures are: 1. Subhorizontal, closely spaced, planar, rough with dark greyish brown staining. 2. Occasionally subvertical, planar, smooth. 3. Incipient fractures are subhorizontal, extremely closely spaced, stepped, rough with occasional dark grey staining.	30.90-33.80 dark grey staining is possible mudstone partings (<5mm thick)	30.90 -26.19		
31.40 - 32.90	100 83 67			13/04/18 24.60	1630 2.60	Weak to medium strong cream CHALK. Fractures are: 1. Subhorizontal, closely spaced, undulating, rough and planar, rough with dark grey staining. 2. Rare 45 degree, undulating, rough with dark grey staining. 3. Incipient fractures are subhorizontal, very closely to closely spaced, undulating, striated, stepped, rough.	32.90-34.50 rare angular to subangular fine to coarse gravel of flint, rare incipient fractures are closely spaced	(3.60)		
32.90 - 34.50	94 82 73	NI 150 310		16/04/18 24.60	1100 2.60		33.80-33.89 1No. cobble of chalk and flint conglomerate			
				16/04/18 24.60	1300 0.70	END OF EXPLORATORY HOLE		34.50 -29.79		

Groundwater Entries				Depth Related Remarks				Chiselling Details		
No.	Depth	Strike	Remarks	Depth Sealed	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used	

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	VPI IMMINGHAM	Borehole	BH6
Scale 1:50	Project No.	A8015-18		
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Borehole Log



Drilled MB	Start	Equipment, Methods and Remarks	Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)	Ground Level	6.49 mOD
Logged IH	06/04/2018	Archway Dart Dynamic sampling SPT Hammer ID: DART235, Rod type: quick thread.	1.20	3.60	87		Coordinates (m)	E 516506.21
Checked TC	End		3.60	4.60	55		National Grid	N 417414.94
Approved TC	06/04/2018							

Samples and Tests				Strata Description				Depth, Level (Thickness)	Legend	Backfill
Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water	Main	Detail			
0.00 - 0.50	D 2					Dark brown slightly sandy slightly gravelly CLAY with low cobble content. Gravel is subangular to rounded fine to medium, rarely coarse, of chalk and mudstone with occasional concrete, quartz and flint. Cobbles are subangular of chalk. (MADE GROUND)	0.50 rare rootlets	(0.50)		
0.00 - 0.50	B 1		p 120kPa, r N/A							
0.50	HV					Dark brown, locally mottled black, slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of chalk, mudstone and rare flint. Strong hydrocarbon odour. (MADE GROUND)		0.50	+5.99	
0.50 - 1.20	D 4		p 120kPa, r N/A							
0.50 - 1.20	B 3					Firm reddish brown, occasionally mottled red, slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of chalk and mudstone with occasional flint and rare sandstone.		(0.90)		
1.00	HV		p 120kPa, r N/A							
1.20 - 1.65	SPTS					Firm grey, mottled brown, slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of chalk and mudstone with occasional flint and rare sandstone.		1.40	+5.09	
1.20 - 1.65	D 5		N=10 (2,2/2,2,3,3)							
1.20 - 1.70	B 7					Firm to stiff indistinctly laminated reddish brown, mottled grey, slightly sandy slightly gravelly CLAY. Gravel is angular to subrounded fine to coarse of chalk and mudstone with occasional flint and rare sandstone.		(0.35)		
1.20 - 2.00	L		100% rec, diameter 87mm							
1.30 - 1.50	D 6					Firm dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded fine to medium of chalk.		1.75	+4.74	
1.80 - 2.00	D 8									
2.00 - 2.45	SPTS					Brown fine to medium SAND.		2.00	+4.49	
2.00 - 2.20	D 10		N=26 (3,5/4,5,8,9)							
2.00 - 2.45	D 9					Firm dark brown slightly gravelly sandy CLAY. Gravel is subangular to rounded fine to medium of chalk.		(0.25)		
2.00 - 2.80	B 12		100% rec, diameter 87mm							
2.00 - 2.80	L					4.50-4.60 brown slightly gravelly fine to coarse sand. Gravel is subangular to well rounded fine to medium of chalk and rare quartz		2.40		
2.30 - 2.50	D 11									
2.80 - 3.25	SPTS					END OF EXPLORATORY HOLE		(1.60)		
2.80 - 3.25	D 13		N=20 (4,4/4,4,5,7)							
2.80 - 3.60	L		100% rec, diameter 87mm			Firm dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded fine to medium of chalk.		3.60	+2.89	
3.00 - 3.20	D 14									
3.40 - 3.60	D 15					Brown fine to medium SAND.		(0.60)		
3.60 - 4.05	SPTS		N=20 (4,5/4,4,5,7)							
3.60 - 3.80	D 16					Firm dark brown slightly gravelly sandy CLAY. Gravel is subangular to rounded fine to medium of chalk.		4.20	+2.29	
3.60 - 4.05	D 17		75% rec, diameter 55mm							
3.60 - 4.60	L					4.50-4.60 brown slightly gravelly fine to coarse sand. Gravel is subangular to well rounded fine to medium of chalk and rare quartz		(0.40)		
4.20 - 4.40	D 18									
4.50 - 4.60	D 19					END OF EXPLORATORY HOLE		4.60	+1.89	
4.60 - 5.05	SPTS		N=16 (3,3/3,4,4,5)							
4.60 - 5.05	D 20			06/04/18	1200			(0.45)		
								5.05	+1.44	

Groundwater Entries			Depth Related Remarks			Chiselling Details		
No.	Depth Strike	Remarks	Depth Sealed	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used
1	4.20			0.00 - 1.20	Hand excavated inspection pit.			

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	VPI IMMINGHAM	Borehole	WS1
Scale 1:50	Project No.	A8015-18		
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Borehole Log



Drilled MB	Start	Equipment, Methods and Remarks	Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)	Ground Level	5.46 mOD
Logged IH	10/04/2018	Archway Dart. Dynamic sampling. SPT Hammer ID: DART235, Rod type: quick thread.	1.20	1.70	87		Coordinates (m)	E 516529.35
Checked TC	End		1.70	2.50	77		National Grid	N 417368.31
Approved TC	10/04/2018		2.50	3.30	67			

Samples and Tests				Strata Description				Depth, Level (Thickness)	Legend	Backfill
Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water	Main	Detail			
0.00 - 0.50	D 2					Brown, mottled orange and grey, slightly sandy slightly gravelly CLAY. Gravel is subangular to rounded fine to coarse of mudstone and sandstone. Strong oil/hydrocarbon odour. (MADE GROUND)	0.50 rare angular to subrounded fine to medium gravel of flint and sandstone with rare chalk	(1.20)	+4.26	
0.00 - 0.50	B 1		p 120kPa, r N/A							
0.25	HV									
0.50	HV		p 120kPa, r N/A							
0.50 - 1.20	D 4									
0.50 - 1.20	B 3									
1.00	HV		p 120kPa, r N/A							
1.20 - 1.65	SPTS		N=16 (2,2/3,3,5,5)							
1.20 - 1.40	D 5									
1.20 - 1.65	D 6									
1.20 - 1.70	B 8									
1.20 - 1.70	L		100% rec, diameter 87mm							
1.50 - 1.70	D 7									
1.70 - 2.15	SPTS		N=28 (3,3/5,8,7,8)							
1.70 - 2.15	D 9									
1.70 - 2.50	B 11									
1.70 - 2.50	L		100% rec, diameter 77mm							
2.20 - 2.40	D 10									
2.40 - 2.50	D 12									
2.50 - 2.95	SPTS		N=22 (2,4/4,5,6,7)							
2.50 - 2.95	D 13									
2.50 - 3.10	B 16									
2.50 - 3.30	L		100% rec, diameter 67mm							
2.85 - 3.10	D 14									
3.10 - 3.30	D 15									
3.30 - 3.75	SPTS		N=26 (3,5/5,5,8,8)							
3.30 - 3.75	D 17			10/04/18	1100	Firm indistinctly laminated dark brown, mottled grey, CLAY.	1.50-2.50 indistinctly laminated	(1.30)		
						Firm yellowish dark brown, mottled grey, slightly sandy slightly gravelly CLAY. Gravel is angular to subangular fine to medium of chalk, flint and sandstone.	2.30 gravel size pocket of dark grey fine sand	(0.60)	+2.96	
						Firm dark brown slightly gravelly sandy CLAY. Gravel is subangular to subrounded fine to medium of chalk and sandstone.	2.85-3.10 gravel size pockets of fine sand	(0.20)	+2.36	
						END OF EXPLORATORY HOLE		(0.45)	+2.16	
									+1.71	

Groundwater Entries				Depth Related Remarks				Chiselling Details			
No.	Depth	Strike	Remarks	Depth Sealed	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used		
					0.00 - 1.20	Hand excavated inspection pit.					
					0.00 - 3.75	No groundwater encountered during drilling.					

Borehole Log



Drilled MB	Start	Equipment, Methods and Remarks	Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)	Ground Level	5.10 mOD
Logged IH	06/04/2018	Archway Dart Dynamic sampling SPT Hammer ID: DART235, Rod type: quick thread.	1.20	2.00	87		Coordinates (m)	E 516586.01
Checked TC	End		2.00	3.00	77		National Grid	N 417401.62
Approved TC	06/04/2018		3.00	3.60	57			

Samples and Tests

Depth	TCR SCR ROD	If	Records/Samples	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.00 - 0.50	D 2					Brown, occasionally mottled grey, slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk and mudstone with rare flint and occasional rootlets. (MADE GROUND)				
0.00 - 0.50	B 1		p 120kPa, r N/A				0.50 dark brown	(1.40)		
0.50	HV		p 120kPa, r N/A							
0.50 - 1.20	D 4									
0.50 - 1.20	B 3									
1.00	HV		p 120kPa, r N/A							
1.20 - 1.65	SPTS		N=19 (2,3/4,5,5,5)				1.35-1.40 layer of brick, recovered as subangular medium to coarse gravel	1.40 +3.70		
1.20 - 1.40	D 5						1.60 pocket of sandy clay (30mm diameter)			
1.20 - 1.65	D 6						2.00-2.40 sandy	(1.60)		
1.20 - 2.00	B 8		100% rec, diameter 87mm				2.40 indistinctly laminated			
1.20 - 2.00	L						2.70 thinly laminated			
1.60 - 1.80	D 7									
2.00 - 2.45	SPTS		N=22 (3,4/5,5,6,6)			Medium dense orangish brown fine to coarse SAND.	3.00 +2.10			
2.00 - 2.20	D 10						(0.60)			
2.00 - 2.45	D 9									
2.00 - 3.00	L		75% rec, diameter 77mm							
2.40 - 2.60	D 11									
2.80 - 3.00	D 12									
3.00 - 3.45	SPTS		N=20 (2,3/4,5,5,6)							
3.00 - 3.20	D 13									
3.00 - 3.45	D 14									
3.00 - 3.50	B 16									
3.00 - 3.60	L		83% rec, diameter 57mm							
3.50 - 3.60	D 15									
3.60 - 4.05	SPTS		N=15 (3,3/3,4,4,4)	06/04/18	1500	Firm dark brown slightly gravelly sandy CLAY. Gravel is subangular to rounded fine to medium of chalk and mudstone.	3.60 +1.50			
3.60 - 4.05	D 17						(0.45)			
						END OF EXPLORATORY HOLE	4.05 +1.05			

Groundwater Entries			Depth Related Remarks			Chiselling Details		
No.	Depth Strike	Remarks	Depth Sealed	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used
1	3.00			0.00 - 1.20	Hand excavated inspection pit.			

Borehole Log



Drilled MB	Start	Equipment, Methods and Remarks	Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)	Ground Level	4.70 mOD
Logged IH	10/04/2018	Archway Dart. Dynamic sampling.	1.20	2.00	87		Coordinates (m)	E 516626.81
Checked TC	End	SPT Hammer ID: DART235, Rod type: quick thread.	2.00	3.00	77		National Grid	N 417337.47
Approved TC	10/04/2018		3.00	5.00	67			

Samples and Tests				Strata Description				Depth, Level (Thickness)	Legend	Backfill
Depth	TCR SCR RQD	If	Records/Samples	Date Casing	Time Water	Main	Detail			
0.00 - 1.20	D 2					Firm dark brown, mottled grey and black, slightly sandy slightly gravelly CLAY with low cobble content and occasional rootlets. Gravel is subangular to subrounded fine to coarse of mudstone, chalk, sandstone and occasional brick fragments. Cobble is subangular of chalk. (MADE GROUND) Firm, becoming stiff, greyish brown slightly sandy slightly gravelly CLAY. Gravel is subangular to well rounded fine to coarse of mudstone with occasional sandstone and flint.				
0.00 - 1.20	B 1									
0.25	HV		p 110kPa, r N/A							
0.50	HV		p 100kPa, r N/A							
1.00	HV		p 100kPa, r N/A							
1.20 - 1.65	SPTS		N=9 (1,2/2,2,3)					1.20 soft	1.25	+3.45
1.20 - 1.25	D 3									
1.20 - 1.65	D 4									
1.20 - 2.00	L		100% rec, diameter 87mm							
1.25 - 1.80	B 7									
1.50 - 1.70	D 5									
1.80 - 2.00	D 6									
2.00 - 2.45	SPTS		N=20 (3,4/5,4,5,6)					1.80 brown mottled grey. Gravel is chalk and occasional mudstone		
2.00 - 2.45	D 8									
2.00 - 3.00	B 11									
2.00 - 3.00	L		88% rec, diameter 77mm				2.35-5.45 indistinctly laminated			
2.20 - 2.40	D 9						2.65-5.45 rare gravel			
2.80 - 3.00	D 10									
3.00 - 3.45	SPTS		N=24 (3,4/5,6,6,7)							
3.00 - 3.20	D 12									
3.00 - 3.45	D 13									
3.00 - 4.00	L		85% rec, diameter 67mm				3.35-5.45 soft, gravelly. Gravel is subangular to subrounded fine to medium of chalk and mudstone with rare sandstone and flint	(4.20)		
3.75 - 3.85	D 14									
4.00 - 4.45	SPTS		N=23 (4,4/4,5,6,8)				3.40 dark brown			
4.00 - 4.45	D 15						3.75 firm			
4.00 - 5.00	L		Diameter 67mm				4.00-4.45 occasional gravel size pockets of sand			
5.00 - 5.45	SPTS		N=19 (4,4/4,4,5,6)							
5.00 - 5.45	D 16			10/04/18	1300					
END OF EXPLORATORY HOLE								5.45	-0.75	

Groundwater Entries				Depth Related Remarks				Chiselling Details		
No.	Depth	Strike	Remarks	Depth Sealed	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used	
					0.00 - 1.20	Hand excavated inspection pit.				
					0.00 - 5.45	No groundwater encountered during drilling.				

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	VPI IMMINGHAM	Borehole	WS5
Scale 1:50	Project No.	A8015-18		
© Copyright SOCOTEC UK Limited	Carried out for	AECOM		Sheet 1 of 1
14/08/2018 13:47:33				

Borehole Log



Drilled MB	Start	Equipment, Methods and Remarks	Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)	Ground Level	5.69 mOD
Logged WH	11/04/2018	Archway Dart Dynamic sampling SPT Hammer ID: DART235, Rod type: quick thread.	1.20	3.00	87		Coordinates (m)	E 516668.52
Checked TC	End		3.00	4.00	77		National Grid	N 417414.78
Approved TC	11/04/2018		4.00	5.00	67			

Samples and Tests

Depth	TCR SCR ROD	If	Records/Samples	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.00 - 1.20	B 1					Brown sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk, mudstone and sandstone. (MADE GROUND)				
0.25	HV		p 90kPa, r N/A							
0.50	HV		p 90kPa, r N/A							
0.60	D 2							(1.70)		
1.00	HV		p 90kPa, r N/A							
1.20 - 1.65	SPTS		N=8 (1,1/3,1,1,3)				1.20-1.30 1No. subrounded cobble of chalk			
1.20 - 1.65	D 3									
1.20 - 2.00	L		94% rec, diameter 87mm				1.40-1.50 dark greyish brown clay			
1.30 - 1.70	B 5							1.70	+3.99	
1.50	D 4									
1.70 - 2.00	B 7									
1.80	D 6									
2.00 - 2.45	SPTS		N=22 (3,3/4,6,5,7)			Firm to stiff brown, occasionally mottled grey, slightly sandy slightly gravelly CLAY. Gravel is subangular fine to coarse of chalk, flint and sandstone.				
2.00 - 2.45	D 8									
2.00 - 3.00	B 10									
2.00 - 3.00	L		100% rec, diameter 87mm					(1.99)		
2.50	D 9									
2.80 - 3.25	SPTS		N=21 (4,4/5,4,6,6)							
2.80 - 3.25	D 11									
3.00 - 3.60	B 13									
3.00 - 4.00	L		100% rec, diameter 77mm							
3.50	D 12									
3.80 - 4.25	SPTS		N=29 (5,8/8,7,7,7)			Soft brown CLAY	3.69-3.80 light brown fine to coarse sand pocket	3.69	+2.00	
3.80	D 14							(0.31)		
3.80 - 4.25	D 15									
4.00 - 5.00	L		70% rec, diameter 67mm			Medium dense light brown gravelly slightly clayey fine to coarse SAND with rare pockets of gravelly clay. Gravel is subangular coarse of sandstone.		4.00	+1.69	
4.30 - 5.00	B 17									
4.50	D 16									
5.00 - 5.45	SPTS		N=19 (4,4/5,4,5,5)	11/04/18	1100					
								(1.45)		
						END OF EXPLORATORY HOLE		5.45	+0.24	

Groundwater Entries			Depth Related Remarks			Chiselling Details		
No.	Depth Strike	Remarks	Depth Sealed	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used
1	4.00			0.00 - 1.20	Hand excavated inspection pit.			

Borehole Log



Drilled MB	Start	Equipment, Methods and Remarks	Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)	Ground Level	5.79 mOD
Logged WH	11/04/2018	Archway Dart. Dynamic sampling. SPT Hammer ID: DART235, Rod type: quick thread.	1.20	3.00	87		Coordinates (m)	E 516708.48
Checked TC	End		3.00	4.00	77		National Grid	N 417492.50
Approved TC	11/04/2018		4.00	5.00	67			

Samples and Tests

Depth	TCR SCR ROD	If	Records/Samples	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.00 - 0.30	B 1					Brown slightly gravelly sandy CLAY with rootlets and low cobble content. Gravel is subangular fine to coarse of chalk and sandstone. Cobbles are subrounded of chalk. (TOPSOIL)	0.50-0.70 pockets of dark greyish brown clay	(0.30)		
0.20	D 2									
0.30 - 0.80	B 3									
0.50	D 4									
0.80 - 1.20	B 5					Light brown sandy gravelly CLAY with low cobble content. Gravel is subangular fine to coarse of sandstone. Cobbles are subrounded of chalk. (MADE GROUND)	0.50-0.70 pockets of dark greyish brown clay	(0.90)		
0.90	D 6									
1.20 - 1.65	SPTS D 7		N=6 (3,3/2,2,1,1)			Soft greyish brown slightly sandy CLAY with rare subrounded fine to medium gravel of chalk.	0.50-0.70 pockets of dark greyish brown clay	1.20		
1.20 - 1.80	B 9									
1.20 - 2.00	L D 8		100% rec, diameter 87mm			Firm, becoming stiff, brown, mottled light grey, slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of chalk.	0.50-0.70 pockets of dark greyish brown clay	(0.60)		
1.50	D 8									
1.80 - 2.00	B 11									
1.90	D 10									
2.00 - 2.45	SPTS D 12		N=19 (3,4/4,4,5,6)			Firm, becoming stiff, brown, mottled light grey, slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of chalk.	0.50-0.70 pockets of dark greyish brown clay	1.80		
2.00 - 2.45	D 12									
2.00 - 3.00	L		80% rec, diameter 87mm			Firm, becoming stiff, brown, mottled light grey, slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of chalk.	0.50-0.70 pockets of dark greyish brown clay	+3.99		
2.40 - 3.00	B 14									
2.80	D 13									
3.00 - 3.45	SPTS D 15		N=23 (4,5/5,6,6,6)							
3.00 - 3.45	D 15					Firm, becoming stiff, brown, mottled light grey, slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of chalk.	0.50-0.70 pockets of dark greyish brown clay	(3.20)		
3.00 - 4.00	L		40% rec, diameter 77mm							
3.60 - 4.00	B 17					Firm, becoming stiff, brown, mottled light grey, slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of chalk.	0.50-0.70 pockets of dark greyish brown clay			
3.80	D 16									
4.00 - 4.45	SPTS D 18		N=23 (5,5/5,6,6,6)							
4.00 - 4.45	D 18									
4.00 - 5.00	L		90% rec, diameter 67mm			Firm, becoming stiff, brown, mottled light grey, slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of chalk.	0.50-0.70 pockets of dark greyish brown clay			
4.60 - 5.00	B 20									
4.90	D 19					Medium dense light brown gravelly fine to coarse SAND. Gravel is subrounded coarse of igneous rock and chalk.	0.50-0.70 pockets of dark greyish brown clay	5.00		
5.00 - 5.45	SPTS D 21		N=18 (5,5/5,4,5,4)	11/04/18	1300					
5.00 - 5.45	D 21					END OF EXPLORATORY HOLE		(0.45)		
								+0.79		
								(0.45)		
								+0.34		

Groundwater Entries			Depth Related Remarks		Chiselling Details			
No.	Depth Strike	Remarks	Depth Sealed	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used
1	5.00			0.00 - 1.20	Hand excavated inspection pit.			
				0.00 - 1.00	Material too granular for hand vane testing.			

Borehole Log



Drilled MB	Start	Equipment, Methods and Remarks	Depth from (m)	to (m)	Diameter (mm)	Casing Depth (m)	Ground Level	4.53 mOD
Logged WH	11/04/2018	Archway Dart. Dynamic sampling.	1.20	2.00	87		Coordinates (m)	E 516813.22
Checked TC	End	SPT Hammer ID: DART235, Rod type: quick thread.	2.00	3.00	77		National Grid	N 417461.78
Approved TC	11/04/2018		3.00	4.00	67			

Samples and Tests

Depth	TCR SCR ROD	If	Records/Samples	Date Casing	Time Water	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.00 - 1.20	B 1					Brown slightly sandy slightly gravelly CLAY with rootlets. Gravel is subangular fine to medium of sandstone. (MADE GROUND)		(1.35)		
0.25	HV		p 120kPa, r N/A							
0.50	HV		p 120kPa, r N/A							
0.60	D 2									
1.00	HV		p 120kPa, r N/A							
1.20 - 1.65	SPTS D 3		N=12 (1,1/3,3,3,3)					1.35	+3.18	
1.20 - 2.00	L		100% rec, diameter 87mm			Firm brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of chalk and sandstone.		(0.35)		
1.35 - 1.70	B 5							1.70	+2.83	
1.50	D 4									
1.70	D 6									
1.70 - 2.00	B 7					Firm brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to medium of chalk and sandstone.				
2.00 - 2.45	SPTS D 8		N=18 (3,4/4,4,5,5)							
2.00 - 2.45	L		40% rec, diameter 77mm							
2.00 - 3.00										
2.70	D 9									
2.70 - 3.00	B 10							(2.00)		
3.00 - 3.45	SPTS D 11		N=12 (3,3/3,2,3,4)							
3.00 - 3.45	L		30% rec, diameter 67mm							
3.00 - 4.00										
3.70	D 12					Soft brown CLAY.		3.70	+0.83	
4.00 - 4.45	SPTS D 13		N=14 (3,3/3,3,4,4)					(0.75)		
4.00 - 4.45				11/04/18	1500					
						END OF EXPLORATORY HOLE		4.45	+0.08	

Groundwater Entries				Depth Related Remarks		Chiselling Details			
No.	Depth	Strike	Remarks	Depth Sealed	Depths (m)	Remarks	Depths (m)	Duration (mins)	Tools used
					0.00 - 1.20	Hand excavated inspection pit.			
					0.00 - 4.45	No groundwater encountered during drilling.			

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column.	Project	VPI IMMINGHAM	Borehole	WS8
Scale 1:50	Project No.	A8015-18		
© Copyright SOCOTEC UK Limited	Carried out for	AECOM		Sheet 1 of 1
14/08/2018 13:47:34				

Trial Pit Log



Logged WH Checked TC Approved TC	Start 11/04/2018 End 11/04/2018	Equipment, Methods and Remarks Tracked 360 excavator. Machine excavated.	Dimension and Orientation Width 0.60 m Length 4.00 m 	Ground Level 6.33 mOD Coordinates (m) E 516544.31 National Grid N 417427.12
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Samples and Tests Strata Description

Depth	Type & No.	Records	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.10 0.10 - 0.30	D1 B2		Dark brown sandy clayey subangular to subrounded fine to coarse GRAVEL of sandstone, chalk, clinker, macadam and slag with low cobble content. Cobbles are subrounded to subangular of concrete and chalk. (MADE GROUND)		(0.50) +5.83		
0.70 0.70 - 0.90	D3 B4		Firm dark greyish brown, mottled black, slightly sandy gravelly CLAY. Gravel is subangular to subrounded of brick, clinker, sandstone, flint and chalk. Strong oil/hydrocarbon odour. (MADE GROUND)		(0.60) +5.23		
1.20 1.20 1.20 - 1.50	HV D5 B6	p 120kPa, r N/A	Stiff brown, mottled grey, slightly sandy gravelly CLAY. Gravel is subrounded fine to medium of chalk and sandstone.		(1.40) +3.83		
2.00 2.00 2.00 - 2.20	HV D7 B8	p 120kPa, r N/A	Firm brown, mottled light grey, slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of predominantly chalk with sandstone.		(1.40) +2.43		
3.40 - 3.60 3.50	B10 D9	11/04/18 Dry					
			END OF EXPLORATORY HOLE				

Groundwater Entries No. Depth Strike (m) Remarks	Remarks Depth (m) Remarks 0.00 - 3.90 No groundwater encountered during excavation.	Stability Stable Shoring None Weather Overcast
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Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 © Copyright SOCOTEC UK Limited 	Project VPI IMMINGHAM Project No. A8015-18 Carried out for AECOM	Trial Pit <h3>TP1</h3> Sheet 1 of 1
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Trial Pit Log



Logged WH Checked TC Approved TC	Start 11/04/2018 End 11/04/2018	Equipment, Methods and Remarks Tracked 360 excavator. Machine excavated.	Dimension and Orientation Width 0.60 m Length 4.00 m 	Ground Level 5.70 mOD Coordinates (m) E 516559.56 National Grid N 417394.29
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Samples and Tests Strata Description

Depth	Type & No.	Records	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.10 - 0.30	B2		Soft dark brown slightly gravelly sandy CLAY with low cobble content and rootlets. Gravel is subangular to subrounded fine to coarse of chalk, flint, sandstone and debris including metal bolts, wood and concrete. Cobbles are subrounded of chalk.		(0.30)		
0.20	D1		(MADE GROUND)		0.30 +5.40		
0.30	D3		Firm dark brown, mottled black, slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk, sandstone and flint. Strong oil/hydrocarbon odour.		(0.30)		
0.30 - 0.50	B4		(MADE GROUND)		0.60 +5.10		
			Firm brown, mottled light grey, slightly sandy slightly gravelly CLAY with low cobble content. Gravel is subangular to subrounded fine to coarse of predominantly chalk with sandstone and flint. Cobbles are subrounded of chalk.	0.60-0.90 firm light brown slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk, sandstone and flint			
1.30	HV	p 120kPa, r N/A					
1.30	D5						
1.30 - 1.50	B6						
					(2.90)		
2.30 - 2.50	B8						
2.50	D7						
3.10	HV	p 120kPa, r N/A					
3.40	D9						
3.40 - 3.50	B10			3.20-3.50 becoming grey with less gravel			
			Light brown clayey, locally very clayey, fine to medium SAND.		3.50 +2.20		
					(0.90)		
4.00	D11						
4.00 - 4.20	B12						
		11/04/18	Dry				
4.40	HV	p 120kPa, r N/A			4.40 +1.30		
4.40	D13				(0.10)		
4.40 - 4.50	B14		Firm dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of chalk.		4.50 +1.20		
			END OF EXPLORATORY HOLE				

Groundwater Entries No. Depth Strike (m) Remarks	Remarks Depth (m) Remarks 0.00 - 4.50 No groundwater encountered during excavation. 0.00 - 3.50 Material too friable for hand vane testing.	Stability Stable Shoring None Weather Overcast
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Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 © Copyright SOCOTEC UK Limited 	Project VPI IMMINGHAM Project No. A8015-18 Carried out for AECOM	Trial Pit <div style="text-align: center;">TP2</div> Sheet 1 of 1
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Trial Pit Log



Logged WH Checked TC Approved TC	Start 10/04/2018 End 10/04/2018	Equipment, Methods and Remarks Tracked 360 excavator. Machine excavated.	Dimension and Orientation Width 0.60 m Length 4.00 m 	Ground Level 4.41 mOD Coordinates (m) E 516568.48 National Grid N 417297.43
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Samples and Tests Strata Description

Depth	Type & No.	Records	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.10 0.10 - 0.20	D1 B2		Soft dark brown slightly sandy slightly gravelly CLAY with frequent rootlets. Gravel is subangular to subrounded fine to medium of sandstone, chalk and flint. (MADE GROUND)	0.20-0.40 light brown, mottled orangish brown	(0.20) 0.20 +4.21		
0.50 0.50 - 0.80	HV D3 B4	p 120kPa, r N/A	Firm light brown, mottled grey, slightly sandy gravelly CLAY with low cobble content. Gravel is subrounded fine to medium of predominantly chalk with sandstone and mudstone. Cobbles are subrounded of flint and chalk.		(2.30)		
1.80 1.80 - 2.00	D5 B6						
2.50 2.50 - 2.80	HV D7 B8	p 120kPa, r N/A	Firm brown CLAY.		2.50 +1.91 (0.30)		
			Dark brown slightly clayey fine to coarse SAND.		2.80 +1.61 (0.80)		
3.40 3.40 - 3.60	D9 B10				3.60 +0.81		
4.00 4.00 - 4.20	D11 B12		Soft dark brown very sandy CLAY with occasional gravel size pockets of sand.		(0.90)		
		10/04/18 Dry					
			END OF EXPLORATORY HOLE		4.50 -0.09		

Groundwater Entries No. Depth Strike (m) Remarks	Remarks Depth (m) Remarks 0.00 - 4.50 No groundwater encountered during excavation.	Stability Face A and E collapsed from 2.80m Shoring None Weather Overcast
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Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 © Copyright SOCOTEC UK Limited 	Project VPI IMMINGHAM Project No. A8015-18 Carried out for AECOM	Trial Pit <div style="text-align: center; font-size: 24pt; font-weight: bold;">TP3</div> Sheet 1 of 1
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Trial Pit Log



Logged WH Checked TC Approved TC	Start 09/04/2018 End 10/04/2018	Equipment, Methods and Remarks Tracked 360 excavator Machine excavated pit	Dimension and Orientation Width 0.60 m Length 4.00 m 	Ground Level 4.47 mOD Coordinates (m) E 516556.55 National Grid N 417325.06
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Samples and Tests Strata Description

Depth	Type & No.	Records	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.10 0.10 - 0.30	D1 B2	09/04/18	Dark brown slightly sandy slightly gravelly CLAY with frequent rootlets. Gravel is subangular to subrounded fine to medium of sandstone, chalk and flint. (MADE GROUND)		(0.30)		
			Firm brown, mottled light grey, slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse of predominantly chalk with sandstone, mudstone and flint.		0.30 +4.17		
0.80 0.80 - 1.00	D3 B4			1.10 land drain	(1.10)		1
1.40 1.40 1.40 - 1.60	HV D5 B6	p 120kPa, r N/A	Firm brown, mottled light grey, CLAY.		1.40 +3.07		
				2.60-3.00 grey mottled brown	(2.00)		
3.00 3.00 - 3.20	D7 B8			3.00-3.40 brown slightly gravelly clayey sand. Gravel is subangular fine to coarse of chalk			
3.40 3.50	B10 D9		Firm brown slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to medium of chalk, flint and sandstone.		3.40 +1.07		
4.00 4.00 - 4.30	D11 B12	10/04/18			(1.10)		
			END OF EXPLORATORY HOLE		4.50 -0.03		

Groundwater Entries <table border="1"> <tr> <th>No.</th> <th>Depth</th> <th>Strike (m)</th> <th>Remarks</th> </tr> <tr> <td>1</td> <td>1.10</td> <td></td> <td>Seepage</td> </tr> </table>	No.	Depth	Strike (m)	Remarks	1	1.10		Seepage	Remarks <table border="1"> <tr> <th>Depth (m)</th> <th>Remarks</th> </tr> <tr> <td></td> <td></td> </tr> </table>	Depth (m)	Remarks			Stability Stable Shoring None Weather overcast
No.	Depth	Strike (m)	Remarks											
1	1.10		Seepage											
Depth (m)	Remarks													

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 © Copyright SOCOTEC UK Limited 14/08/2018 13:48:24	Project VPI IMMINGHAM Project No. A8015-18 Carried out for AECOM	Trial Pit <h1>TP4</h1> Sheet 1 of 1
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Trial Pit Log



Logged WH Checked TC Approved TC	Start 10/04/2018 End 10/04/2018	Equipment, Methods and Remarks Tracked 360 excavator. Machine excavated.	Dimension and Orientation Width 0.60 m Length 4.00 m 	Ground Level 4.31 mOD Coordinates (m) E 516595.86 National Grid N 417316.85
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Samples and Tests			Strata Description				
Depth	Type & No.	Records	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.10 0.10 - 0.20	D1 B2	p 120kPa, r N/A	Soft dark brown slightly sandy slightly gravelly CLAY with frequent rootlets. Gravel is subangular to subrounded fine to medium of sandstone, chalk and flint. (MADE GROUND)	0.60-0.90 soft light yellowish brown slightly sandy clay	(0.30)		
0.50 0.50 - 0.70	HV D3 B4		Firm brown, mottled grey, gravelly slightly sandy CLAY with low cobble content. Gravel is subrounded fine to medium of chalk, flint and mudstone. Cobbles are subangular of chalk.		1.20 land drain		
1.50 1.50 - 1.70	HV D5 B6	p 120kPa, r N/A	Stiff bluish grey, mottled brown, CLAY.		(1.40)		
2.00 2.00 - 2.20	D7 B8				1.70 +2.61		
2.50 2.50 - 2.70	D9 B10		Light brown slightly clayey to clayey fine to medium SAND. Rare angular fine gravel of mudstone.		(0.80)		
		10/04/18			2.50 +1.81		
			END OF EXPLORATORY HOLE		(0.50)		
					3.00 +1.31		

Groundwater Entries No. Depth Strike (m) Remarks 1 1.20 Seepage	Remarks Depth (m) Remarks	Stability Faces A and C collapsed Shoring None Weather Overcast
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Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 © Copyright SOCOTEC UK Limited 	Project VPI IMMINGHAM Project No. A8015-18 Carried out for AECOM	Trial Pit <h2>TP5</h2> Sheet 1 of 1
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Trial Pit Log



Logged WH Checked TC Approved TC	Start 10/04/2018 End 10/04/2018	Equipment, Methods and Remarks Tracked 360 excavator. Machine excavated.	Dimension and Orientation Width 0.60 m Length 4.00 m 	Ground Level 5.43 mOD Coordinates (m) E 516601.66 National Grid N 417379.51
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Samples and Tests Strata Description

Depth	Type & No.	Records	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.10 0.10 - 0.30	D1 B2		Dark brown slightly gravelly clayey SAND with medium cobble content. Gravel is subangular fine to coarse of clinker, chalk and macadam. Cobbles are subrounded of chalk. (MADE GROUND)		(0.30)		
0.40 - 0.60 0.50	B4 D3		Firm dark brown, mottled orangish brown, slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of chalk and flint. (MADE GROUND)		0.30 +5.13 (0.30)		
1.00 1.00 - 1.20	D5 B6		Firm light brown slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of flint, chalk, mudstone and sandstone.	0.60-1.20 brown mottled grey gravelly clay	0.60 +4.83		
1.50	HV	p 120kPa, r N/A		1.20 land drain			
2.00	HV	p 120kPa, r N/A			(3.50)		1 ∞
2.50 2.50 - 3.00	D7 B8						
4.10 4.10 - 4.30	D9 B10		Firm dark brown sandy CLAY with occasional gravel size pockets of sand.		4.10 +1.33 (0.50)		
		10/04/18					
			END OF EXPLORATORY HOLE		4.60 -0.83		

Groundwater Entries <table border="1"> <thead> <tr> <th>No.</th> <th>Depth</th> <th>Strike (m)</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1.90</td> <td></td> <td>Seepage</td> </tr> </tbody> </table>	No.	Depth	Strike (m)	Remarks	1	1.90		Seepage	Remarks <table border="1"> <thead> <tr> <th>Depth (m)</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> </tbody> </table>	Depth (m)	Remarks			Stability Stable Shoring None Weather Overcast
No.	Depth	Strike (m)	Remarks											
1	1.90		Seepage											
Depth (m)	Remarks													

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 © Copyright SOCOTEC UK Limited 14/08/2018 13:48:25	Project VPI IMMINGHAM Project No. A8015-18 Carried out for AECOM	TP6 Sheet 1 of 1
--	---	----------------------------

Trial Pit Log



Logged WH Checked TC Approved TC	Start 10/04/2018 End 10/04/2018	Equipment, Methods and Remarks Tracked 360 excavator. Machine excavated.	Dimension and Orientation Width 0.60 m Length 4.00 m 	Ground Level 5.29 mOD Coordinates (m) E 516616.25 National Grid N 417423.18
---	--	---	---	--

Samples and Tests Strata Description

Depth	Type & No.	Records	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.10 - 0.30	B2		Soft brown sandy slightly gravelly CLAY with frequent rootlets. Gravel is subrounded fine to medium of chalk. (TOPSOIL)		(0.30)		
0.20	D1		Soft brown slightly gravelly sandy CLAY. Gravel is subangular to subrounded fine to medium of chalk sandstone and flint.		0.30 +4.99		
1.30	HV	p 120kPa, r N/A		1.10 soft orangish brown sandy clay	(2.60)		1
1.30	D3			1.10 land drain			
1.30 - 1.60	B4						
3.50	D5		Brown clayey fine to coarse SAND.		2.90 +2.39		
3.50 - 3.80	B6				(0.90)		
4.00	D7	10/04/18	Firm dark greyish brown CLAY.		3.80 +1.49		
4.00 - 4.20	B8				(0.40)		
			END OF EXPLORATORY HOLE		4.20 +1.09		

Groundwater Entries No. Depth Strike (m) Remarks 1 1.10 Seepage	Remarks Depth (m) Remarks	Stability Faces A and C collapsed from 2.90m Shoring None Weather Overcast
--	--	---

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 Copyright SOCOTEC UK Limited 	Project VPI IMMINGHAM Project No. A8015-18 Carried out for AECOM	Trial Pit <h3>TP7</h3> Sheet 1 of 1
--	---	--

Trial Pit Log



Logged WH Checked TC Approved TC	Start 10/04/2018 End 10/04/2018	Equipment, Methods and Remarks Tracked 360 excavator. Machine excavated.	Dimension and Orientation Width 0.60 m Length 4.00 m 35 (Deg)	Ground Level 4.60 mOD Coordinates (m) E 516678.60 National Grid N 556494.03
---	--	---	---	--

Samples and Tests Strata Description

Depth	Type & No.	Records	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.10 0.10 - 0.20 0.20 0.20 0.20 - 0.50	D1 B2 HV D3 B4	p 120kPa, r N/A	Soft dark brown silty CLAY with rootlets. (TOPSOIL)		(0.20) 0.20 +4.40		
			Light orangish brown slightly sandy gravelly CLAY. Gravel is subrounded fine to coarse of sandstone and chalk. (MADE GROUND)		(0.30) 0.50 +4.10		
			Firm brown, mottled light grey, slightly sandy gravelly CLAY with low cobble content. Gravel is subrounded to rounded fine to coarse of chalk and sandstone. Cobbles are subrounded of chalk.		(2.50)		
0.80 0.80 0.80 - 1.00	HV D5 B6	p 120kPa, r N/A					
2.00 2.00 - 2.20	D7 B8						
3.10 3.10 - 3.30	D9 B10		Soft light grey, mottled brown, CLAY with rare subrounded fine to medium gravel of chalk.	3.20-3.90 firm dark brown clay	3.00 +1.60 (0.30) 3.30 +1.30		
			Dark brown clayey fine to medium SAND with occasional gravel size pockets of sandy clay.		(0.60)		
3.70 - 3.90 3.80	B12 D11						
4.00 4.00 4.00 - 4.50	HV D13 B14	p 100kPa, r N/A	Firm brown slightly sandy silty CLAY.		3.90 +0.70 (0.60)		
		10/04/18 Dry					
			END OF EXPLORATORY HOLE		4.50 +0.10		

Groundwater Entries No. Depth Strike (m) Remarks	Remarks Depth (m) Remarks 0.00 - 4.50 No groundwater encountered during excavation.	Stability Stable Shoring None Weather Overcast
---	--	---

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 © Copyright SOCOTEC UK Limited 14/08/2018 13:48:25	Project VPI IMMINGHAM Project No. A8015-18 Carried out for AECOM	Trial Pit <div style="text-align: center;">TP8</div> Sheet 1 of 1
---	---	---

Trial Pit Log



Logged WH Checked TC Approved TC	Start 10/04/2018 End 10/04/2018	Equipment, Methods and Remarks Tracked 360 excavator. Machine excavated.	Dimension and Orientation Width 0.60 m Length 4.00 m 	Ground Level 5.71 mOD Coordinates (m) E 516677.98 National Grid N 417410.00
---	--	---	---	--

Samples and Tests Strata Description

Depth	Type & No.	Records	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.10 0.10 - 0.20	D1 B2		Soft dark brown slightly gravelly slightly silty CLAY with frequent rootlets. Gravel is angular to subrounded fine to medium of sandstone and flint. (TOPSOIL)		(0.20)		
0.30 0.30 - 0.40	D3 B4		Light yellowish brown very sandy clayey angular to subangular fine to coarse GRAVEL of limestone and sandstone. (MADE GROUND)		0.20 +5.51		
0.80 0.80 - 1.00	D5 B6				(1.40)		
1.60 1.60 1.60 - 1.80	HV D7 B8	p 120kPa, r N/A	Stiff dark orangish brown, mottled dark brown, CLAY with rare subangular fine gravel of flint.		1.60 +4.11		
2.00 2.00 - 2.20	D9 B10		Stiff light brown, mottled grey, slightly gravelly sandy CLAY. Gravel is subangular fine to coarse of chalk.		(0.40) 2.00 +3.71		
3.20 3.20 - 3.40	D11 B12				(2.20)		
		10/04/18					
			END OF EXPLORATORY HOLE		4.20 +1.51		

Groundwater Entries <table border="1"> <thead> <tr> <th>No.</th> <th>Depth (m)</th> <th>Strike (m)</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>0.70</td> <td></td> <td>Seepage</td> </tr> </tbody> </table>	No.	Depth (m)	Strike (m)	Remarks	1	0.70		Seepage	Remarks <table border="1"> <thead> <tr> <th>Depth (m)</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> </tbody> </table>	Depth (m)	Remarks			Stability Faces A and C collapsed from 0.20 to 4.20m Shoring None Weather Overcast
No.	Depth (m)	Strike (m)	Remarks											
1	0.70		Seepage											
Depth (m)	Remarks													

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 © Copyright SOCOTEC UK Limited 14/08/2018 13:48:25	Project VPI IMMINGHAM Project No. A8015-18 Carried out for AECOM	Trial Pit <h2>TP9</h2> Sheet 1 of 1
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Trial Pit Log



Logged WH Checked TC Approved TC	Start 06/04/2018 End 06/04/2018	Equipment, Methods and Remarks Tracked 360 excavator. Machine excavated.	Dimension and Orientation Width 0.60 m Length 3.00 m 	Ground Level 4.70 mOD Coordinates (m) E 516725.56 National Grid N 417441.68
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Samples and Tests Strata Description

Depth	Type & No.	Records	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.10 - 0.40	B2		Soft light brown, mottled greyish brown, slightly sandy slightly gravelly CLAY with frequent rootlets. Gravel is subangular to rounded of chalk and mudstone. (TOPSOIL)		(0.40)		
0.30	D1						
0.40	HV	p 120kPa, r N/A	Firm dark greyish brown, mottled dark grey, slightly sandy CLAY with frequent wood and plant material.		0.40 +4.30		
0.40	D3						
0.40 - 0.60	B4				(0.40)		
0.80	HV	p 120kPa, r N/A	Firm light orangish brown, mottled light grey, slightly sandy gravelly CLAY. Gravel is subangular to subrounded of predominantly chalk with mudstone and flint.		0.80 +3.90		
0.90	D5						
0.90 - 1.20	B6			1.00-1.20 light yellowish brown sand pockets	(2.20)		
2.20	D7						
2.20 - 2.70	B8						
3.00	D9		Firm dark brown CLAY with rare subrounded fine to medium gravel of mudstone.		3.00 +1.70		
3.20 - 3.70	B10				(1.00)		
4.20	D11		Greyish brown slightly gravelly clayey fine to coarse SAND. Gravel is subrounded fine to medium of mudstone.		4.00 +0.70		
4.20 - 4.50	B12	06/04/18			(0.50)		
			END OF EXPLORATORY HOLE		4.50 +0.20		

Groundwater Entries No. Depth Strike (m) Remarks 1 1.00 Seepage	Remarks Depth (m) Remarks	Stability Stable Shoring None Weather Overcast
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Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 © Copyright SOCOTEC UK Limited 14/08/2018 13:48:26	Project VPI IMMINGHAM Project No. A8015-18 Carried out for AECOM	Trial Pit TP10 Sheet 1 of 1
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Trial Pit Log



Logged WH Checked TC Approved TC	Start 09/04/2018 End 09/04/2018	Equipment, Methods and Remarks Tracked 360 excavator. Machine excavated.	Dimension and Orientation Width 0.60 m Length 4.00 m 	Ground Level 6.44 mOD Coordinates (m) E 516698.32 National Grid N 417407.31
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Samples and Tests Strata Description

Depth	Type & No.	Records	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.10 0.10 - 0.30	D1 B2		Soft brown slightly sandy slightly gravelly CLAY. Gravel is angular to rounded fine to coarse of chalk, brick, sandstone and concrete. (MADE GROUND)		(0.50)		
0.50 0.50 0.50 - 0.70	HV D3 B4	p 120kPa, r N/A	Firm brown, mottled light grey, slightly sandy gravelly CLAY. Gravel is subangular to subrounded fine to coarse of chalk, mudstone, flint and sandstone.	0.50 concrete block wider than trench on Face D	0.50 +5.94		
1.70 1.70	D5 D6			1.40 low cobble content. Cobbles are subrounded of chalk	(1.60)		
2.20 2.20 2.20 - 2.30	HV D7 B8	p 100kPa, r N/A	Firm dark greyish brown, mottled dark grey, slightly gravelly slightly sandy to sandy CLAY. Gravel is subrounded fine to coarse of sandstone.		2.10 +4.34 (0.30)		
2.50 2.50 - 2.70	D9 B10		Firm light brown, mottled light grey, locally light orange brown, slightly gravelly CLAY. Gravel is subrounded to rounded fine to coarse of chalk.		2.40 +4.04 (1.00)		
3.40 3.50 - 3.70	D11 B12		Stiff light brown, mottled grey slightly sandy slightly gravelly CLAY. Gravel is subrounded fine to coarse of sandstone and chalk.		3.40 +3.04 (1.10)		
		09/04/18		4.10 locally slightly sandy gravelly clay			
			END OF EXPLORATORY HOLE		4.50 +1.94		

Groundwater Entries <table border="1"> <thead> <tr> <th>No.</th> <th>Depth</th> <th>Strike (m)</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>1.50</td> <td></td> <td>Seepage</td> </tr> </tbody> </table>	No.	Depth	Strike (m)	Remarks	1	1.50		Seepage	Remarks <table border="1"> <thead> <tr> <th>Depth (m)</th> <th>Remarks</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> </tr> </tbody> </table>	Depth (m)	Remarks			Stability Stable Shoring None Weather Overcast
No.	Depth	Strike (m)	Remarks											
1	1.50		Seepage											
Depth (m)	Remarks													

Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 © Copyright SOCOTEC UK Limited 	Project VPI IMMINGHAM Project No. A8015-18 Carried out for AECOM	Trial Pit TT1 Sheet 1 of 1
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Trial Pit Log



Logged WH Checked TC Approved TC	Start 06/04/2018 End 06/04/2018	Equipment, Methods and Remarks Wheeled 360 excavator. Machine excavated. Top strata too friable to do hand vane.	Dimension and Orientation Width 0.60 m Length 4.00 m 	Ground Level 5.22 mOD Coordinates (m) E 516764.39 National Grid N 417439.42
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Samples and Tests Strata Description

Depth	Type & No.	Records	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.00 - 0.25	B2		Soft light brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded of flint and sandstone. Occasional rootlets. (MADE GROUND)				
0.25	D1						
1.00 1.00 - 1.25	D3 B4						
2.00 2.00 2.00 - 2.15	HV D5 B6	p 70kPa, r N/A			(3.00)		
3.00 3.00 3.00 - 3.20	HV D7 B8	p 120kPa, r N/A	Dark greyish brown, mottled light brown, CLAY with rare angular to subrounded fine to medium gravel of various lithologies including flint and quartzite.		3.00 +2.22 (0.25)		
3.25 3.25 3.25 - 3.50	HV D9 B10	p 120kPa, r N/A 06/04/18	Dry Firm light brown slightly gravelly sandy CLAY. Gravel is subangular to subrounded fine to medium of flint and mudstone.		3.25 +1.97 (0.25)		
			END OF EXPLORATORY HOLE		3.50 +1.72		

Groundwater Entries No. Depth Strike (m) Remarks	Remarks Depth (m) Remarks 0.00 - 3.50 No groundwater encountered during excavation.	Stability Stable Shoring None Weather Overcast
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Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 © Copyright SOCOTEC UK Limited 14/08/2018 13:51:53	Project VPI IMMINGHAM Project No. A8015-18 Carried out for AECOM	TT2 Sheet 1 of 1
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Trial Pit Log



Logged WH Checked TC Approved TC	Start 05/04/2018 End 06/04/2018	Equipment, Methods and Remarks Tracked 360 excavator Machine excavated pit	Dimension and Orientation Width 0.60 m Length 4.00 m 	Ground Level 5.40 mOD Coordinates (m) E 516764.82 National Grid N 417461.85
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Samples and Tests Strata Description

Depth	Type & No.	Records	Main	Detail	Depth, Level (Thickness)	Legend	Backfill
0.30 0.30 - 0.60	D1 B2	05/04/18	Brown, locally light brown, slightly sandy CLAY with low cobble content. Cobbles are subrounded of flint and sandstone.		(1.40)		
1.30 1.30 - 1.60	D3 B4		Dark greyish brown silty CLAY with occasional wood fragments. Slight organic odour.		1.40 +4.00 (0.60)		
2.10 2.10 2.10 - 2.50	HV D5 B6	p 120kPa, r N/A 06/04/18	Firm light brown, mottled light grey, slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium of sandstone, chalk and quartzite.		2.00 +3.40 (0.50)		
			END OF EXPLORATORY HOLE		2.50 +2.90		

Groundwater Entries No. Depth Strike (m) Remarks	Remarks Depth (m) Remarks 0.00 - 2.00 Material too friable for hand vane testing. 0.00 - 2.50 No groundwater encountered during excavation.	Stability Stable Shoring None Weather overcast
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Notes: For explanation of symbols and abbreviations see Key to Exploratory Hole Records. All depths and reduced levels in metres. Stratum thickness given in brackets in depth column. Scale 1:25 © Copyright SOCOTEC UK Limited 	Project VPI IMMINGHAM Project No. A8015-18 Carried out for AECOM	Trial Pit TT3 Sheet 1 of 1
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APPENDIX C
INSTRUMENTATION AND MONITORING

Installation Details

Table C1



Installation Details

Instrument Reference	Instrument Type (See Notes)	Installation Date, dd/mm/yyyy	Pipe Diameter, mm	Instrument Base, mbgl	Response Zone Range, mbgl	Pipe Top Details	Headworks	Remarks
BH1 (1)	SP	11/04/2018	50	14.80	12.60 to 15.00	Gas tap	Raised cover	
BH2 (1)	SP	16/04/2018	50	15.10	14.00 to 15.20	Gas tap	Flush cover	
BH3 (1)	SP	18/04/2018	50	28.60	26.60 to 28.60	Gas tap	Flush cover	
BH4 (1)	SP	20/04/2018	50	34.60	28.60 to 34.60	Gas tap	Flush cover	
BH5 (1)	SP	19/04/2018	50	18.50	17.50 to 18.50	Gas tap	Flush cover	
BH6 (1)	SP	16/04/2018	50	34.50	25.50 to 34.50	Gas tap	Raised cover	
WS1 (1)	SP	06/04/2018	50	1.40	1.00 to 1.40	Gas tap	Raised covers	
WS2 (1)	SP	10/04/2018	50	1.20	0.70 to 1.20	Gas tap	Raised cover	
WS3 (1)	SP	10/04/2018	50	3.50	2.50 to 3.50	Gas tap	Raised cover	
WS4 (1)	SP	06/04/2018	50	2.30	1.30 to 2.30	Gas tap	Raised cover	
WS5 (1)	SP	10/04/2018	50	4.30	3.30 to 4.30	Gas tap	Raised cover	
WS6 (1)	SP	11/04/2018	50	3.70	3.10 to 3.70	Gas tap	Raised cover	
WS7 (1)	SP	11/04/2018	50	3.60	3.10 to 3.60	Gas tap	Raised cover	
WS8 (1)	SP	11/04/2018	50	4.10	3.60 to 4.10	Gas tap	Raised cover	

Notes: Type: SP - Standpipe, SPIE - Standpipe Piezometer, HPIE - Hydraulic Piezometer, PPIE - Pneumatic Piezometer, EPIE - Vibrating Wire Piezometer, PWEL - Pumping Well



Project VPI IMMINGHAM
Project No. A8015-18
Carried out for AECOM

Table

C1

APPENDIX D
GEOTECHNICAL LABORATORY TEST RESULTS

Index Properties – Summary of Results	INDX 1 to 3
Particle Size Distribution Analyses	PSD 1 to 24
Unconsolidated Undrained Triaxial Compression Tests – Summary of Results	UUSUM
Consolidated Undrained Triaxial Compression Tests with Measurement of Pore Water Pressure	CUM 1 to 6 (3 sheets per test)
One Dimensional Consolidation Test	OED 1 to 8
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Dry Density / Moisture Content Relationship (Light)	COMPL 1 to 7
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California Bearing Ratio	CBR 1 to 11
Chemical Tests	EFS/187041 EFS/187043 EFS/187204 EFS/187902

INDEX PROPERTIES - SUMMARY OF RESULTS

Hole No.	Sample			Soil Description	ρ	ρ_d	W	< 425 μ m sieve	W _L	W _P	I _p	ρ_s	Remarks	
	No.	Depth (m)												type
		from	to											
					Mg/m ³	%	%	%	%		Mg/m ³			
BH1	4	0.50	0.70	B	Greyish brown slightly sandy slightly gravelly silty CLAY.		27	91	54 a	26	28			
BH1	8	2.00	2.45	D	Brown slightly sandy slightly gravelly CLAY.		14	92	43 a	19	24			
BH1	9	2.50	3.00	B	Brown slightly sandy slightly gravelly silty CLAY with chalk fragments.							2.71-p		
BH1	17	6.50	6.95	D	Brown slightly sandy slightly gravelly CLAY.		13	82	33 a	15	18			
BH1	22	9.50	9.95	D	Brown slightly sandy slightly gravelly CLAY.		14	88	29 a	15	14			
BH1	27	13.00	13.50	B	Brown slightly gravelly sandy silty CLAY.							2.68-p		
BH1	35	17.00	17.45	UT	Very stiff greyish brown slightly sandy slightly gravelly CLAY. Gravel is mainly chalk.							2.72-p		
BH1	36	17.45	17.60	D	Dark grey sandy gravelly CLAY.		13	82	30 a	15	15			
BH1	40	20.40	20.50	D	Grey slightly sandy gravelly CLAY.		22							
BH1	43	22.50	22.70	D	Grey slightly sandy slightly gravelly CLAY. Gravel contains chalk fragments.		13							
BH1	46	25.00	25.22	D	Grey slightly gravelly sandy CLAY. Gravel is chalk fragments.		13	89	27 a	15	12			
BH2	2	0.30	0.50	B	Brown slightly sandy gravelly CLAY.		20	56	44 a	22	22			
BH2	5	1.00		D	Brown slightly sandy slightly gravelly CLAY.		22							
BH2	8	1.65	1.80	D	Brown slightly sandy slightly gravelly CLAY.		24	91	42 a	19	23			
BH2	15	3.30	3.75	UT	Firm laminated brown slightly sandy CLAY.		23	100	47 a	22	25			
BH2	28	5.10	5.55	UT	Firm dark brown slightly sandy slightly gravelly CLAY.		16	83	32 a	17	15	2.70-p		
BH2	34	7.10	7.55	D	Brown slightly sandy slightly gravelly CLAY.		18	88	33 a	14	19			
BH2	40	9.50	9.95	UT	Firm brown slightly sandy slightly gravelly silty CLAY. Gravel is chalk fragments.		14	87	32 a	13	19			
BH2	51	13.10	13.55	B	Brown slightly sandy slightly gravelly silty CLAY. Gravel is chalk.		16	89	31 a	15	16			
BH2	63	18.50	19.00	B	Greenish grey slightly sandy SILT.		22	100	23 a	NP				
BH3	3	1.65	2.00	B	Brown slightly sandy slightly gravelly silty CLAY with chalk fragments.		28	95	37 a	21	16	2.71-p		
BH3	8	4.00	4.45	D	Brown slightly gravelly very sandy silty CLAY.		21							
BH3	12	5.65	6.00	B	Brown slightly sandy slightly gravelly CLAY.		18	85	32 a	15	17	2.70-p		
BH3	19	9.00	9.45	UT	Firm greyish brown slightly sandy slightly gravelly silty CLAY. Gravel contains chalk fragments.		17							
BH3	27	12.00	12.45	UT	Firm brown slightly sandy slightly gravelly CLAY.		17							
BH3	32	13.50	13.95	D	Light brown silty SAND.		25							
BH3	45	23.00	24.00	B	Greenish grey CLAY with chalk fragments.		15							
BH4	1	0.50	1.20	B	Brown slightly sandy slightly gravelly CLAY.		24	95	43 a	21	22			
BH4	7	3.10	3.55	UT	Brown slightly sandy SILT.		21							
BH4	10	4.50	4.95	UT	Firm to stiff greyish brown slightly sandy slightly gravelly CLAY.							2.70-p		
BH4	14	6.00	6.45	UT	Firm brown slightly sandy slightly gravelly CLAY.		14	89	33 a	14	19			

General notes:

All above tests carried out to BS1377 : 1990 unless annotated otherwise. See Remarks for further details

Key : ρ bulk density, linear

W_L Liquid limit

W_P Plastic limit

<425 μ m preparation

ρ_s particle density

ρ_d dry density

a 4 point cone test

NP non - plastic

n from natural soil

-g = gas jar

w moisture content

b 1 point cone test

IP Plasticity Index

s sieved specimen

-p = small pyknometer

* test carried out to BS EN ISO 17892-1 2014

QA Ref
SLR 1
Rev 2.91
Mar 17



Project No A8015-18
Project Name VPI IMMINGHAM

Figure
INDX

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INDEX PROPERTIES - SUMMARY OF RESULTS

Hole No.	Sample			Soil Description	ρ	ρ_d	W	< 425 μ m sieve	W _L	W _P	I _p	ρ_s	Remarks	
	No.	Depth (m)												type
		from	to											
					Mg/m ³	%	%	%	%	%	Mg/m ³			
BH4	22	9.00	9.45	UT	Firm to stiff dark brown slightly sandy slightly gravelly CLAY. Gravel contains chalk fragments.		15	89	32 a	15	17			
BH4	27	11.15	11.60	D	Brown slightly sandy slightly gravelly CLAY.		12							
BH4	34	15.50	16.00	B	Light brown gravelly SAND.		8.6							
BH4	42	22.00	22.50	B	Grey slightly sandy slightly gravelly CLAY. Gravel is chalk fragments.		17							
BH5	3	0.50		D	Brown slightly sandy slightly gravelly CLAY.		16	96	39 a	19	20			
BH5	11	2.30	2.75	UT	Very stiff brown slightly sandy slightly gravelly CLAY. Gravel is chalk fragments.		16						2.71-p	
BH5	20	4.50	4.95	UT	Firm laminated brown slightly gravelly sandy CLAY.		17	88	27 a	16	11			
BH5	27	8.00	8.45	UT	Firm greyish brown slightly sandy slightly gravelly CLAY. Gravel contains chalk.		16	82	30 a	14	16			
BH5	35	11.00	11.45	UT	Firm brown slightly sandy slightly gravelly CLAY.		16							
BH5	42	13.00		D	Soft brown slightly gravelly, slightly sandy CLAY.		15							
BH5	51	17.00	17.36	D	Light grey sandy gravelly CLAY.		1.7							
BH5	58	20.00	20.28	B	Greenish grey CLAY with chalk fragments.		4.9							
BH6	1	0.00	0.30	B	Brown very sandy clayey GRAVEL.		20							
BH6	6	2.00	2.45	UT	Very stiff brown mottled grey slightly sandy slightly gravelly CLAY. Gravel contains chalk.								2.71-p	
BH6	9	3.50	4.00	B	Brown slightly silty CLAY.		27							
BH6	14	6.00	6.45	UT	Firm to stiff greyish brown slightly gravelly sandy CLAY. Gravel contains chalk.		15	90	29 a	18	11			
BH6	21	10.00	10.50	B			17							
BH6	25	13.00	13.50	B	Brown slightly sandy slightly gravelly CLAY.		16						2.65-g	
BH6	28	15.00	15.45	D	Light brown sandy gravelly CLAY.		16							
BH6	35	19.50	21.00	B	Greyish brown gravelly CLAY. Gravel is chalk fragments.		17							
TP1	4	0.70	0.90	B	Brown slightly sandy CLAY with occasional chalk fragments.		26							
TP1	8	2.00	2.20	B	Brown slightly sandy slightly gravelly CLAY.		20	96	47 a	19	28		2.69-p	
TP10	8	2.20	2.70	B	Brown slightly sandy slightly gravelly CLAY.		22	95	41 a	19	22			
TP10	12	4.20	4.50	B	Brown SAND.		21							
TP2	1	0.20		D	Dark brown slightly sandy slightly gravelly CLAY.		25							
TP2	8	2.30	2.50	B	Brown slightly sandy slightly gravelly CLAY.		11	94	45 a	19	26			
TP2	12	4.00	4.20	B	Brown slightly gravelly silty SAND.		25						2.72-p	
TP2	13	4.40		D	Brownish grey slightly gravelly sandy CLAY.		16	88	32 a	17	15			
TP3	10	3.40	3.60	B	Light brown SAND.		25						2.69-p	
TP3	12	4.00	4.20	B	Brown very clayey SAND with chalk fragments.		21	92	23 a	14	9			
TP4	4	0.80	1.00	B	Brown slightly sandy CLAY with chalk fragments.		17	94	42 a	17	25			

General notes:

All above tests carried out to BS1377 : 1990 unless annotated otherwise. See Remarks for further details

Key : ρ bulk density, linear

W_L Liquid limit

W_P Plastic limit

<425 μ m preparation

ρ_s particle density

ρ_d dry density

a 4 point cone test

NP non - plastic

n from natural soil

-g = gas jar

w moisture content

b 1 point cone test

IP Plasticity Index

s sieved specimen

-p = small pyknometer

* test carried out to BS EN ISO 17892-1 2014

QA Ref
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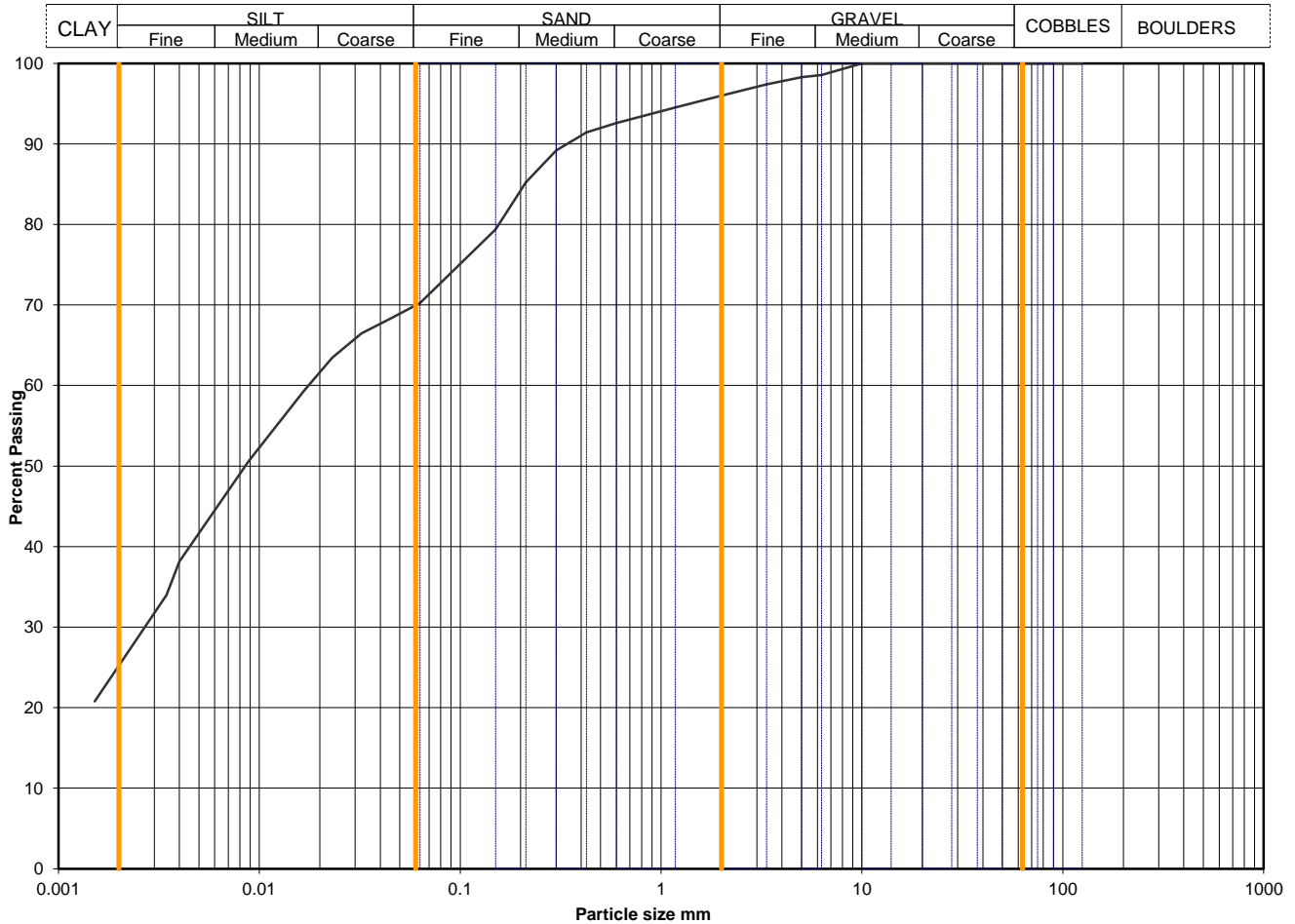
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	BH1
	A8015-1820180409104548	Sample Depth (m BGL)	0.50 - 0.70
		Sample Type and No	B4
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	70
90	100	0.0453	68
75	100	0.0323	66
63	100	0.0231	63
50	100	0.0166	59
37.5	100	0.0089	51
28	100	0.0040	38
20	100	0.0035	34
14	100	0.0015	21
10	100		
6.3	99		
5.0	98		
3.35	97		
2.00	96		
1.18	95		
0.600	93		
0.425	91		
0.300	89		
0.212	85		
0.150	79		
0.063	70		

Particle density, Mg/m3	2.65	assumed
Dry mass of sample, kg	12.2	

Soil description	Greyish brown slightly sandy slightly gravelly silty CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole	*<60mm
		0	0
		4	4
		26	26
		45	45
*<60mm values to aid description only		25	25

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
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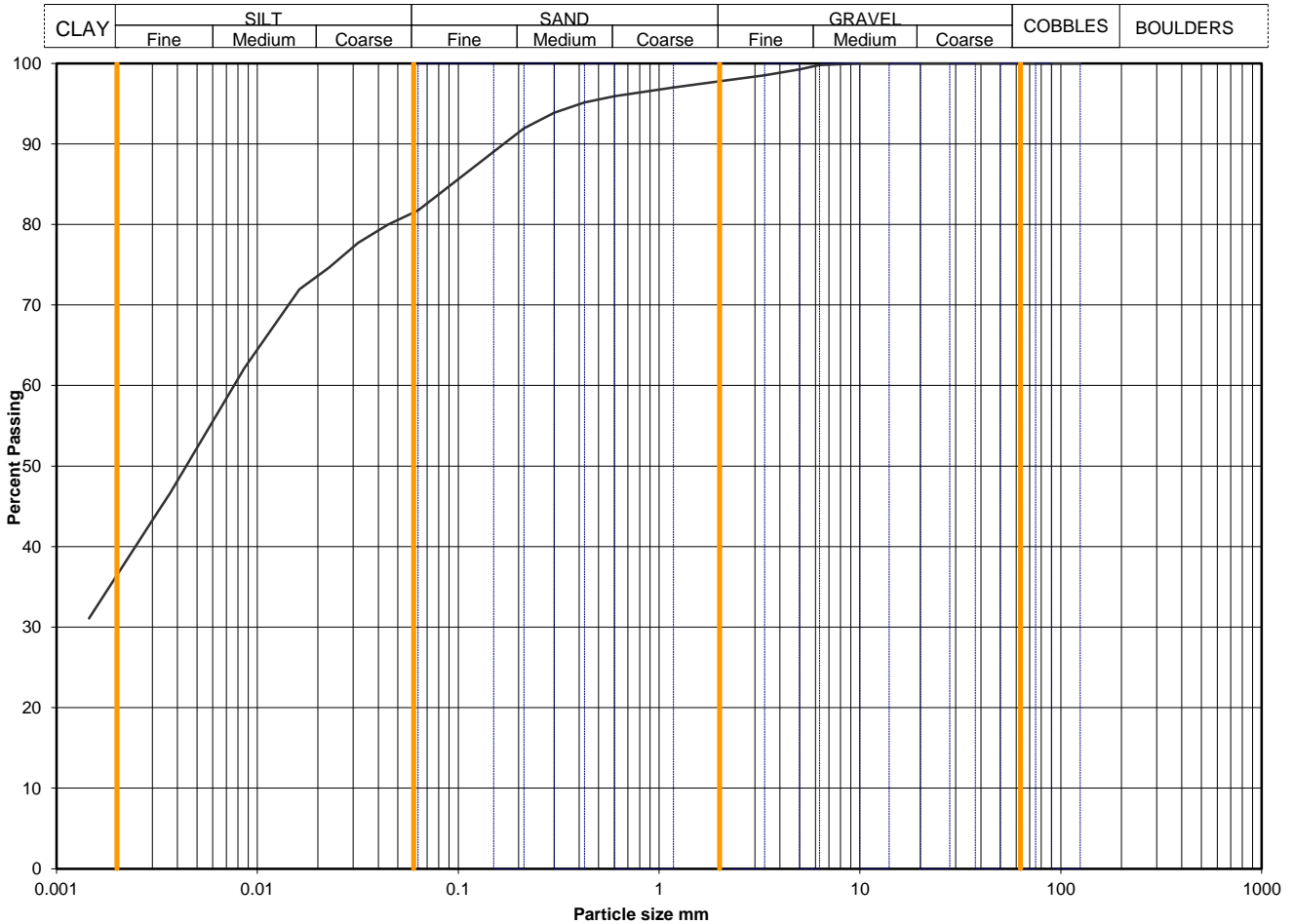
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	BH1
	A8015-1820180409104626	Sample Depth (m BGL)	2.50 - 3.00
		Sample Type and No	B9
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	82
90	100	0.0446	80
75	100	0.0318	78
63	100	0.0227	75
50	100	0.0162	72
37.5	100	0.0086	62
28	100	0.0037	47
20	100	0.0032	44
14	100	0.0015	31
10	100		
6.3	100		
5.0	99		
3.35	99		
2.00	98		
1.18	97		
0.600	96		
0.425	95		
0.300	94		
0.212	92		
0.150	89		
0.063	82		

Particle density, Mg/m3	
2.71	measured
Dry mass of sample, kg	
11.1	

Soil description	Brown slightly sandy slightly gravelly silty CLAY with chalk fragments.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole	*<60mm
		0	0
		2	2
		16	16
		45	45
*<60mm values to aid description only		36	36

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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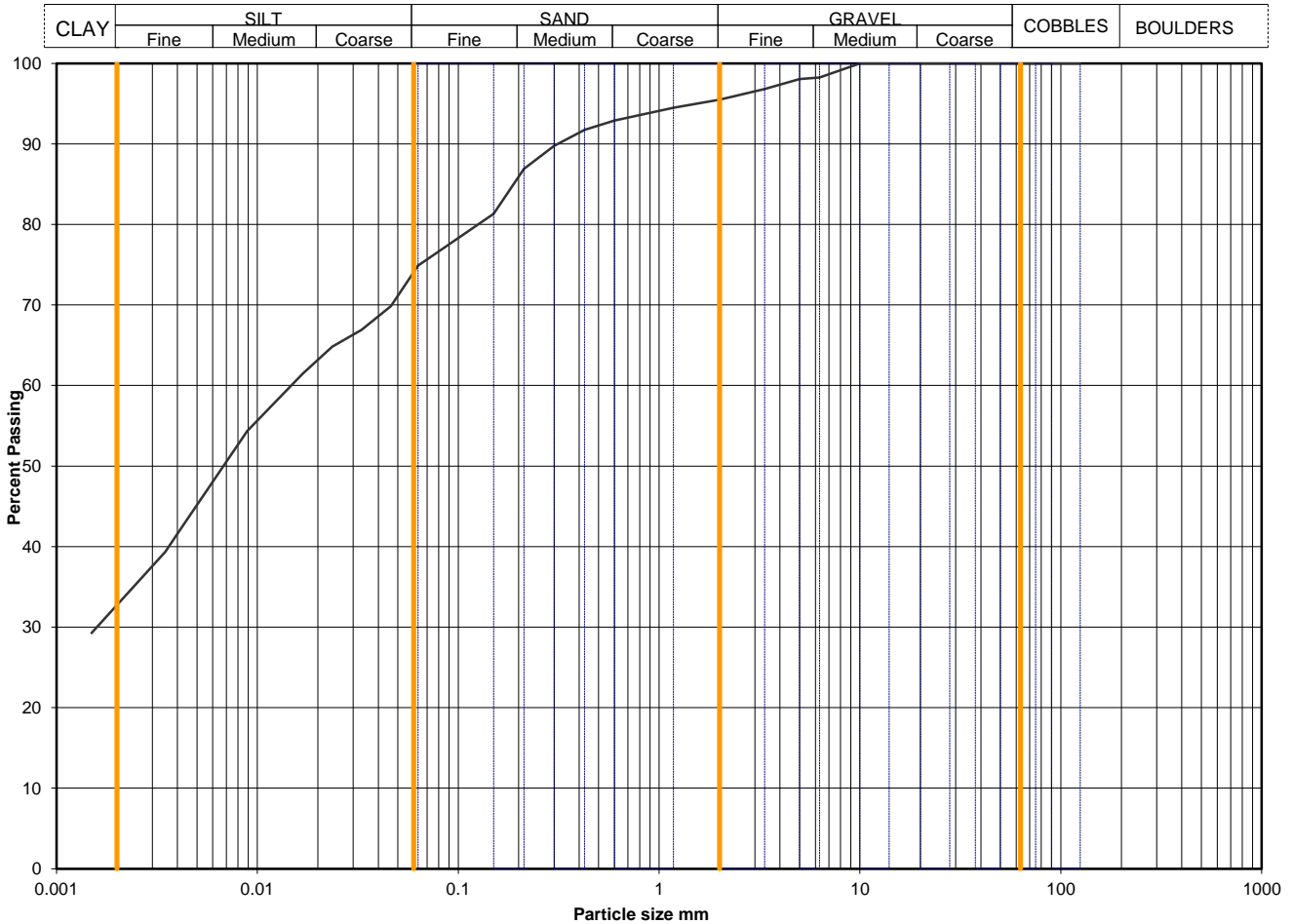
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	BH1
	A8015-1820180409104655	Sample Depth (m BGL)	4.00 - 4.45
		Sample Type and No	B13
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	75
90	100	0.0463	70
75	100	0.0331	67
63	100	0.0236	65
50	100	0.0168	61
37.5	100	0.0089	54
28	100	0.0041	42
20	100	0.0035	39
14	100	0.0015	29
10	100		
6.3	98		
5.0	98		
3.35	97		
2.00	95		
1.18	94		
0.600	93		
0.425	92		
0.300	90		
0.212	87		
0.150	81		
0.063	75		

Particle density, Mg/m3	
2.65	assumed
Dry mass of sample, kg	
13.1	

Soil description	Brown slightly sandy slightly gravelly silty CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole	*<60mm
		0	0
		5	5
		21	21
		42	42
*<60mm values to aid description only		33	33

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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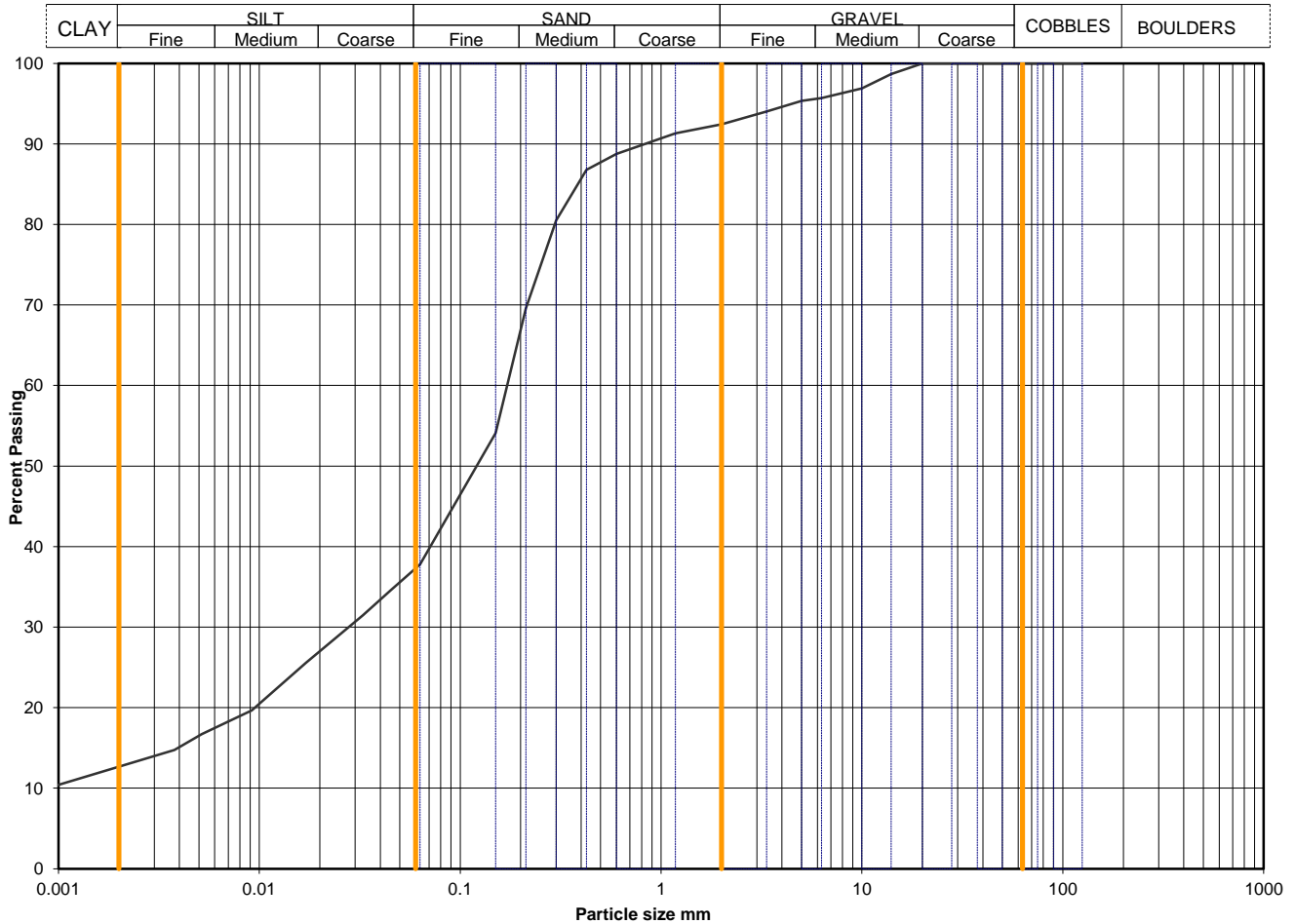
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	BH1
	A8015-1820180409105002	Sample Depth (m BGL)	13.00 - 13.50
		Sample Type and No	B27
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	38
90	100	0.0453	35
75	100	0.0328	31
63	100	0.0237	29
50	100	0.0171	26
37.5	100	0.0092	20
28	100	0.0052	17
20	100	0.0038	15
14	99	0.0008	10
10	97		
6.3	96		
5.0	95		
3.35	94		
2.00	92		
1.18	91		
0.600	89		
0.425	87		
0.300	81		
0.212	70		
0.150	54		
0.063	38		

Particle density, Mg/m3	
2.68	assumed
Dry mass of sample, kg	
8.5	

Soil description	Brown slightly gravelly sandy silty CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole	*<60mm
		0	0
		8	8
		55	55
		25	25
*<60mm values to aid description only		13	13

Uniformity Coefficient	D60 / D10	196
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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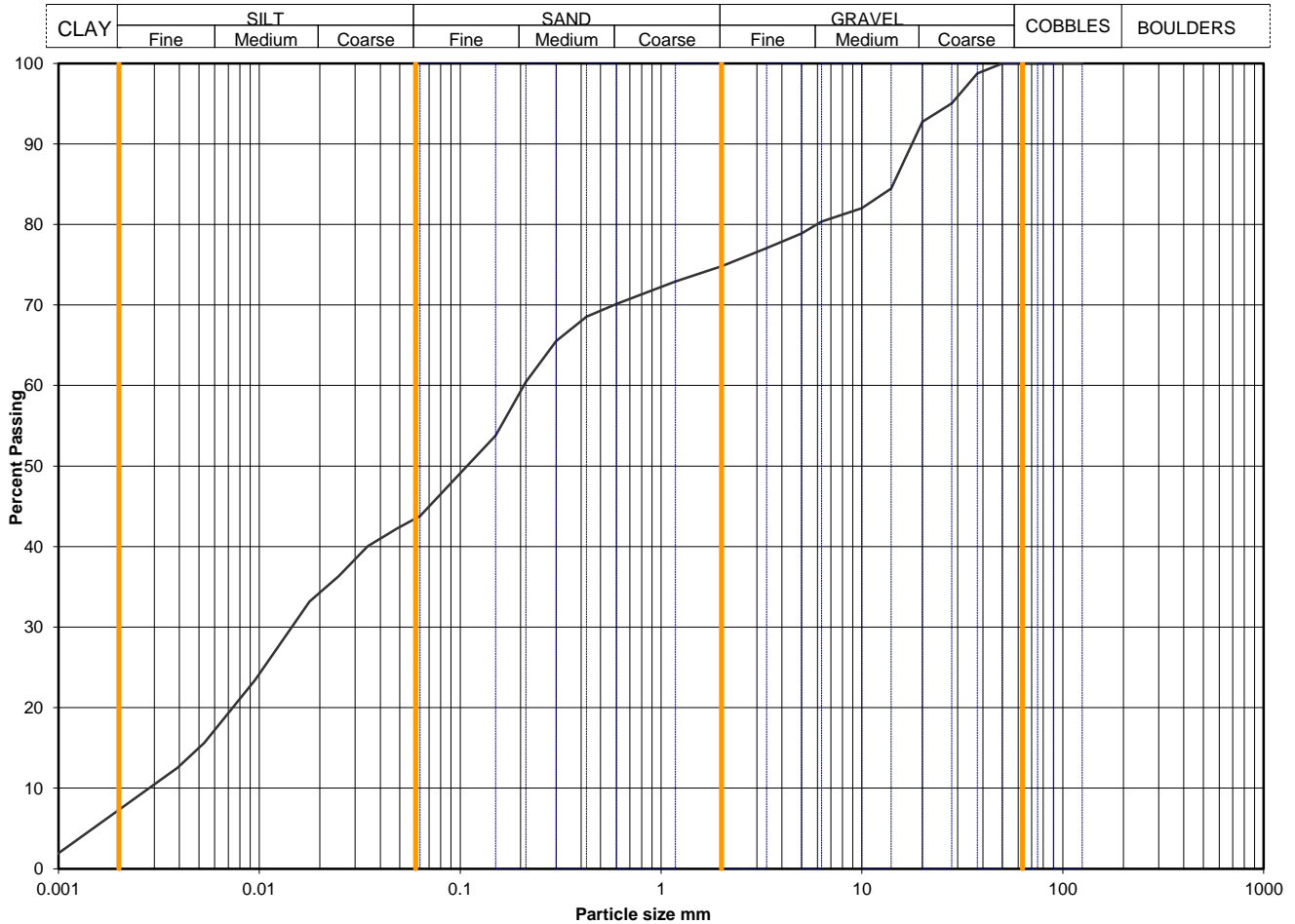
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	BH2
	A8015-1820180413011418	Sample Depth (m BGL)	0.60 - 1.00
		Sample Type and No	B4
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	44
90	100	0.0484	42
75	100	0.0346	40
63	100	0.0248	36
50	100	0.0178	33
37.5	99	0.0095	23
28	95	0.0053	16
20	93	0.0039	13
14	84	0.0009	1
10	82		
6.3	80		
5.0	79		
3.35	77		
2.00	75		
1.18	73		
0.600	70		
0.425	69		
0.300	66		
0.212	60		
0.150	54		
0.063	44		

Particle density, Mg/m3		5.1
2.65	assumed	
Dry mass of sample, kg		

Soil description	Dark brown slightly sandy slightly gravelly clayey SILT.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole	*<60mm
		0	0
		25	25
		31	31
		37	37
*<60mm values to aid description only		7	7

Uniformity Coefficient	D60 / D10	73
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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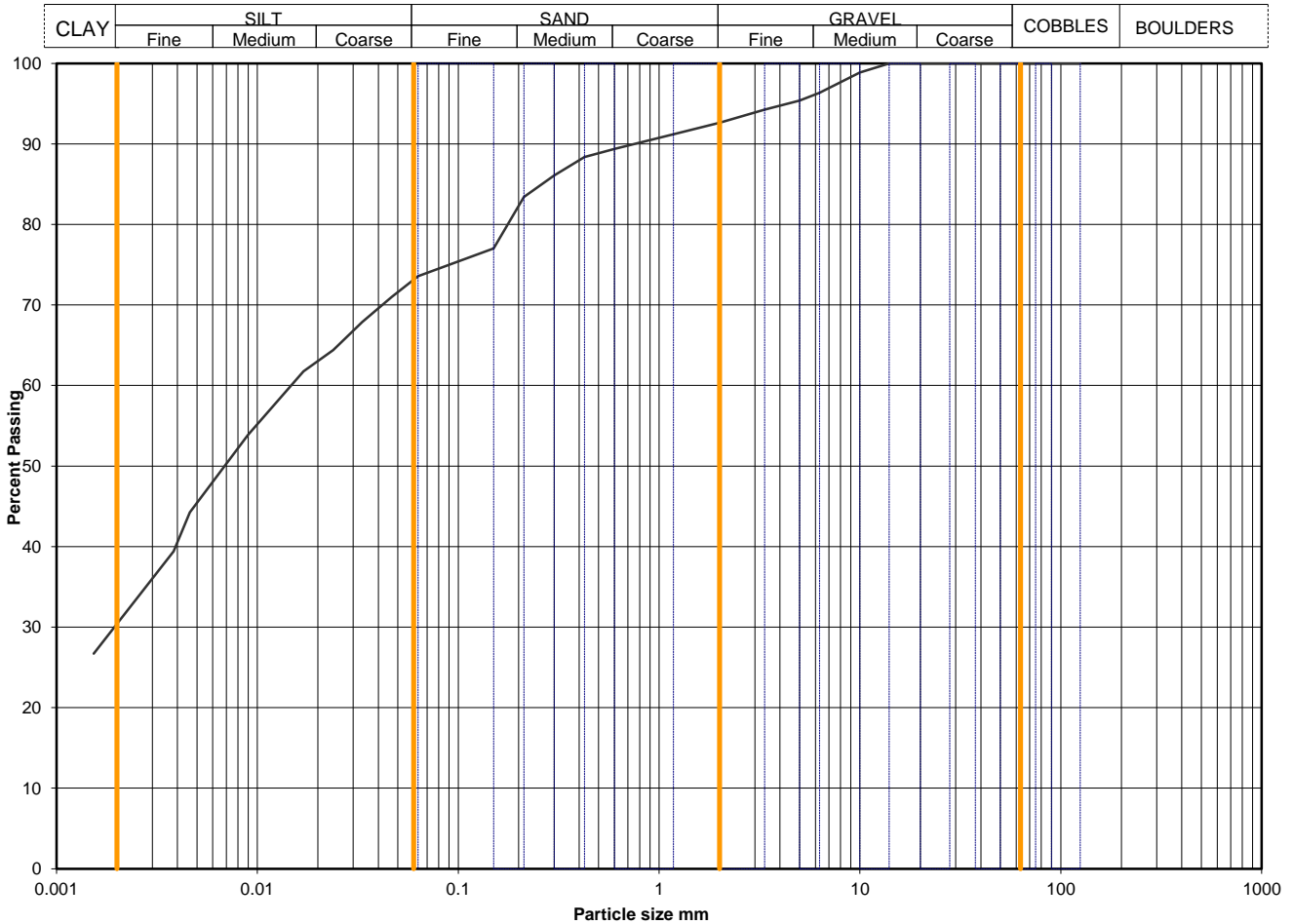
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	BH2
	A8015-1820180413011538	Sample Depth (m BGL)	2.70 - 2.80
		Sample Type and No	D12
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	74
90	100	0.0466	71
75	100	0.0333	68
63	100	0.0238	64
50	100	0.0170	62
37.5	100	0.0090	54
28	100	0.0046	44
20	100	0.0038	39
14	100	0.0015	27
10	99		
6.3	96		
5.0	95		
3.35	94		
2.00	93		
1.18	91		
0.600	89		
0.425	88		
0.300	86		
0.212	83		
0.150	77		
0.063	74		

Particle density, Mg/m3	
2.65	assumed
Dry mass of sample, kg	
0.9	

Soil description	Brown slightly sandy slightly gravelly silty CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole	*<60mm
		0	0
		7	7
		19	19
		43	43
*<60mm values to aid description only		30	30

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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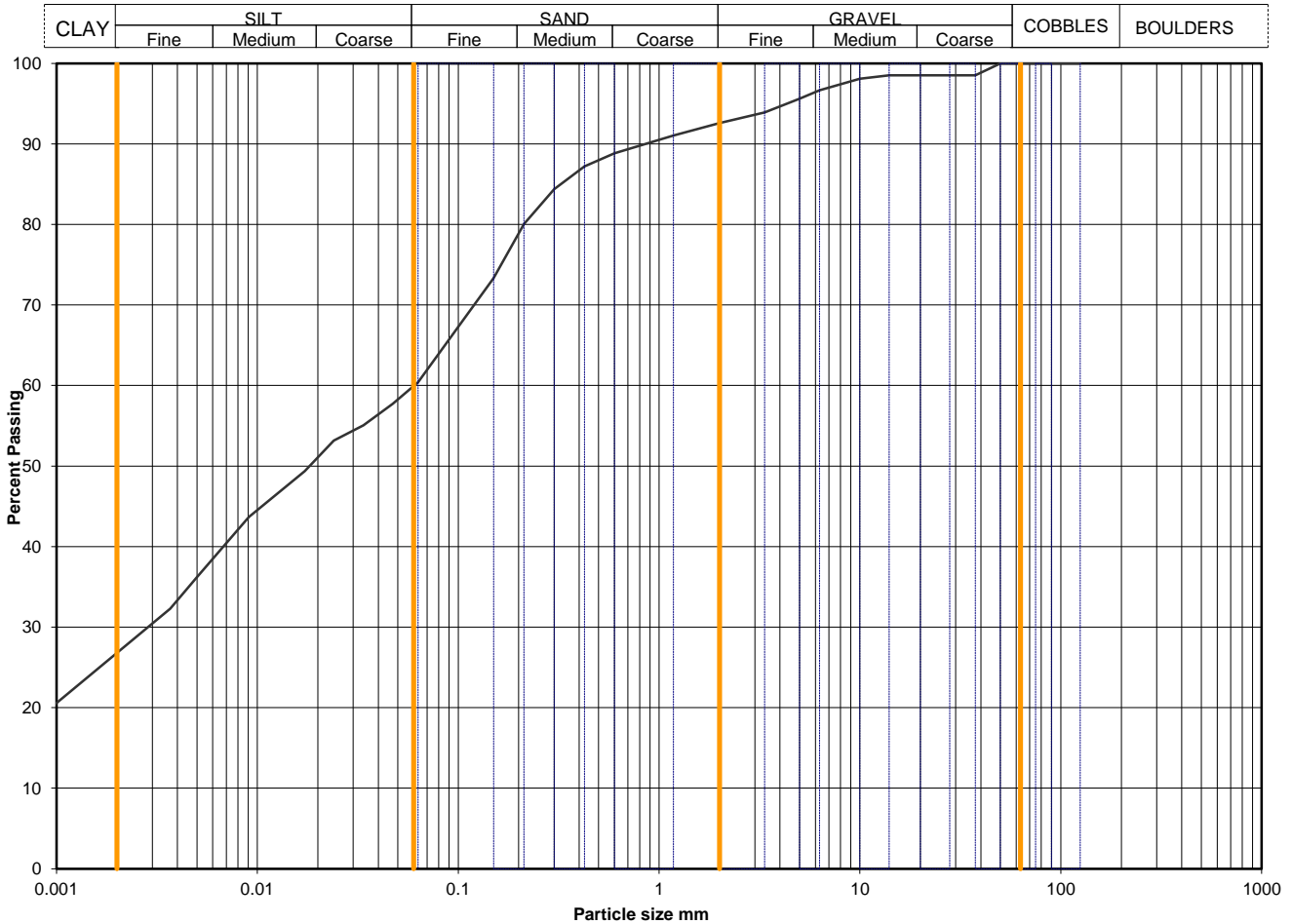
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	BH2
	A8015-1820180413012751	Sample Depth (m BGL)	9.50 - 9.95
		Sample Type and No	UT40
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	60
90	100	0.0473	58
75	100	0.0338	55
63	100	0.0241	53
50	100	0.0172	49
37.5	99	0.0091	44
28	99	0.0050	36
20	99	0.0037	32
14	99	0.0008	19
10	98		
6.3	97		
5.0	96		
3.35	94		
2.00	93		
1.18	91		
0.600	89		
0.425	87		
0.300	84		
0.212	80		
0.150	73		
0.063	60		

Particle density, Mg/m3	
2.65	assumed
Dry mass of sample, kg	
7.2	

Soil description	Firm bown slightly sandy slightly gravelly silty CLAY. Gravel is chalk fragments.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole	*<60mm
		0	0
		7	7
		32	32
		34	34
*<60mm values to aid description only		27	27

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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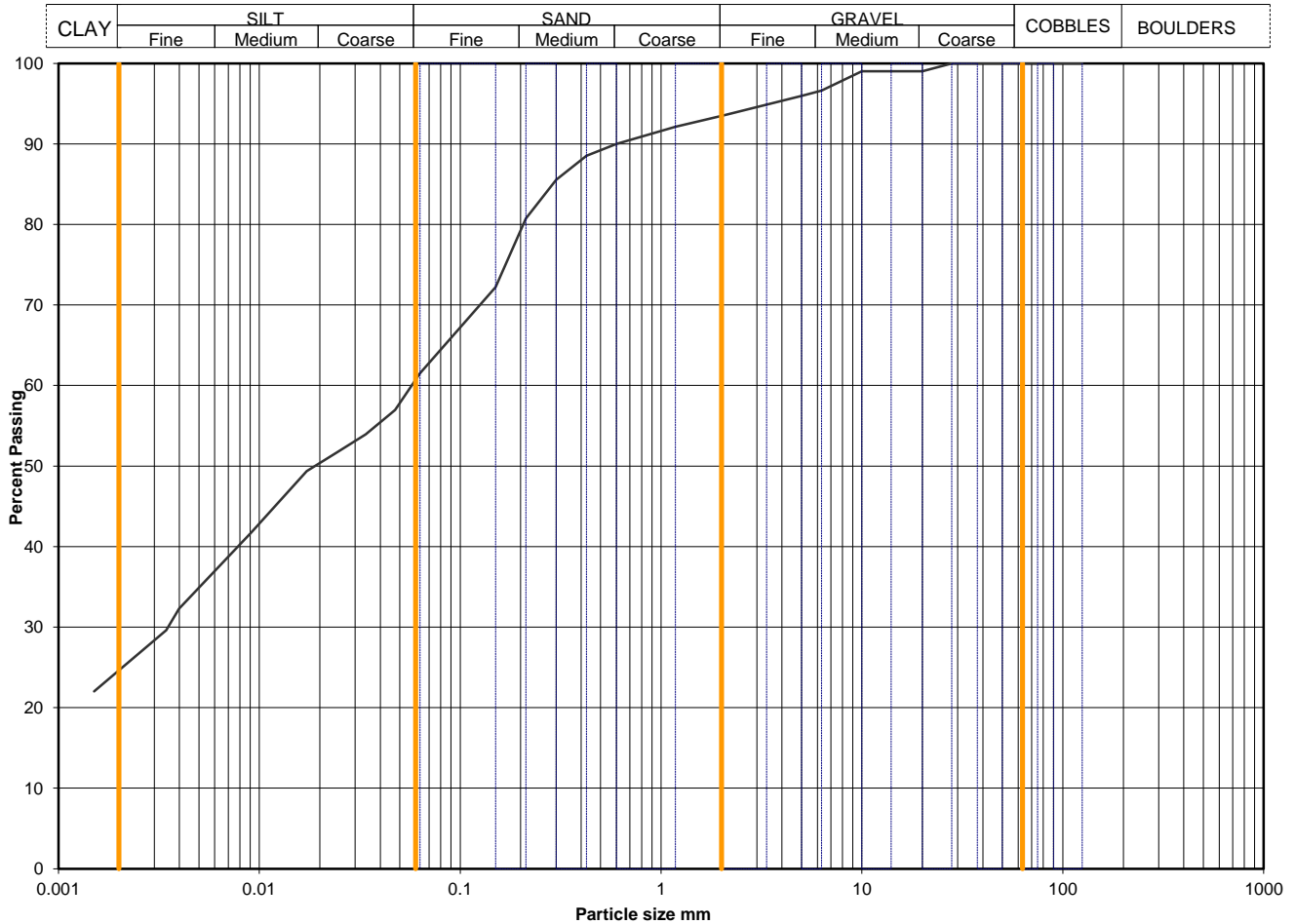
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	BH2
	A8015-1820180413012921	Sample Depth (m BGL)	13.10 - 13.55
		Sample Type and No	B51
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	62
90	100	0.0474	57
75	100	0.0339	54
63	100	0.0242	52
50	100	0.0172	49
37.5	100	0.0091	42
28	100	0.0040	32
20	99	0.0034	30
14	99	0.0015	22
10	99		
6.3	97		
5.0	96		
3.35	95		
2.00	93		
1.18	92		
0.600	90		
0.425	89		
0.300	86		
0.212	81		
0.150	72		
0.063	62		

Particle density, Mg/m3	
2.65	assumed
Dry mass of sample, kg	
15.8	

Soil description	Brown slightly sandy slightly gravelly silty CLAY. Gravel is chalk.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole	*<60mm
		0	0
		7	7
		32	32
		37	37
*<60mm values to aid description only		25	25

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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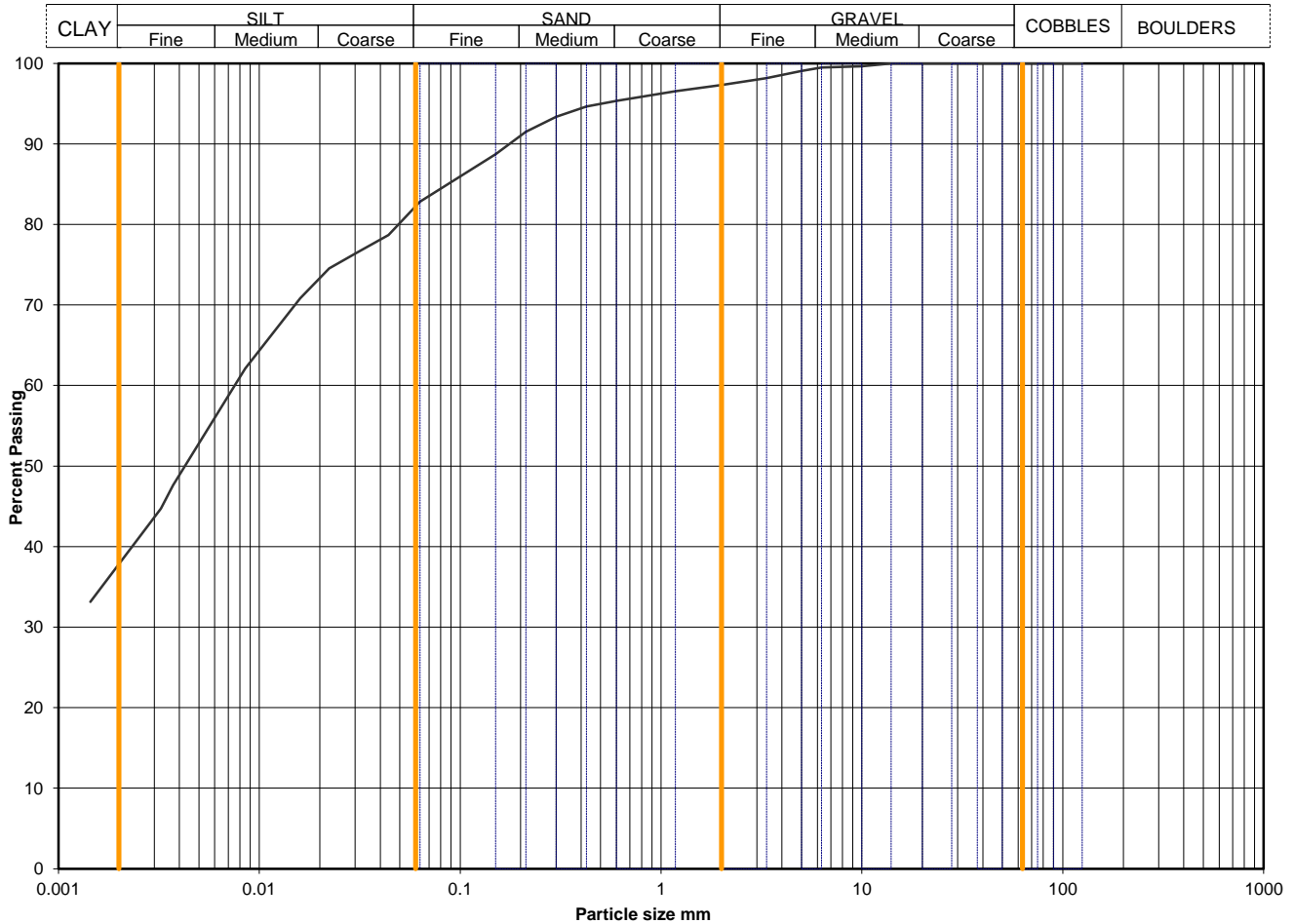
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	BH3
	A8015-1820180413102616	Sample Depth (m BGL)	1.65 - 2.00
		Sample Type and No	B3
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	83
90	100	0.0439	79
75	100	0.0313	77
63	100	0.0223	75
50	100	0.0160	71
37.5	100	0.0085	62
28	100	0.0037	48
20	100	0.0032	45
14	100	0.0014	33
10	100		
6.3	99		
5.0	99		
3.35	98		
2.00	97		
1.18	97		
0.600	95		
0.425	95		
0.300	93		
0.212	91		
0.150	89		
0.063	83		

Particle density, Mg/m3	2.71	measured
Dry mass of sample, kg	6.9	

Soil description	Brown slightly sandy slightly gravelly silty CLAY with chalk fragments.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole	*<60mm
		0	0
		3	3
		14	14
		45	45
*<60mm values to aid description only		38	38

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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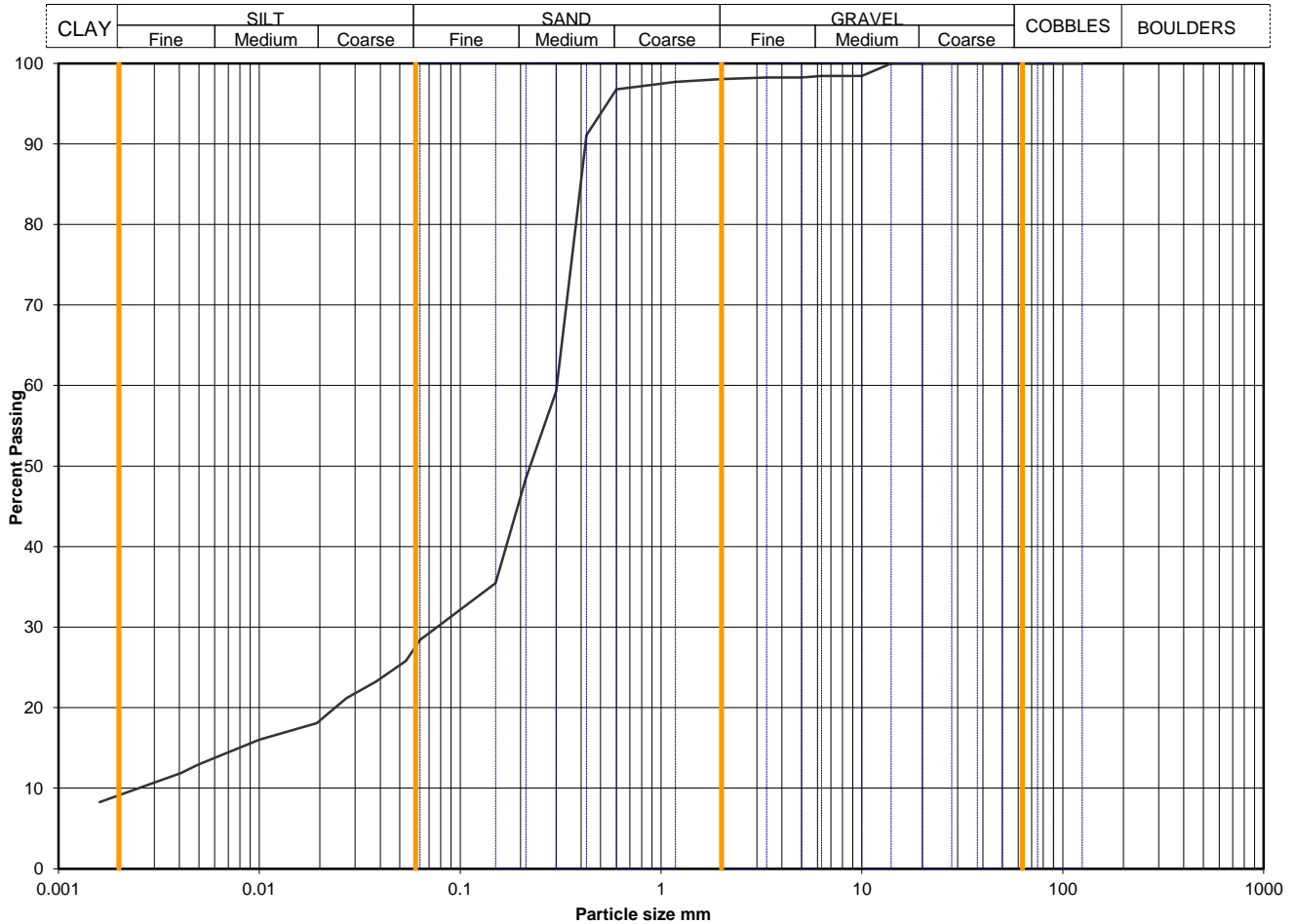
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	BH3
	A8015-1820180413102638	Sample Depth (m BGL)	4.00 - 4.45
		Sample Type and No	D8
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	28
90	100	0.0537	26
75	100	0.0382	23
63	100	0.0271	21
50	100	0.0193	18
37.5	100	0.0100	16
28	100	0.0050	13
20	100	0.0041	12
14	100	0.0016	8
10	98		
6.3	98		
5.0	98		
3.35	98		
2.00	98		
1.18	98		
0.600	97	Particle density, Mg/m3	
0.425	91	2.65	assumed
0.300	59	Dry mass of sample, kg	
0.212	48		
0.150	35		
0.063	28	0.4	

Soil description	Brown slightly gravelly very sandy silty CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions <small>*<60mm values to aid description only</small>	Cobbles / boulders Gravel Sand Silt Clay	Whole	*<60mm
		0	0
		2	2
		70	70
		19	19
		9	9

Uniformity Coefficient	D60 / D10	120
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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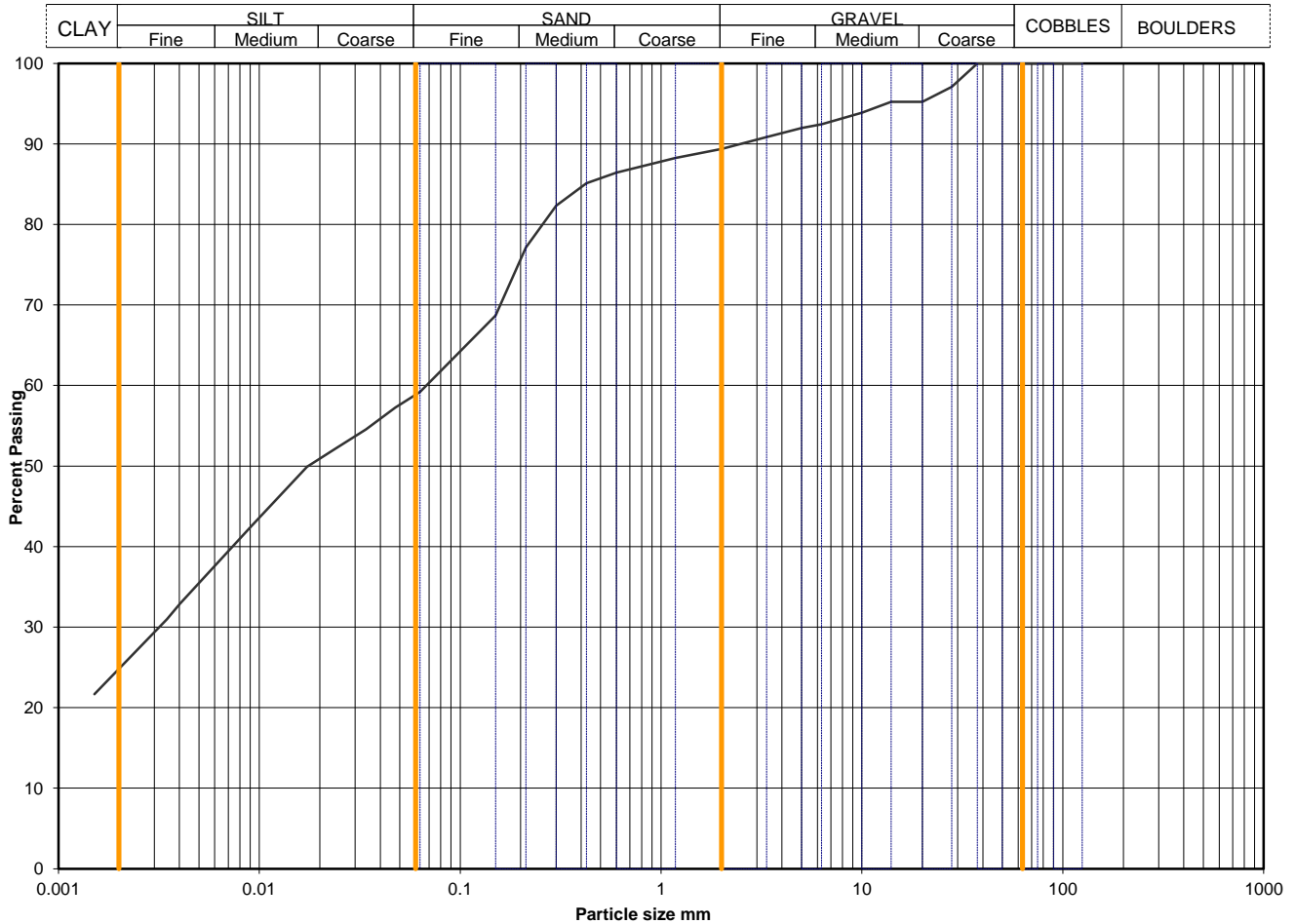
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	BH3
	A8015-1820180413102754	Sample Depth (m BGL)	9.00 - 9.45
		Sample Type and No	UT19
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	59
90	100	0.0476	57
75	100	0.0340	55
63	100	0.0242	52
50	100	0.0173	50
37.5	100	0.0091	43
28	97	0.0040	33
20	95	0.0035	31
14	95	0.0015	22
10	94		
6.3	92		
5.0	92		
3.35	91		
2.00	89		
1.18	88		
0.600	86		
0.425	85		
0.300	82		
0.212	77		
0.150	69		
0.063	59		
		Particle density, Mg/m ³	
		2.65 assumed	
		Dry mass of sample, kg	
		4.7	

Soil description	Firm greyish brown slightly sandy slightly gravelly silty CLAY. Gravel contains chalk fragments.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole	*<60mm
		0	0
		11	11
		30	30
		34	34
*<60mm values to aid description only		25	25

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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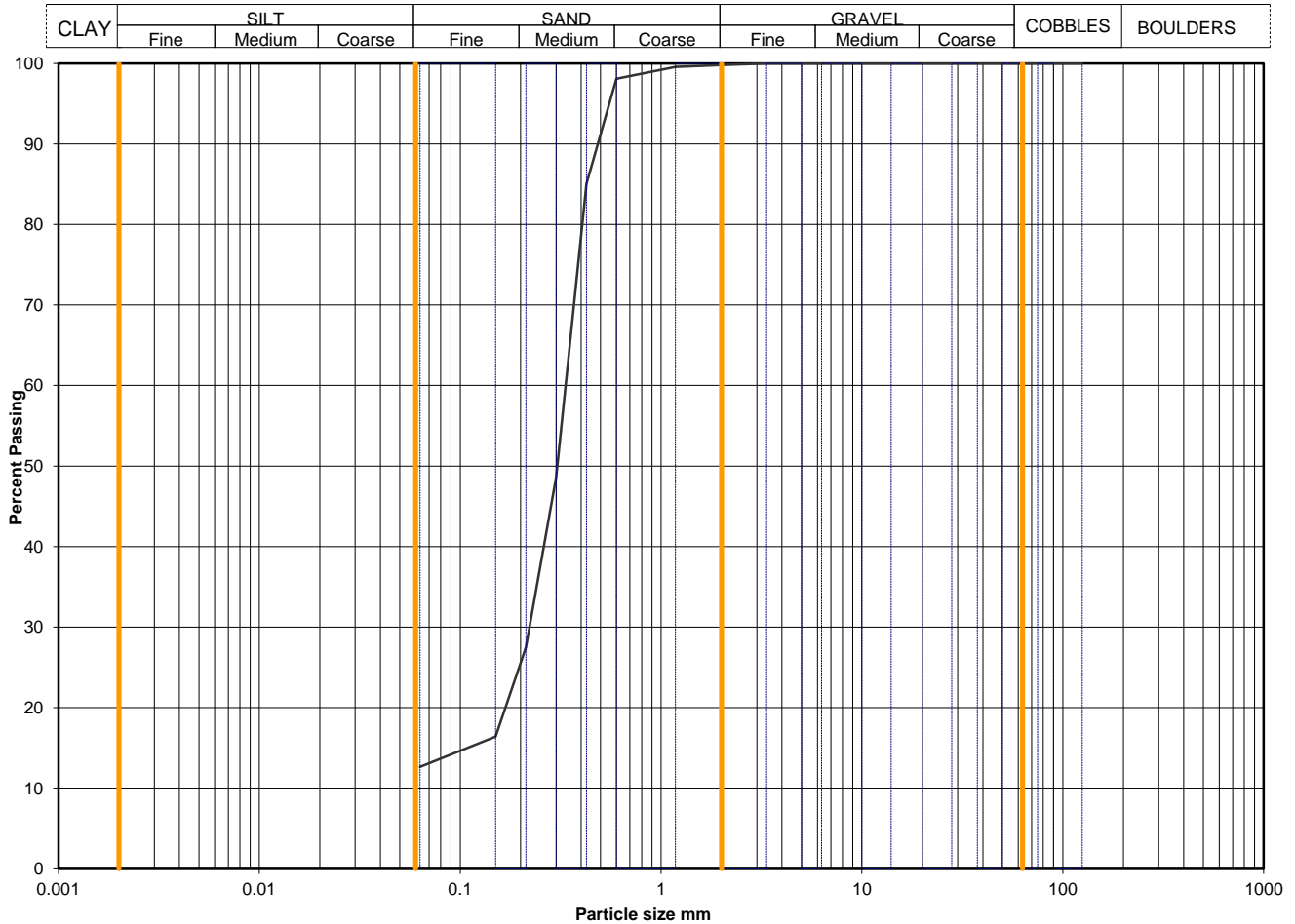
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	BH3
	A8015-1820180413102944	Sample Depth (m BGL)	13.50 - 13.95
		Sample Type and No	D32
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	100		
0.600	98		
0.425	85		
0.300	49		
0.212	27		
0.150	16		
0.063	13		

Dry mass of sample, kg	
0.4	

Soil description	Light brown silty SAND.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions <small>*<60mm values to aid description only</small>	Cobbles / boulders Gravel Sand Silt Clay	Whole	*<60mm
		0	0
		0	0
		87	87
		silt+clay =	
		13	13

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

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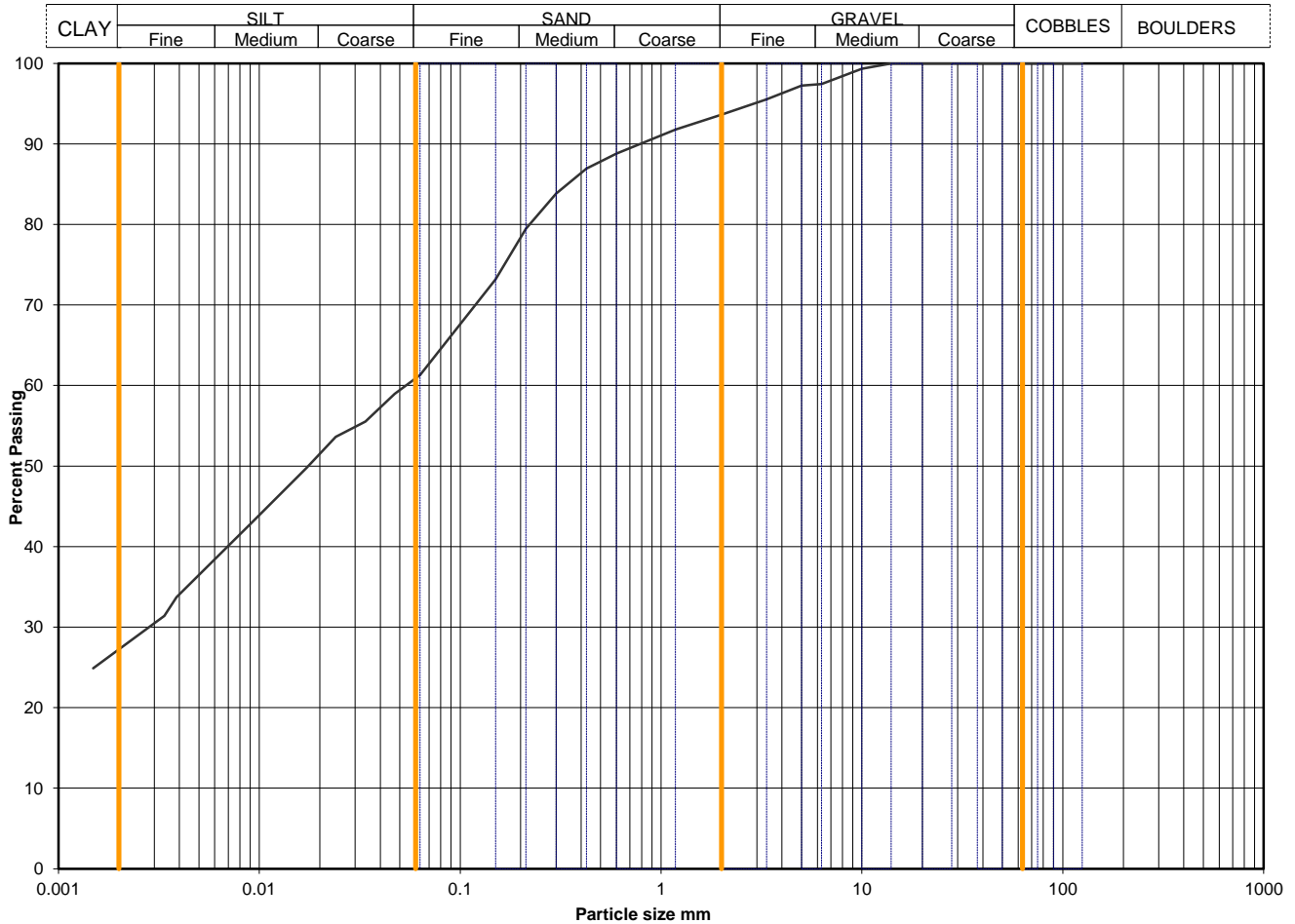
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	BH4
	A8015-1820180418115116	Sample Depth (m BGL)	5.50 - 6.00
		Sample Type and No	B13
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	61
90	100	0.0472	59
75	100	0.0338	56
63	100	0.0241	54
50	100	0.0172	50
37.5	100	0.0091	43
28	100	0.0039	34
20	100	0.0034	31
14	100	0.0015	25
10	99		
6.3	97		
5.0	97		
3.35	96		
2.00	94		
1.18	92		
0.600	89		
0.425	87		
0.300	84		
0.212	79		
0.150	73		
0.063	61		

Particle density, Mg/m3	
2.65	assumed
Dry mass of sample, kg	
7.9	

Soil description	Brown slightly sandy slightly gravelly silty CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole	*<60mm
		0	0
		6	6
		32	32
		34	34
*<60mm values to aid description only		27	27

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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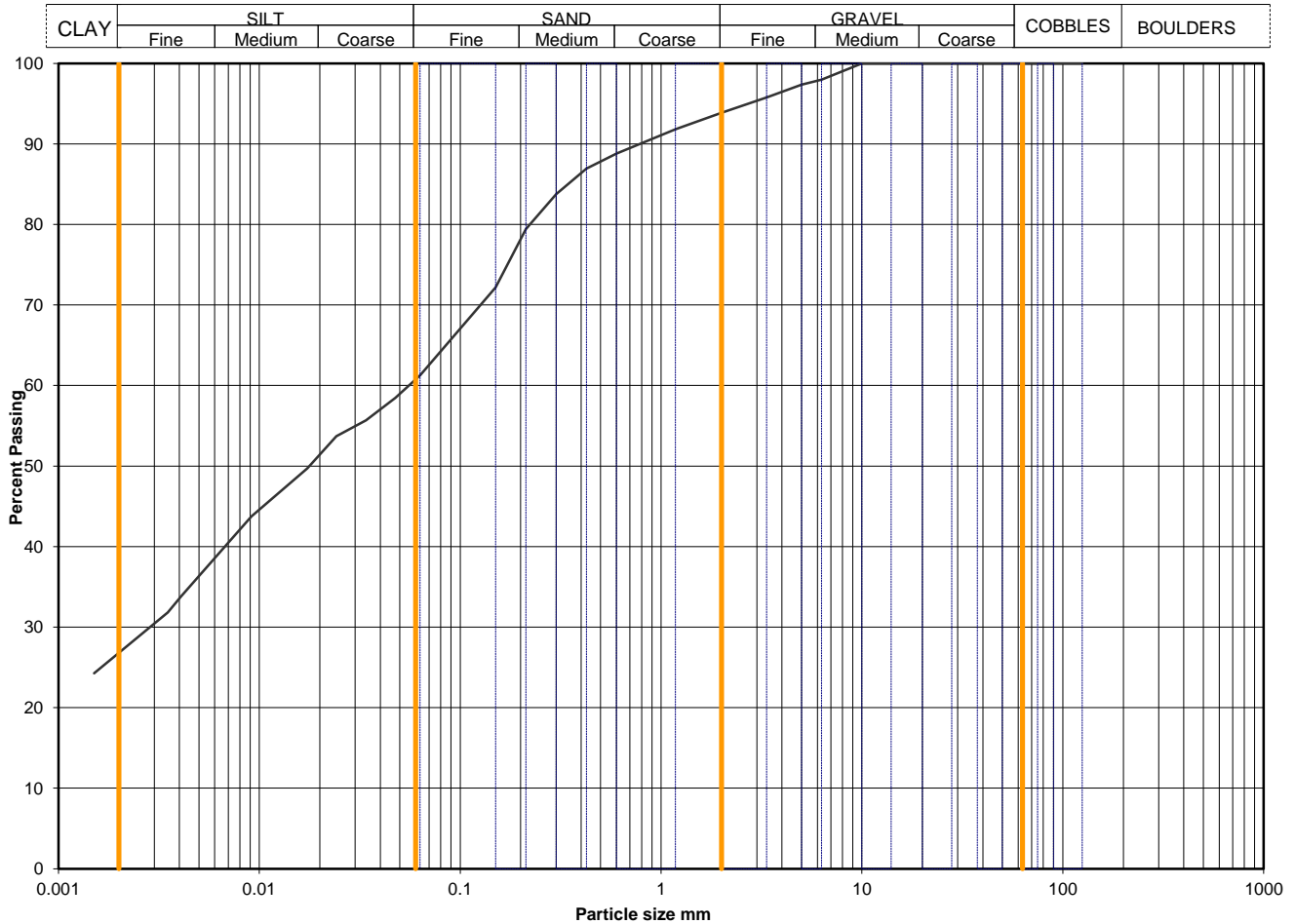
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	BH5
	A8015-1820180418120720	Sample Depth (m BGL)	7.10 - 7.55
		Sample Type and No	B26
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	61
90	100	0.0476	58
75	100	0.0340	56
63	100	0.0242	54
50	100	0.0174	50
37.5	100	0.0091	44
28	100	0.0041	34
20	100	0.0035	32
14	100	0.0015	24
10	100		
6.3	98		
5.0	97		
3.35	96		
2.00	94		
1.18	92		
0.600	89		
0.425	87		
0.300	84		
0.212	79		
0.150	72		
0.063	61		
		Particle density, Mg/m3 2.65 assumed	
		Dry mass of sample, kg 14.1	

Soil description	Brown slightly sandy slightly gravelly silty CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole	*<60mm
		0	0
		6	6
		33	33
		34	34
*<60mm values to aid description only		27	27

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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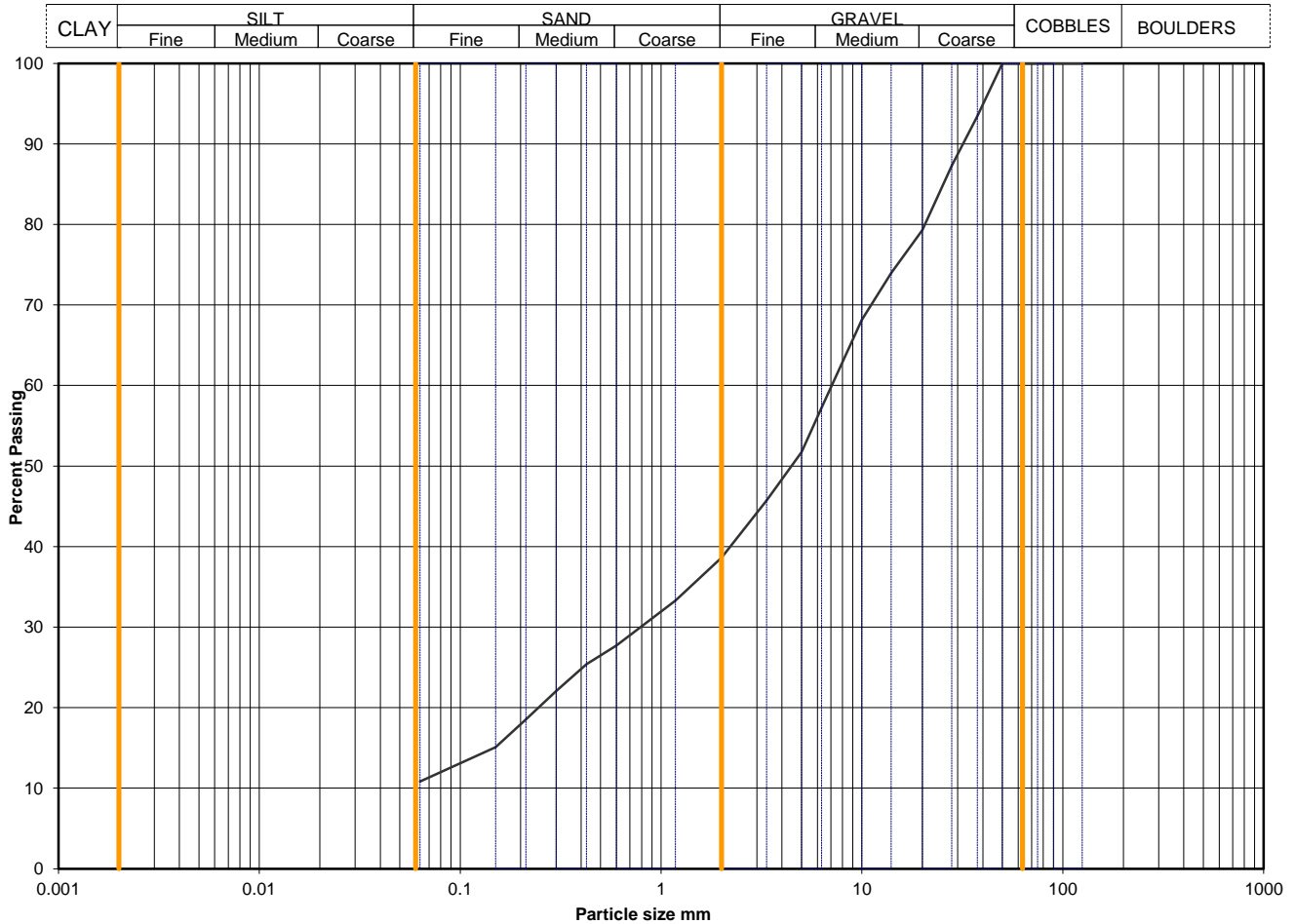
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	BH6
	A8015-1820180409092440	Sample Depth (m BGL)	0.00 - 0.30
		Sample Type and No	B1
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	93		
28	87		
20	79		
14	74		
10	68		
6.3	57		
5.0	52		
3.35	46		
2.00	39		
1.18	33		
0.600	28		
0.425	25		
0.300	22		
0.212	19		
0.150	15		
0.063	11		

Dry mass of sample, kg	
6.4	

Soil description	Brown very sandy clayey GRAVEL.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions <small>*<60mm values to aid description only</small>	Cobbles / boulders	Whole	*<60mm
	Gravel	0	0
	Sand	61	61
	Silt	28	28
	Clay	11	11

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

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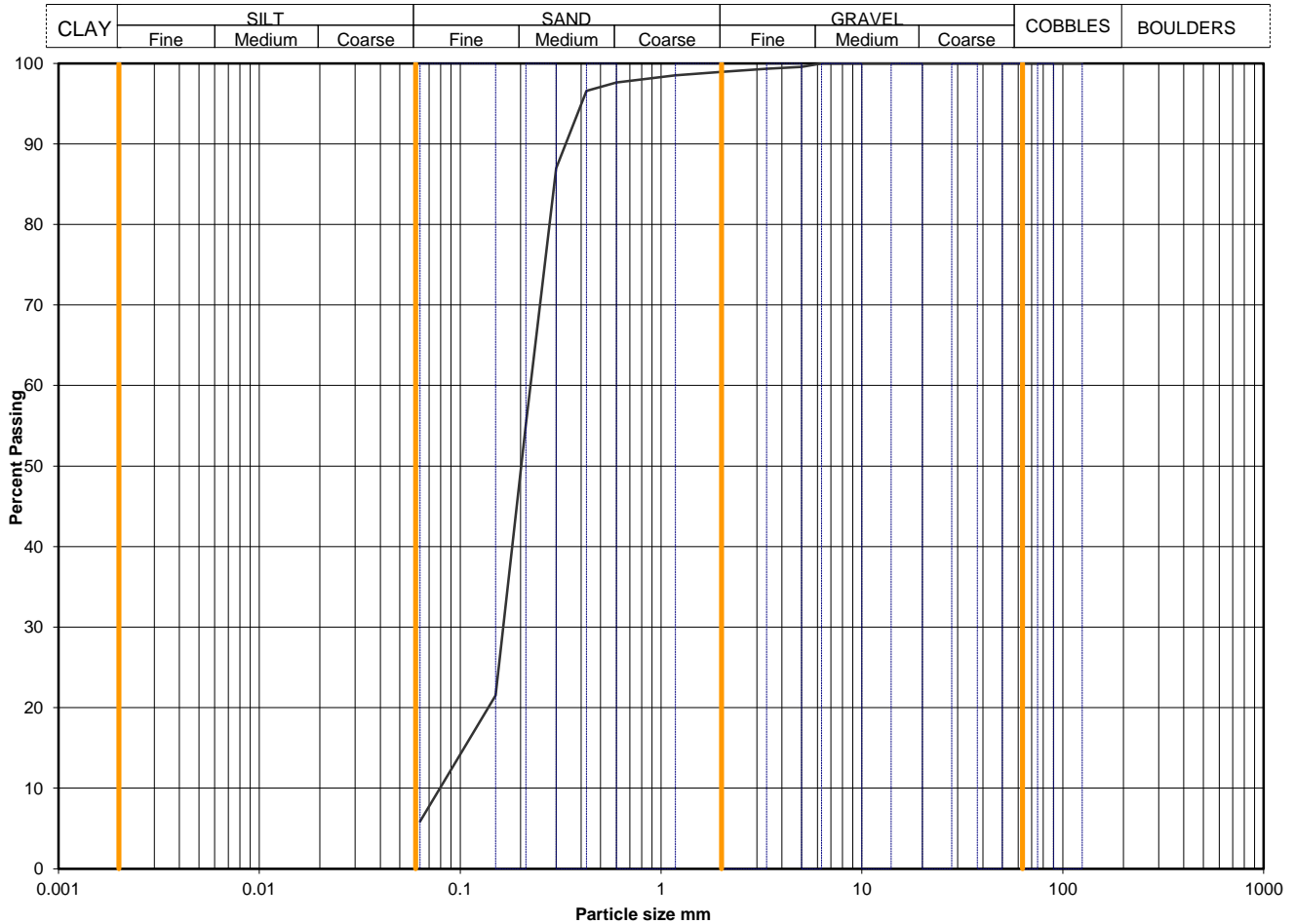
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	TP2
	A8015-18-20180413090532	Sample Depth (m BGL)	4.00 - 4.20
		Sample Type and No	B12
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5.0	100		
3.35	99		
2.00	99		
1.18	99		
0.600	98		
0.425	97		
0.300	87		
0.212	55		
0.150	22		
0.063	6		
		Dry mass of sample, kg	
		11.1	

Soil description	Brown slightly gravelly silty SAND.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions <small>*<60mm values to aid description only</small>	Cobbles / boulders Gravel Sand Silt Clay	Whole	*<60mm
		0	0
		1	1
		93	93
		silt+clay =	
6	6		

Uniformity Coefficient	D60 / D10	3
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

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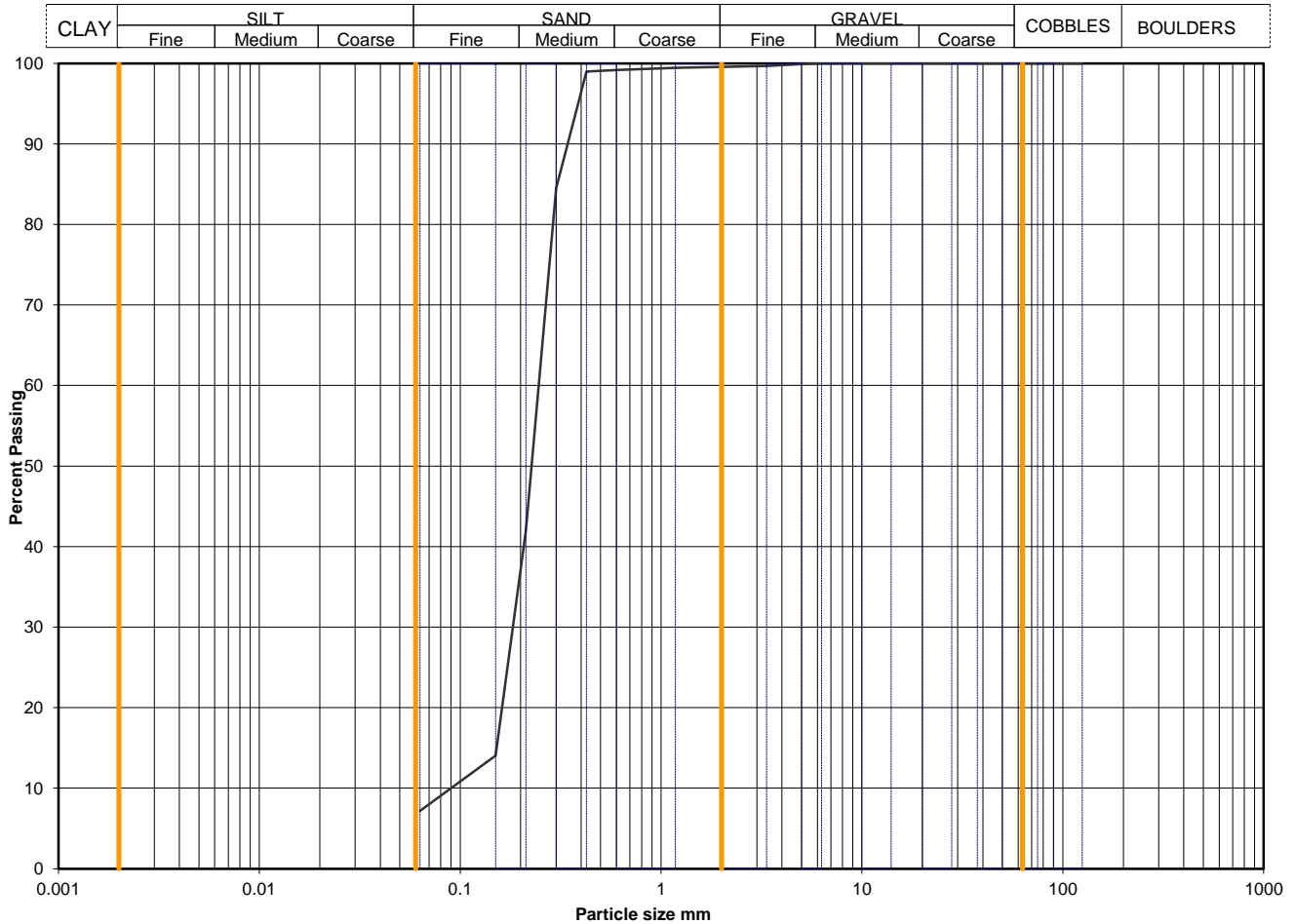
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	TP5
	A8015-18-20180410090059	Sample Depth (m BGL)	2.50 - 2.70
		Sample Type and No	B10
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5.0	100		
3.35	100		
2.00	100		
1.18	99		
0.600	99		
0.425	99		
0.300	85		
0.212	42		
0.150	14		
0.063	7		
		Dry mass of sample, kg	
		13.5	

Soil description	Brown silty SAND.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions <small>*<60mm values to aid description only</small>	Cobbles / boulders	Whole	*<60mm
	Gravel	0	0
	Sand	92	92
	Silt	silt+clay =	
	Clay	7	7

Uniformity Coefficient	D60 / D10	3
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

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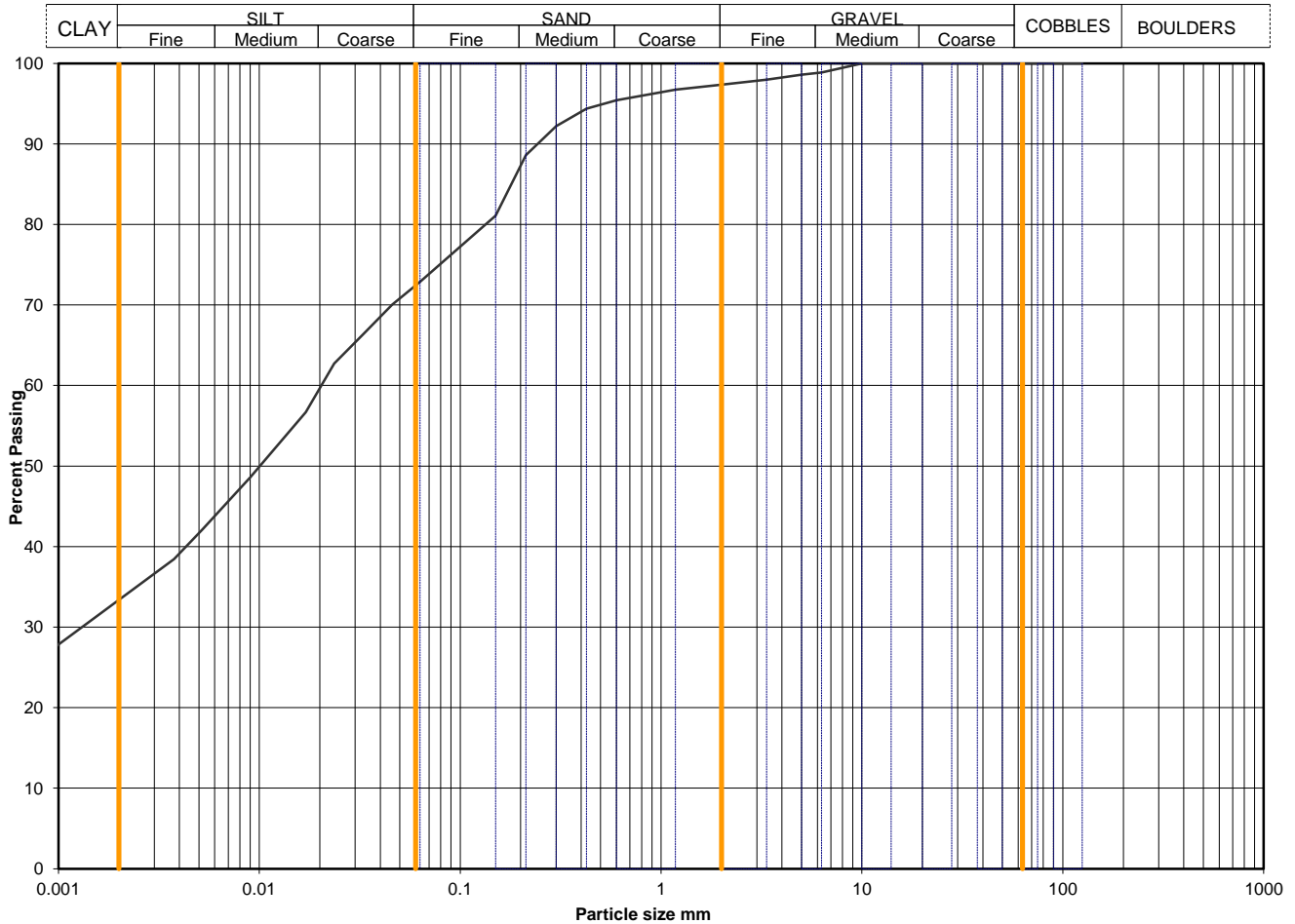
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	TP8
	A8015-18-20180410074235	Sample Depth (m BGL)	0.20 - 0.50
		Sample Type and No	B4
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	73
90	100	0.0459	70
75	100	0.0329	66
63	100	0.0236	63
50	100	0.0170	57
37.5	100	0.0090	49
28	100	0.0052	42
20	100	0.0038	38
14	100	0.0008	26
10	100		
6.3	99		
5.0	99		
3.35	98		
2.00	97		
1.18	97		
0.600	95		
0.425	94		
0.300	92		
0.212	89		
0.150	81		
0.063	73		

Particle density, Mg/m3	
2.65	assumed
Dry mass of sample, kg	
10.6	

Soil description	Brown slightly sandy slightly gravelly silty CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole	*<60mm
		0	0
		3	3
		24	24
		39	39
*<60mm values to aid description only		33	33

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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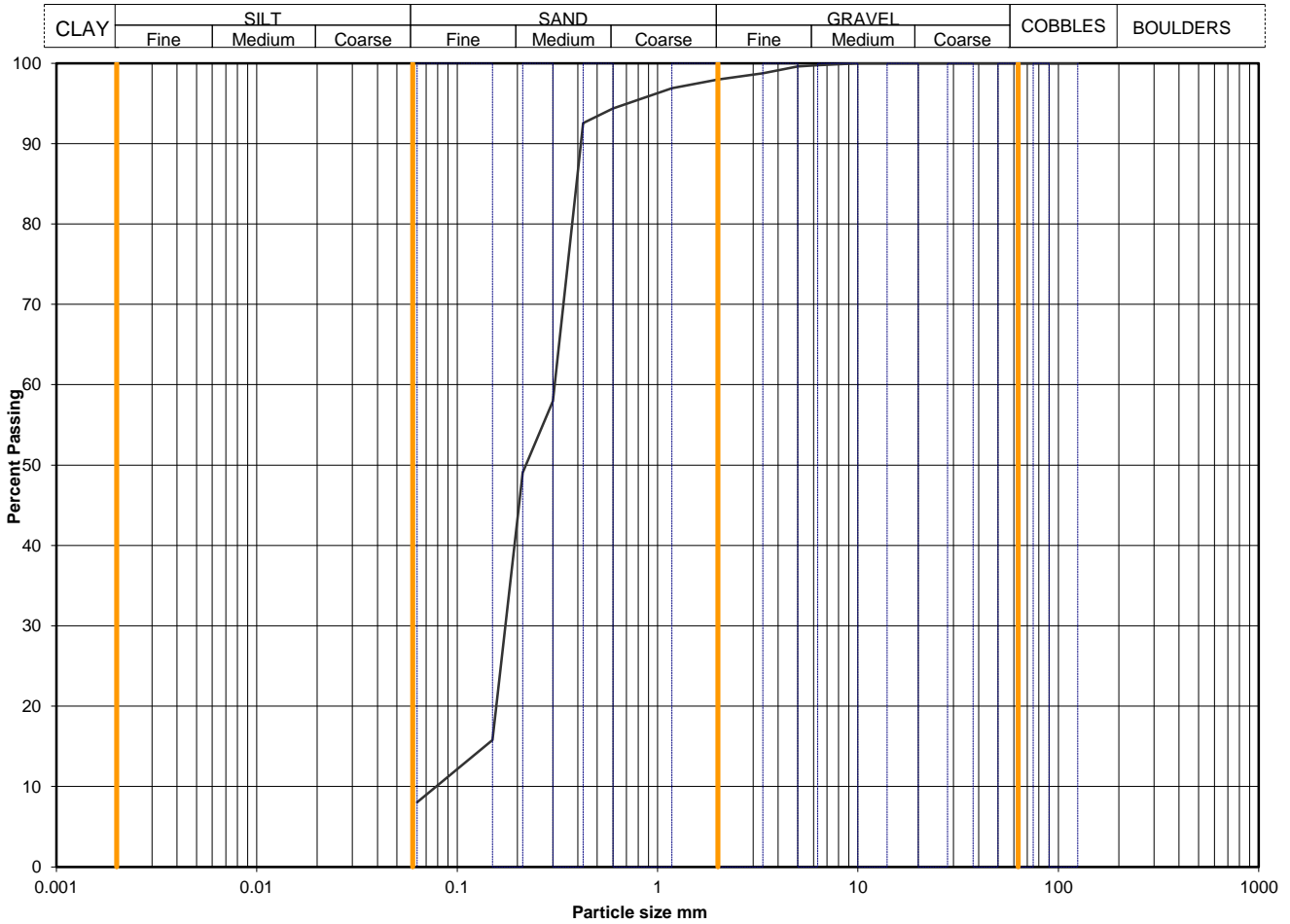
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	TP8
	A8015-18-20180410074504	Sample Depth (m BGL)	3.8
		Sample Type and No	D11
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	100		
20	100		
14	100		
10	100		
6.3	100		
5.0	100		
3.35	99		
2.00	98		
1.18	97		
0.600	94		
0.425	93		
0.300	58		
0.212	49		
0.150	16		
0.063	8		

Dry mass of sample, kg	
1.1	

Soil description	Brown slightly gravelly silty SAND.		
Preparation / Pretreatment	Sieve: natural material		
Remarks			
Sample Proportions <small>*<60mm values to aid description only</small>	Cobbles / boulders	Whole	*<60mm
	Gravel	0	0
	Sand	2	2
	Silt	90	90
	Clay	silt+clay =	
		8	8

Uniformity Coefficient	D60 / D10	4
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	none

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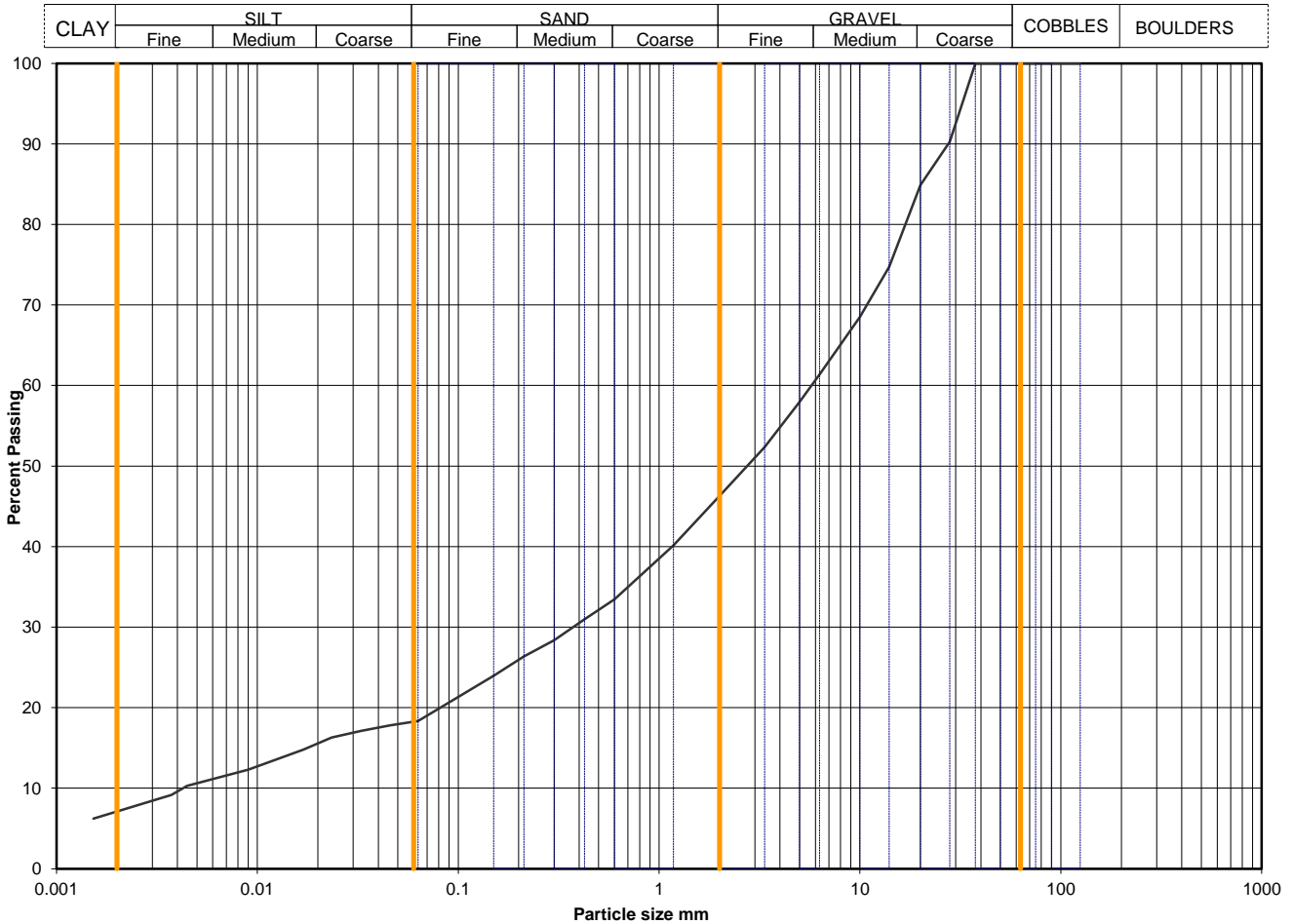
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	TP9
	A8015-18-20180410091457	Sample Depth (m BGL)	0.3
		Sample Type and No	D3
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	18
90	100	0.0457	18
75	100	0.0327	17
63	100	0.0234	16
50	100	0.0169	15
37.5	100	0.0090	12
28	90	0.0045	10
20	85	0.0037	9
14	75	0.0015	6
10	69		
6.3	61		
5.0	58		
3.35	52		
2.00	46		
1.18	40		
0.600	33		
0.425	31		
0.300	28		
0.212	26		
0.150	24		
0.063	18		

Particle density, Mg/m3	
2.65	assumed
Dry mass of sample, kg	
1.1	

Soil description	Brown slightly sandy gravelly silty CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole	*<60mm
		0	0
		54	54
		28	28
		11	11
*<60mm values to aid description only		7	7

Uniformity Coefficient	D60 / D10	1347
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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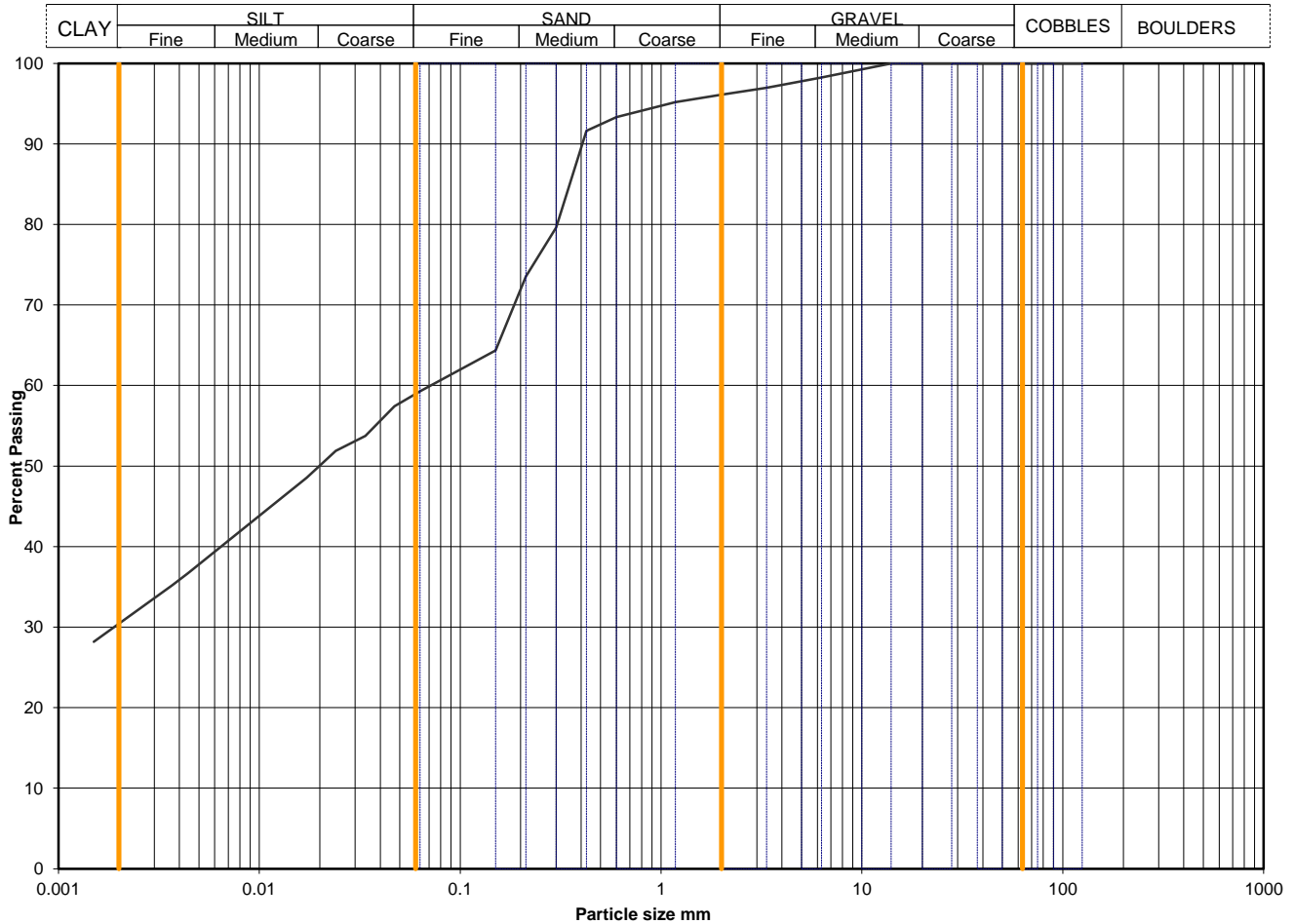
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	TP9
	A8015-18-20180410091609	Sample Depth (m BGL)	2.00 - 2.20
		Sample Type and No	B10
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	59
90	100	0.0471	57
75	100	0.0338	54
63	100	0.0241	52
50	100	0.0172	49
37.5	100	0.0091	43
28	100	0.0044	37
20	100	0.0037	35
14	100	0.0015	28
10	99		
6.3	98		
5.0	98		
3.35	97		
2.00	96		
1.18	95		
0.600	93		
0.425	92		
0.300	80		
0.212	74		
0.150	64		
0.063	59		

Particle density, Mg/m3	
2.65	assumed
Dry mass of sample, kg	
10.4	

Soil description	Brown slightly gravelly sandy silty CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole	*<60mm
		0	0
		4	4
		37	37
		29	29
*<60mm values to aid description only		30	30

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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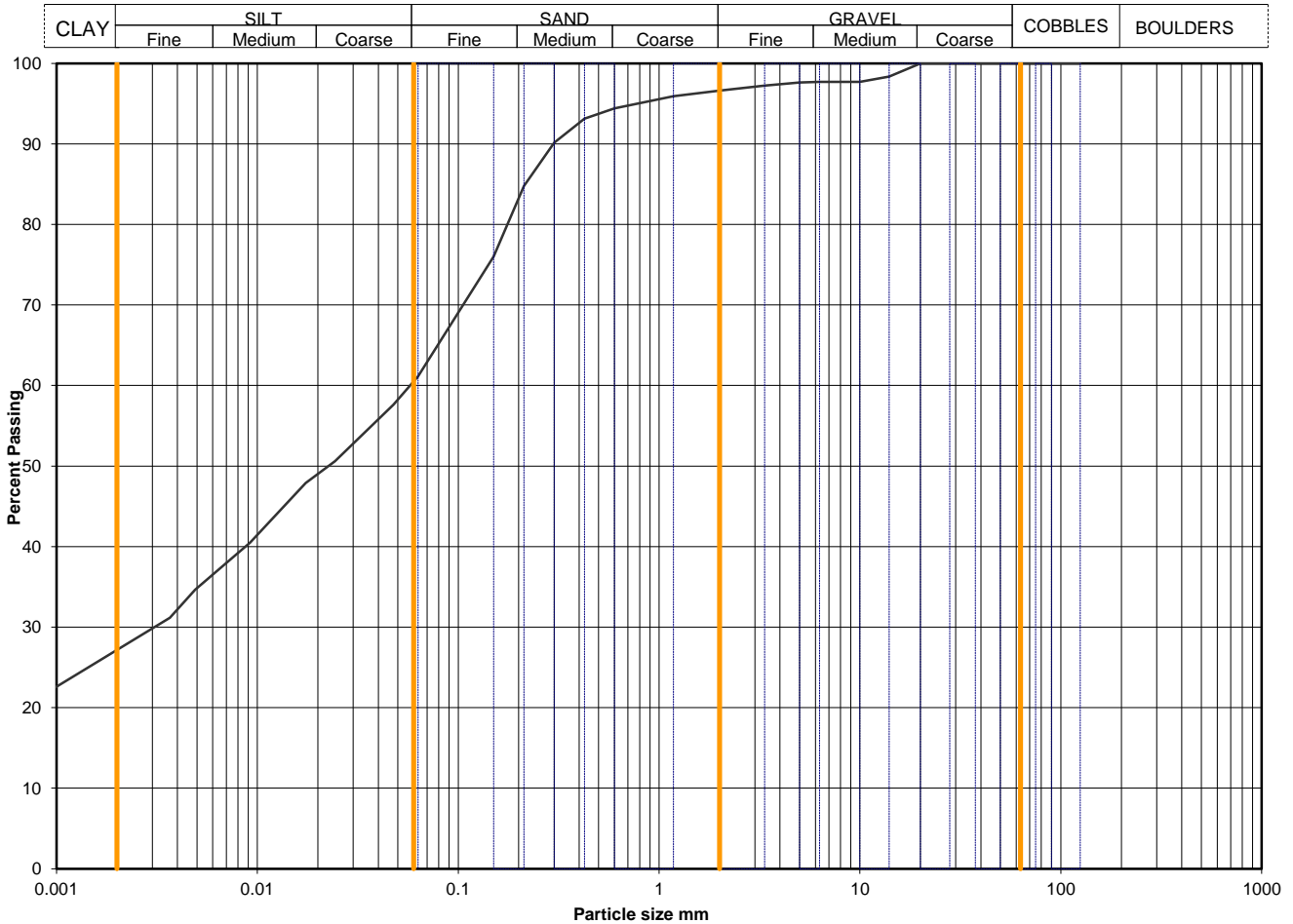
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	TT1
	A8015-18-20180413014845	Sample Depth (m BGL)	2.20 - 2.30
		Sample Type and No	B8
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	61
90	100	0.0476	58
75	100	0.0341	54
63	100	0.0244	51
50	100	0.0174	48
37.5	100	0.0092	40
28	100	0.0049	35
20	100	0.0037	31
14	98	0.0008	21
10	98		
6.3	98		
5.0	98		
3.35	97		
2.00	97		
1.18	96		
0.600	94		
0.425	93		
0.300	90		
0.212	85		
0.150	76		
0.063	61		

Particle density, Mg/m3		11.2
2.65 assumed		
Dry mass of sample, kg		

Soil description	Brown slightly gravelly sandy silty CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole	*<60mm
		0	0
		3	3
		35	35
		34	34
*<60mm values to aid description only		27	27

Uniformity Coefficient	D60 / D10	Not applicable
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Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

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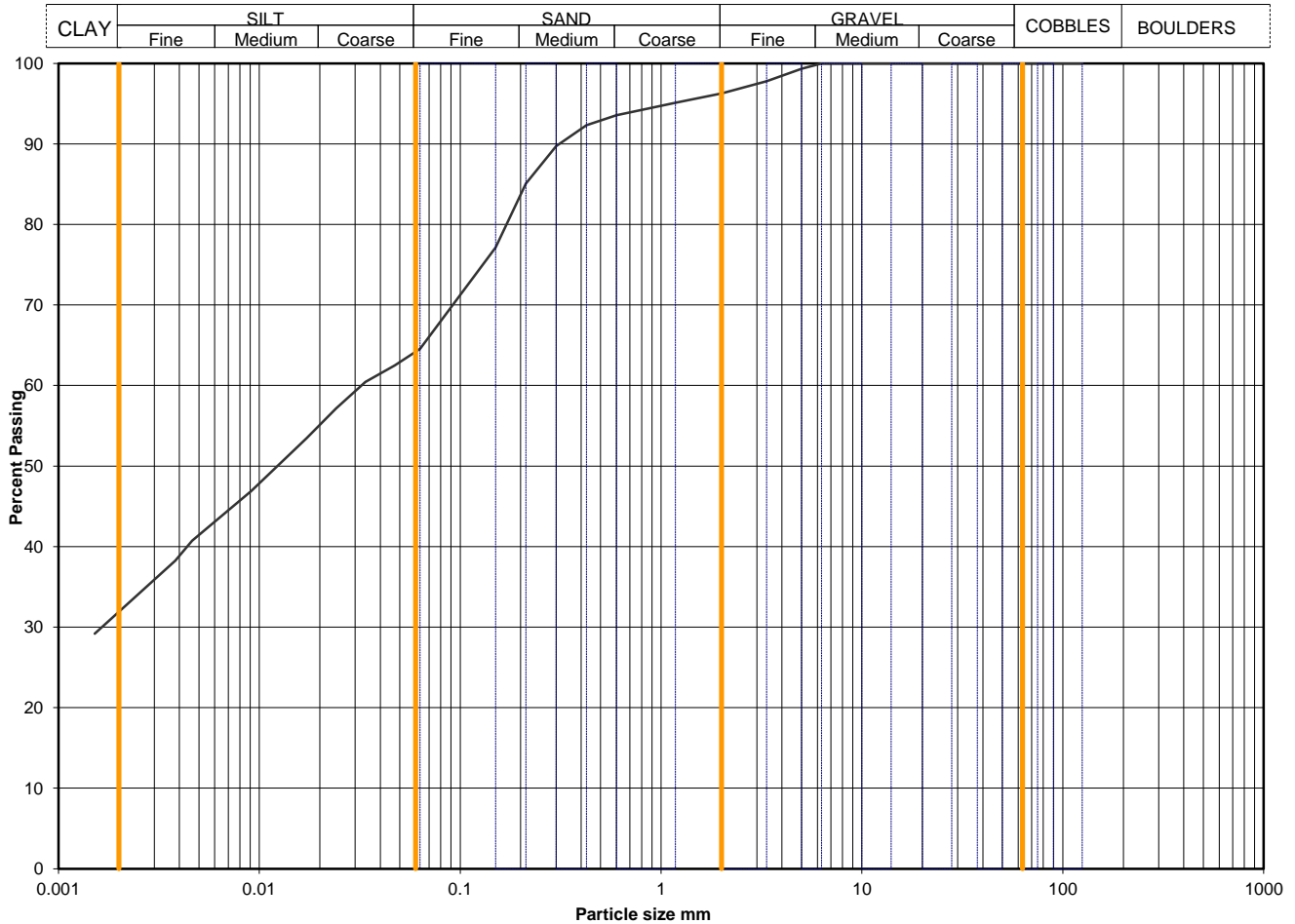
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	TT2
	A8015-18-20180408083410	Sample Depth (m BGL)	1.00 - 1.25
		Sample Type and No	B4
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	65
90	100	0.0473	63
75	100	0.0337	60
63	100	0.0241	57
50	100	0.0172	53
37.5	100	0.0091	47
28	100	0.0046	41
20	100	0.0038	38
14	100	0.0015	29
10	100		
6.3	100		
5.0	99		
3.35	98		
2.00	96		
1.18	95		
0.600	94		
0.425	92		
0.300	90		
0.212	85		
0.150	77		
0.063	65		

Particle density, Mg/m3	2.65	assumed
Dry mass of sample, kg	13.9	

Soil description	Brown slightly sandy slightly gravelly silty CLAY with rootlets.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions <small>*<60mm values to aid description only</small>	Cobbles / boulders Gravel Sand Silt Clay	Whole	*<60mm
		0	0
		4	4
		32	32
		33	33
		32	32

Uniformity Coefficient	D60 / D10	Not applicable
------------------------	-----------	----------------

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2,9
Rev 2.10
Oct 16



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Project No A8015-18
Project Name VPI IMMINGHAM

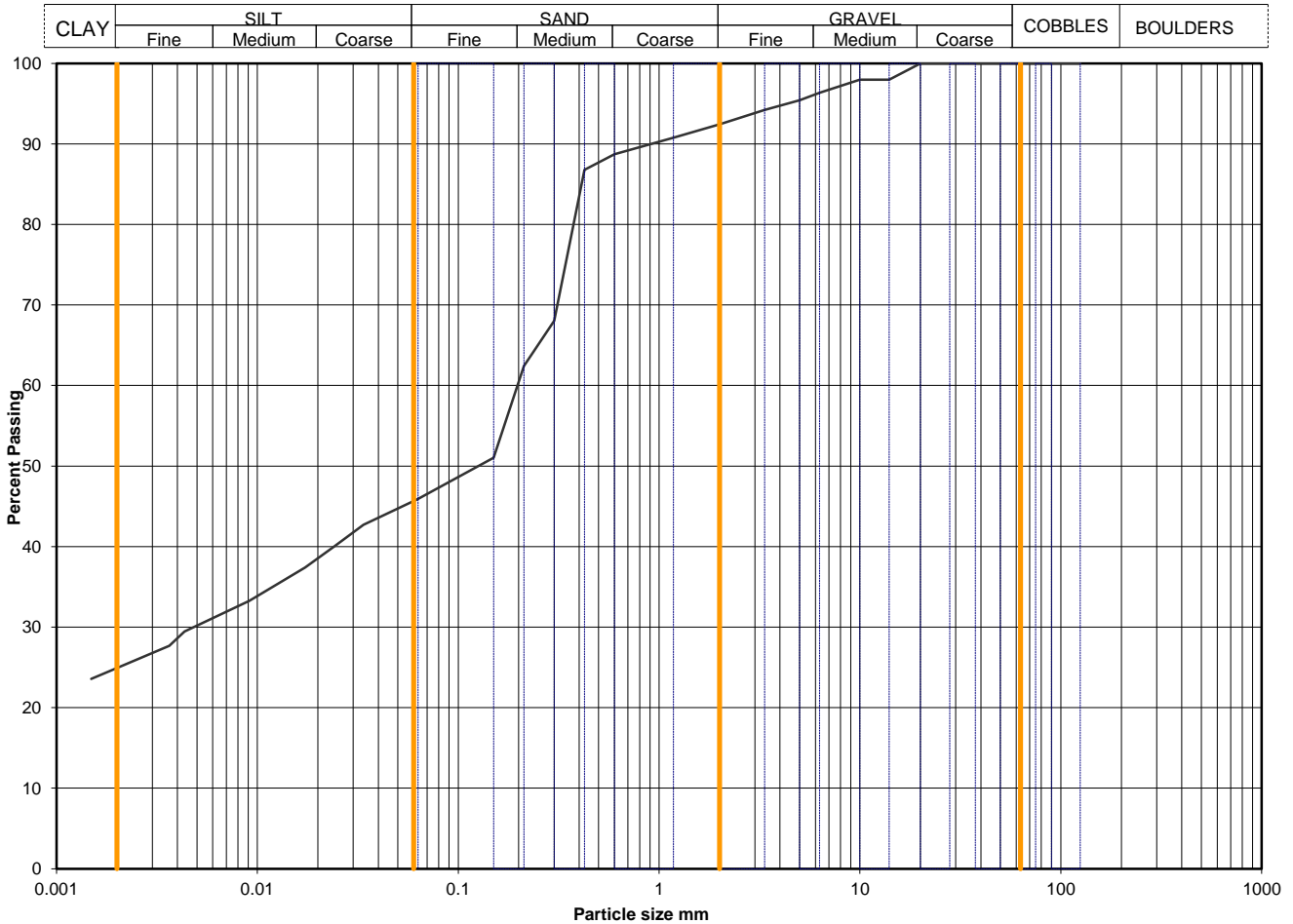
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Particle Size Distribution Analysis

Sample Details:	SAMPLE ID:	Hole No	TT2
	A8015-18-20180408083738	Sample Depth (m BGL)	3.25 - 3.50
		Sample Type and No	B10
		Specimen Ref	



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0630	46
90	100	0.0474	44
75	100	0.0338	43
63	100	0.0242	40
50	100	0.0173	37
37.5	100	0.0091	33
28	100	0.0043	29
20	100	0.0036	28
14	98	0.0015	24
10	98		
6.3	96		
5.0	95		
3.35	94		
2.00	92		
1.18	91		
0.600	89		
0.425	87		
0.300	68		
0.212	62		
0.150	51		
0.063	46		
		Particle density, Mg/m3 2.65 assumed	
		Dry mass of sample, kg 14.0	

Soil description	Brown slightly gravelly sandy silty CLAY.		
Preparation / Pretreatment	Sieve: natural material Hydro: as BS1377		
Remarks			
Sample Proportions	Cobbles / boulders Gravel Sand Silt Clay	Whole	*<60mm
		0	0
		8	8
		46	46
		21	21
*<60mm values to aid description only		25	25

Uniformity Coefficient	D60 / D10	Not applicable
------------------------	-----------	----------------

Test Method	BS 1377 : Part 2 : 1990	
	Sieving	9.2 wet sieve
	Sedimentation	9.5 hydrometer

QA Ref
SLR 2,9
Rev 2.10
Oct 16



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Project No A8015-18
Project Name VPI IMMINGHAM

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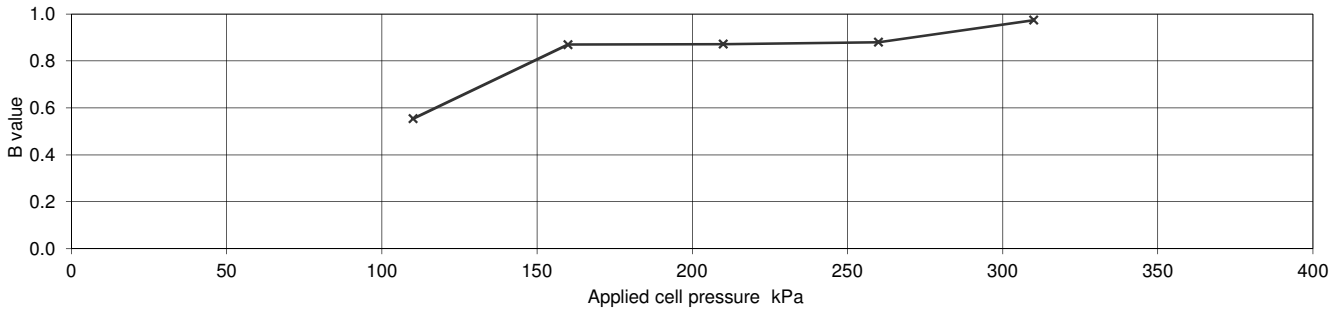
**Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure
(BS1377 : Part 8 : 1990) - Multistage test on a single specimen**

Project No	A8015-18	Sample Details:	Hole No	BH1		
Project Name	IMMINGHAM		Depth (m BGL)	1.20 - 1.65		
			No	6	Type	UT
			ID			
		Spec Ref				

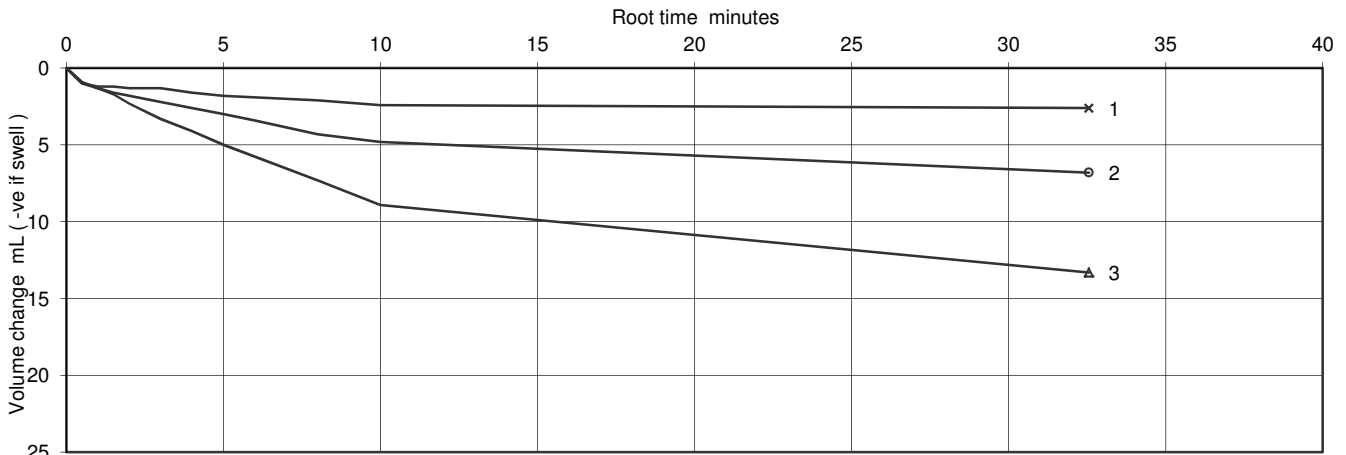
Specimen Details		
Initial		
Length	mm	203.24
Diameter	mm	103.57
Bulk Density	Mg/m ³	2.10
Water Content	%	19
Dry density	Mg/m ³	1.76
After test		
Bulk Density	Mg/m ³	2.08
Water Content	%	20
Dry density	Mg/m ³	1.73

Soil Description	Firm brown slightly sandy slightly gravelly CLAY
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation
		Increments of cell and back pressure
Cell pressure increments	kPa	50
Differential Pressure	kPa	10
Final Cell Pressure	kPa	310
Final pore water pressure	kPa	293.8
Final B Value		0.97



Consolidation Details	Drainage Conditions	From radial boundary and one end				
	Stage No.	1	2	3		
	Cell Pressure applied	312	325	350	kPa	
	Back Pressure applied	300	300	300	kPa	
	Effective Pressure	12	25	50	kPa	
	Pore pressure at start of consolidation	303	308	324	kPa	
	Pore pressure at end of consolidation	301	300	300	kPa	
	Pore pressure dissipation at end of consolidation	70	95	100	%	
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C _{vi}	2.12	1.17	1.08	m ² /year
	Coefficient of Compressibility	M _{vi}	0.67	0.48	0.32	m ² /MN
	Coefficient of Permeability (calculated)	k _{vi}	4.4E-10	1.7E-10	1.1E-10	m/s



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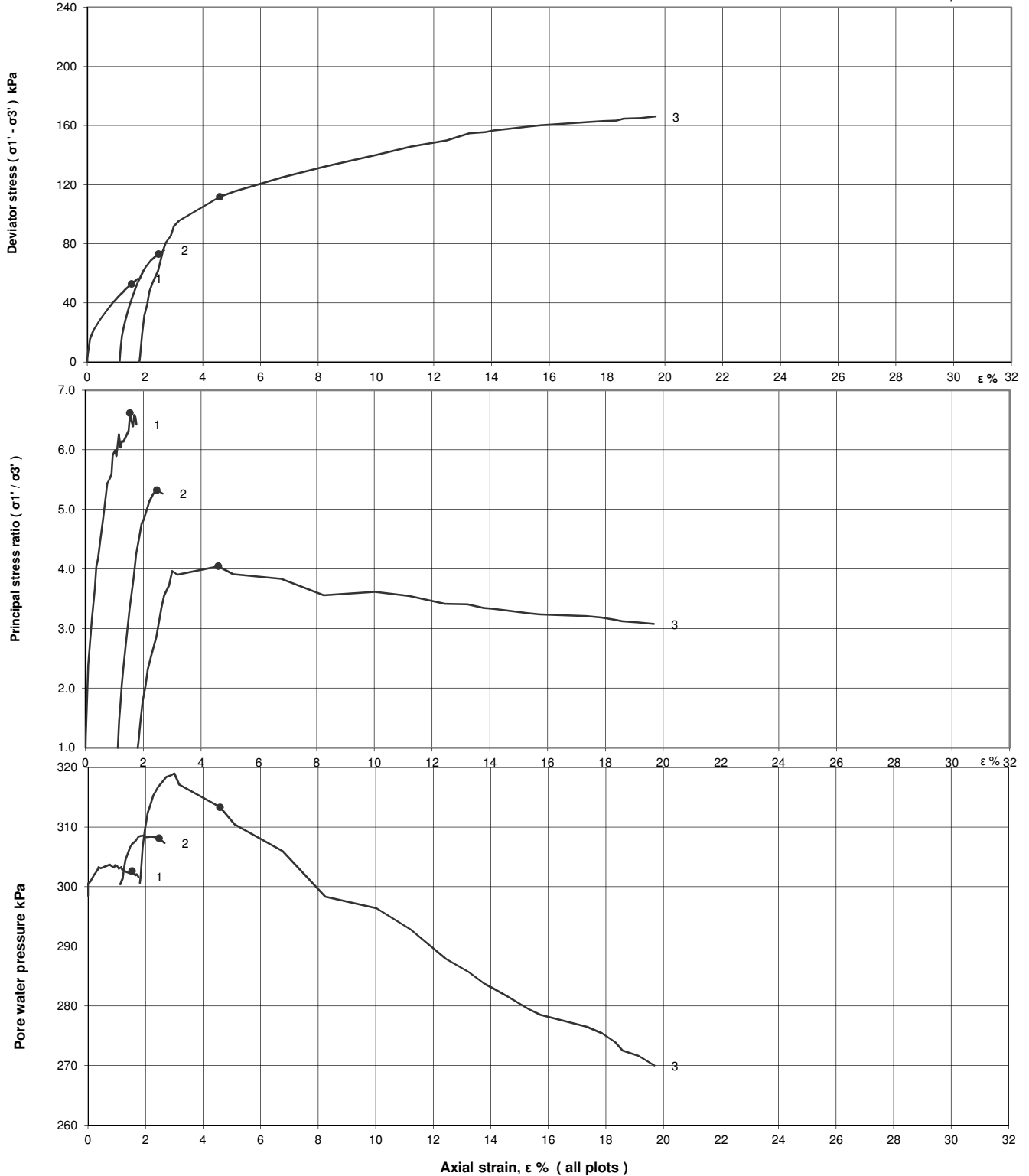
sheet 1 of 3

**Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure
(BS1377 : Part 8 : 1990) - Multistage test on a single specimen**

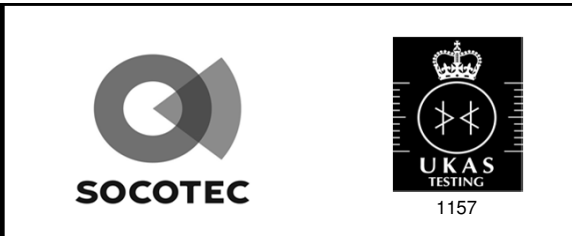
Project No	A8015-18	Sample Details:	Hole No	BH1		
Project Name	IMMINGHAM		Depth (m BGL)	1.20 - 1.65		
			No	6	Type	UT
			ID			
		Spec Ref				

Shearing stages - graphical data

o failure points



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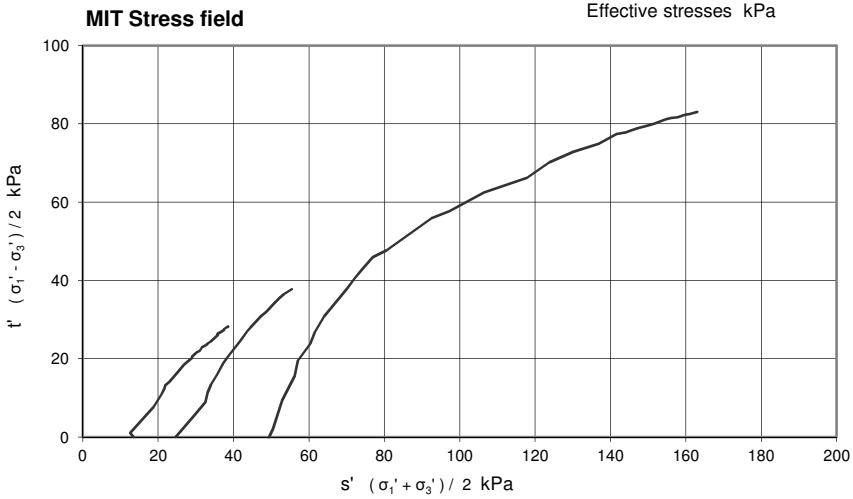
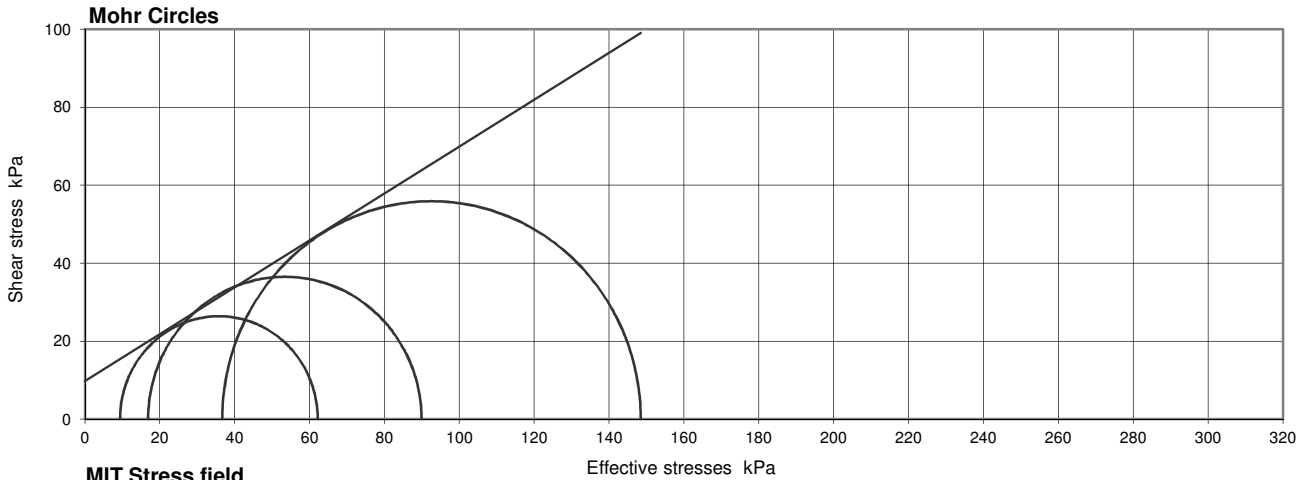
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**Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure
(BS1377 : Part 8 : 1990) - Multistage test on a single specimen**

Project No	A8015-18	Sample Details:	Hole No	BH1		
Project Name	IMMINGHAM		Depth (m BGL)	1.20 - 1.65		
			No	6	Type	UT
			ID			
		Spec Ref				

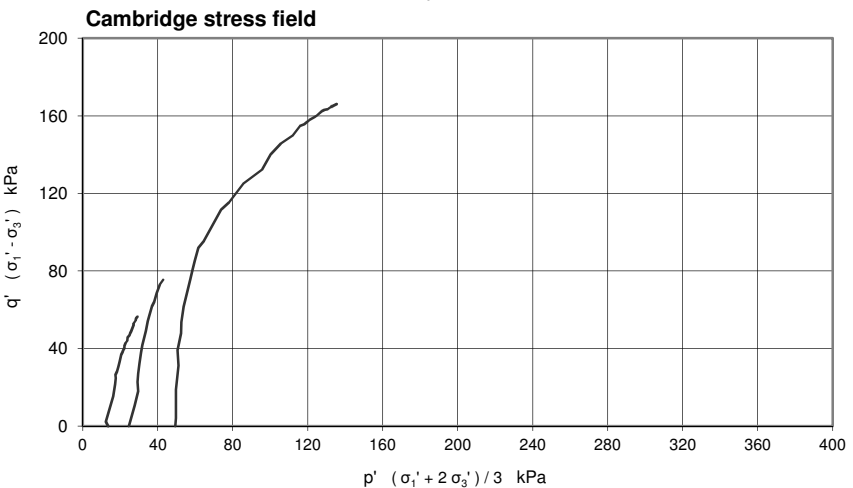


Compression stages

Stage	1	2	3	
Cell pressure	312	325	350	kPa
Initial pwp	299	300	301	kPa
Initial σ_3'	14	25	49	kPa
Rate of strain	1.51	1.51	1.51	%/hr

Failure conditions

Criterion	Maximum effective principal stress ratio			
	1	2	3	
Axial strain	1.54	2.47	4.60	%
$(\sigma_1' / \sigma_3')_f$	6.616	5.321	4.046	
$(\sigma_1' - \sigma_3')_f$	52.8	73.0	111.8	kPa
u_f	303	308	313	kPa
$\sigma_3'_f$	9	17	37	kPa
$\sigma_1'_f$	62	90	148	kPa
A_f	0.08	0.11	0.11	
Time to failure	1.0	1.6	3.0	hrs



Shear Strength Parameters

at peak stress ratio

		Linear regression
c'	kPa	9.8
ϕ'	degrees	31.0
		Manual re-assessment
c'	kPa	-
ϕ'	degrees	-

Mode of failure



Notes : Deviator stresses corrected for area change, vertical side drains and 0.594 mm thick rubber membrane(s)

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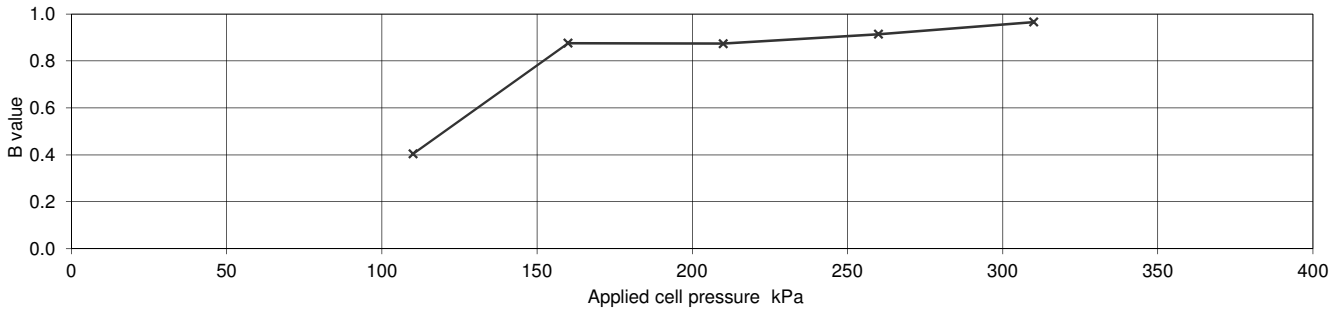
**Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure
(BS1377 : Part 8 : 1990) - Multistage test on a single specimen**

Project No	A8015-18	Sample Details:	Hole No	BH2		
Project Name	IMMINGHAM		Depth (m BGL)	3.30 - 3.75		
			No	15	Type	UT
			ID			
		Spec Ref				

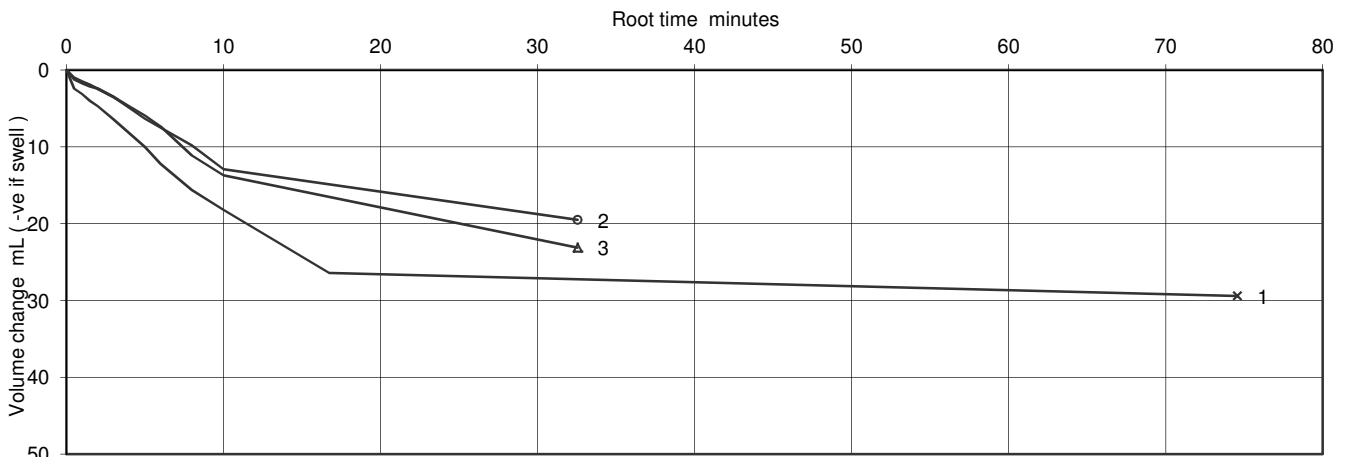
Specimen Details		
Initial		
Length	mm	202.89
Diameter	mm	103.07
Bulk Density	Mg/m ³	2.03
Water Content	%	25
Dry density	Mg/m ³	1.63
After test		
Bulk Density	Mg/m ³	2.04
Water Content	%	24
Dry density	Mg/m ³	1.64

Soil Description	Firm brown laminated slightly sandy CLAY.
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation
		Increments of cell and back pressure
Cell pressure increments	kPa	50
Differential Pressure	kPa	10
Final Cell Pressure	kPa	310
Final pore water pressure	kPa	300
Final B Value		0.97



Consolidation Details	Drainage Conditions	From radial boundary and one end				
	Stage No.	1	2	3		
	Cell Pressure applied	355	410	520	kPa	
	Back Pressure applied	300	300	300	kPa	
	Effective Pressure	55	110	220	kPa	
	Pore pressure at start of consolidation	348	365	419	kPa	
	Pore pressure at end of consolidation	301	301	302	kPa	
	Pore pressure dissipation at end of consolidation	97	99	98	%	
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C _{vi}	0.97	0.94	0.93	m ² /year
	Coefficient of Compressibility	M _{vi}	0.36	0.18	0.12	m ² /MN
	Coefficient of Permeability (calculated)	k _{vi}	1.1E-10	5.1E-11	3.3E-11	m/s



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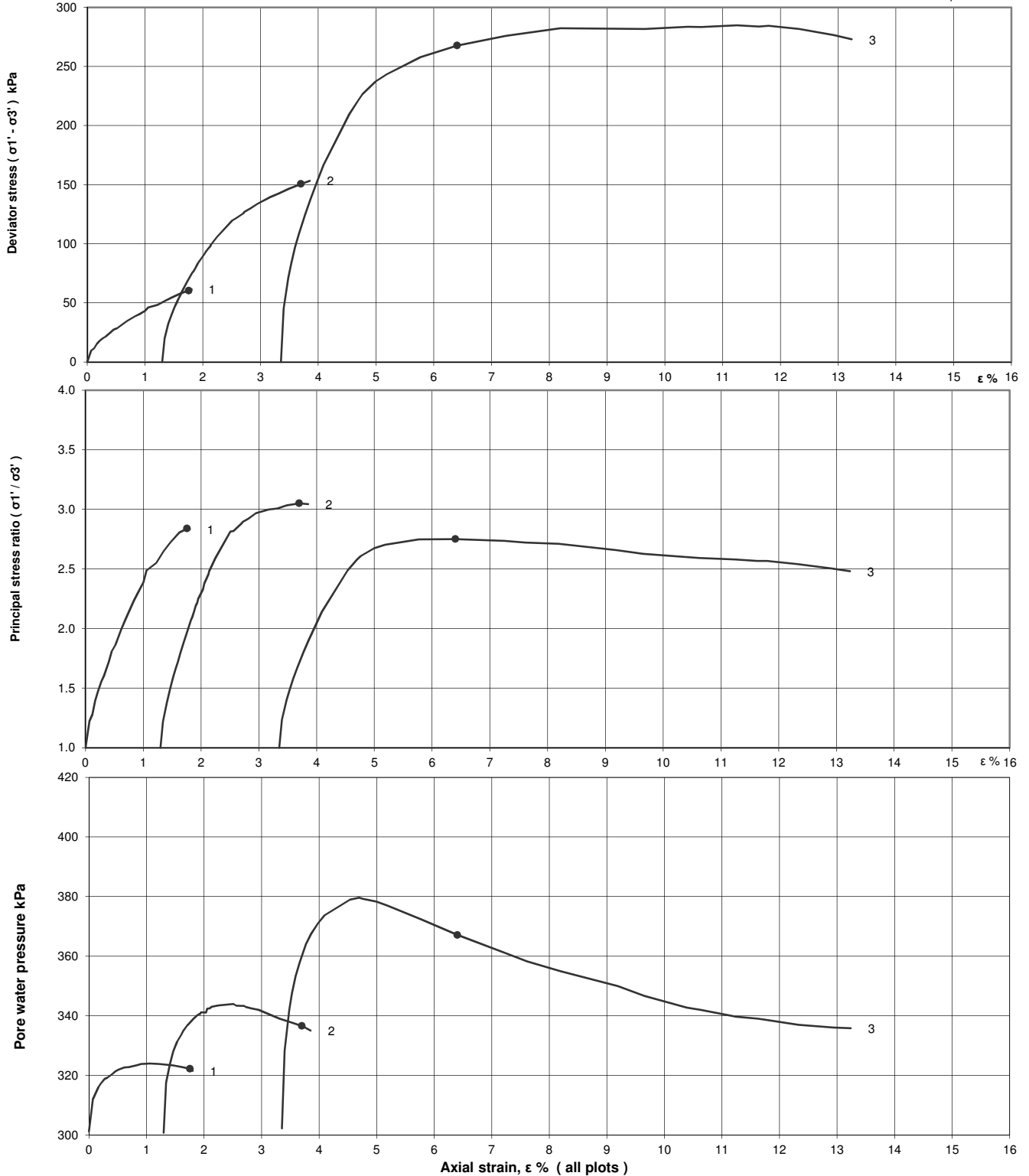
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**Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure
(BS1377 : Part 8 : 1990) - Multistage test on a single specimen**

Project No	A8015-18	Sample Details:	Hole No	BH2		
Project Name	IMMINGHAM		Depth (m BGL)	3.30 - 3.75		
			No	15	Type	UT
			ID			
			Spec Ref			

Shearing stages - graphical data

o failure points



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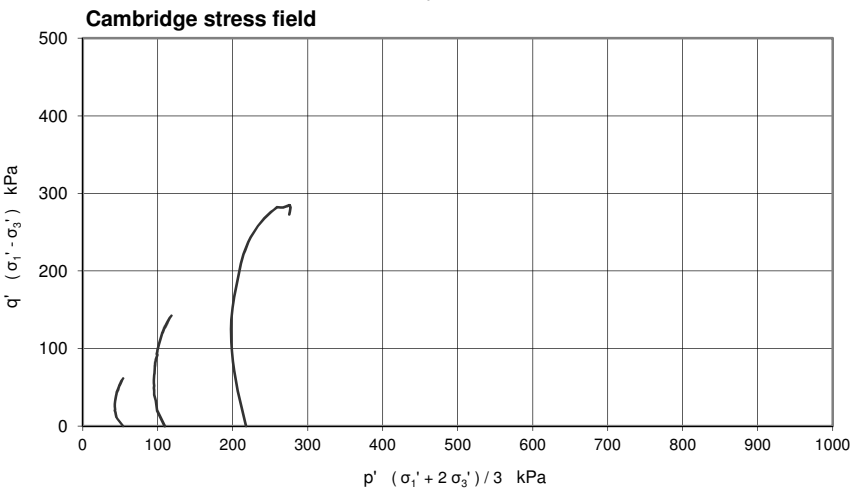
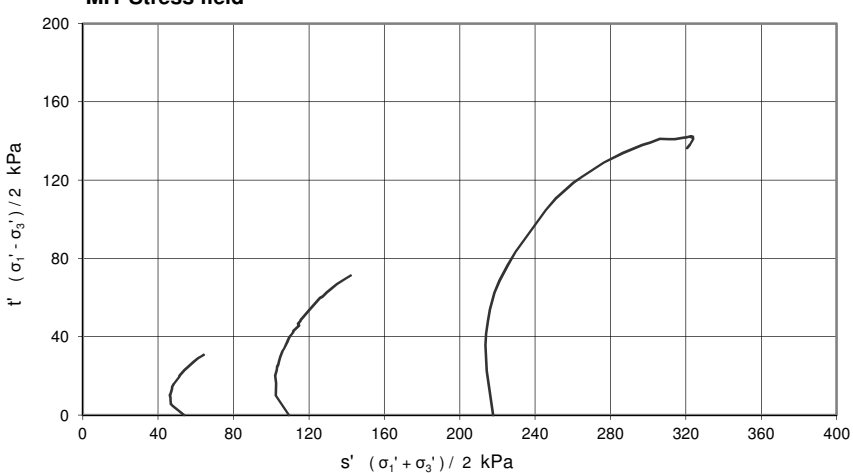
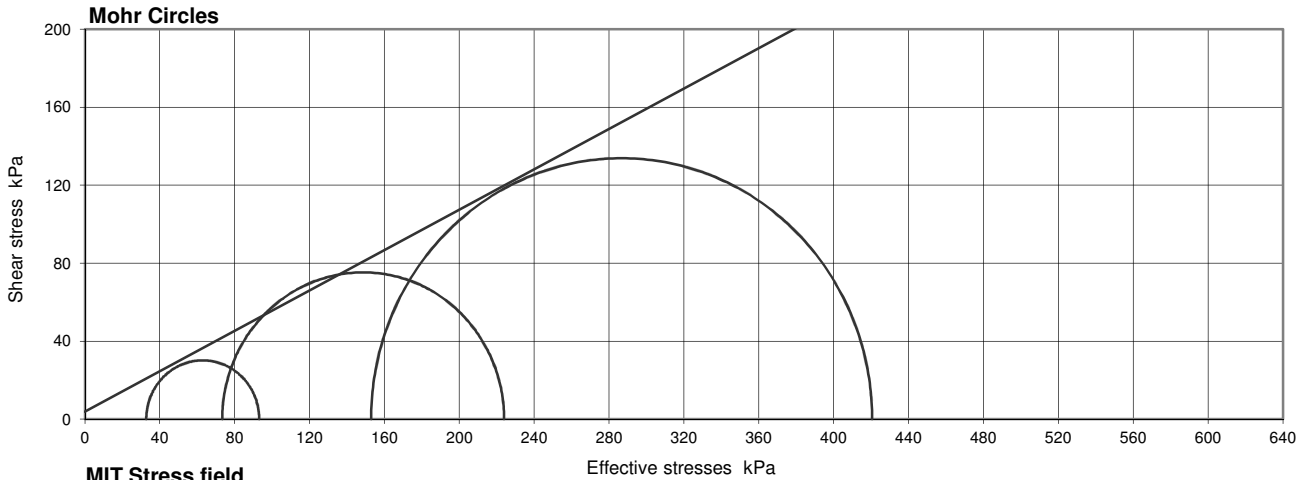


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**Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure
(BS1377 : Part 8 : 1990) - Multistage test on a single specimen**

Project No	A8015-18	Sample Details:	Hole No	BH2	
Project Name	IMMINGHAM		Depth (m BGL)	3.30 - 3.75	
		No	15	Type	UT
		ID			
		Spec Ref			



Compression stages

Stage	1	2	3	
Cell pressure	355	410	520	kPa
Initial pwp	301	301	302	kPa
Initial σ_3'	54	109	218	kPa
Rate of strain	0.71	0.71	0.71	%/hr

Failure conditions

Criterion	Maximum effective principal stress ratio			
	1	2	3	
Axial strain	1.76	3.70	6.40	%
$(\sigma_1' / \sigma_3')_f$	2.839	3.051	2.751	
$(\sigma_1' - \sigma_3')_f$	60.3	150.5	267.7	kPa
u_f	322	337	367	kPa
$\sigma_3'_f$	33	73	153	kPa
$\sigma_1'_f$	93	224	421	kPa
A_f	0.35	0.24	0.24	
Time to failure	2.5	5.2	9.0	hrs

Shear Strength Parameters

at peak stress ratio

		Linear regression
c'	kPa	3.8
ϕ'	degrees	27.4
		Manual re-assessment
c'	kPa	-
ϕ'	degrees	-

Mode of failure



Notes : Deviator stresses corrected for area change, vertical side drains and 0.594 mm thick rubber membrane(s)

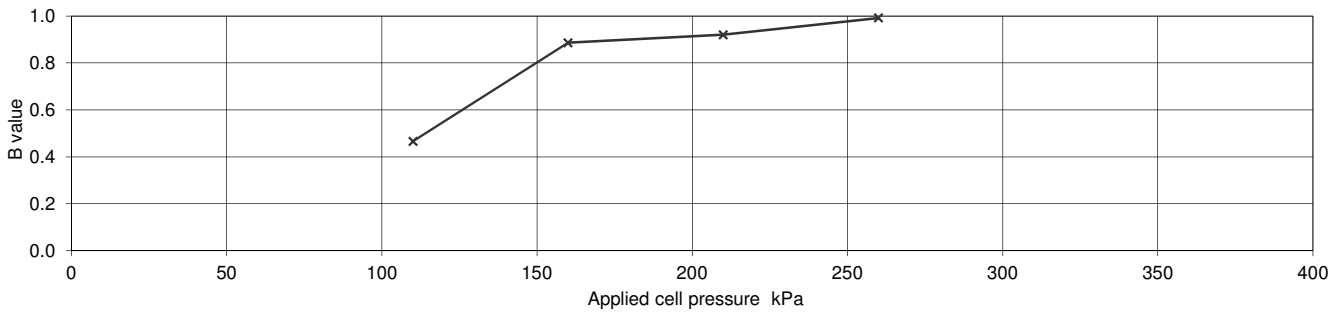
**Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure
(BS1377 : Part 8 : 1990) - Multistage test on a single specimen**

Project No	A8015-18	Sample Details:	Hole No	BH3		
Project Name	IMMINGHAM		Depth (m BGL)	5 - 5.45		
			No	10	Type	UT
			ID			
		Spec Ref				

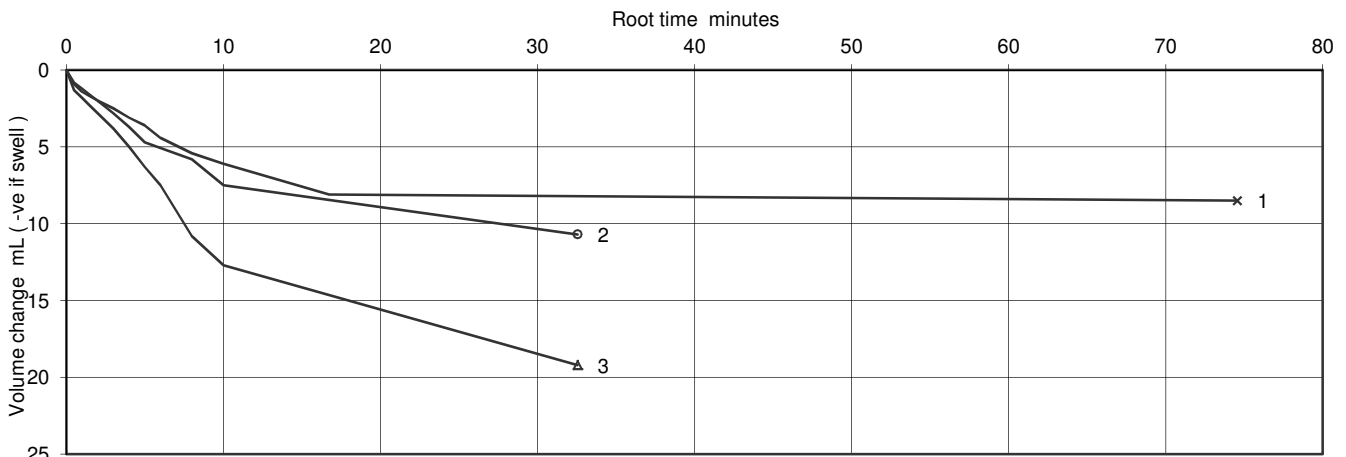
Specimen Details		
Initial		
Length	mm	203.48
Diameter	mm	102.37
Bulk Density	Mg/m ³	2.19
Water Content	%	20
Dry density	Mg/m ³	1.82
After test		
Bulk Density	Mg/m ³	2.26
Water Content	%	16
Dry density	Mg/m ³	1.94

Soil Description	Firm brown slightly sandy slightly gravelly CLAY
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation
		Increments of cell and back pressure
Cell pressure increments	kPa	50
Differential Pressure	kPa	10
Final Cell Pressure	kPa	260
Final pore water pressure	kPa	237.3
Final B Value		0.99



Consolidation Details	Drainage Conditions	From radial boundary and one end				
	Stage No.	1	2	3		
	Cell Pressure applied	335	370	440	kPa	
	Back Pressure applied	300	300	300	kPa	
	Effective Pressure	35	70	140	kPa	
	Pore pressure at start of consolidation	314	327	383	kPa	
	Pore pressure at end of consolidation	300	300	302	kPa	
	Pore pressure dissipation at end of consolidation	100	100	98	%	
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C _{vi}	1.30	0.95	0.84	m ² /year
	Coefficient of Compressibility	M _{vi}	0.39	0.25	0.15	m ² /MN
	Coefficient of Permeability (calculated)	k _{vi}	1.6E-10	7.4E-11	3.9E-11	m/s



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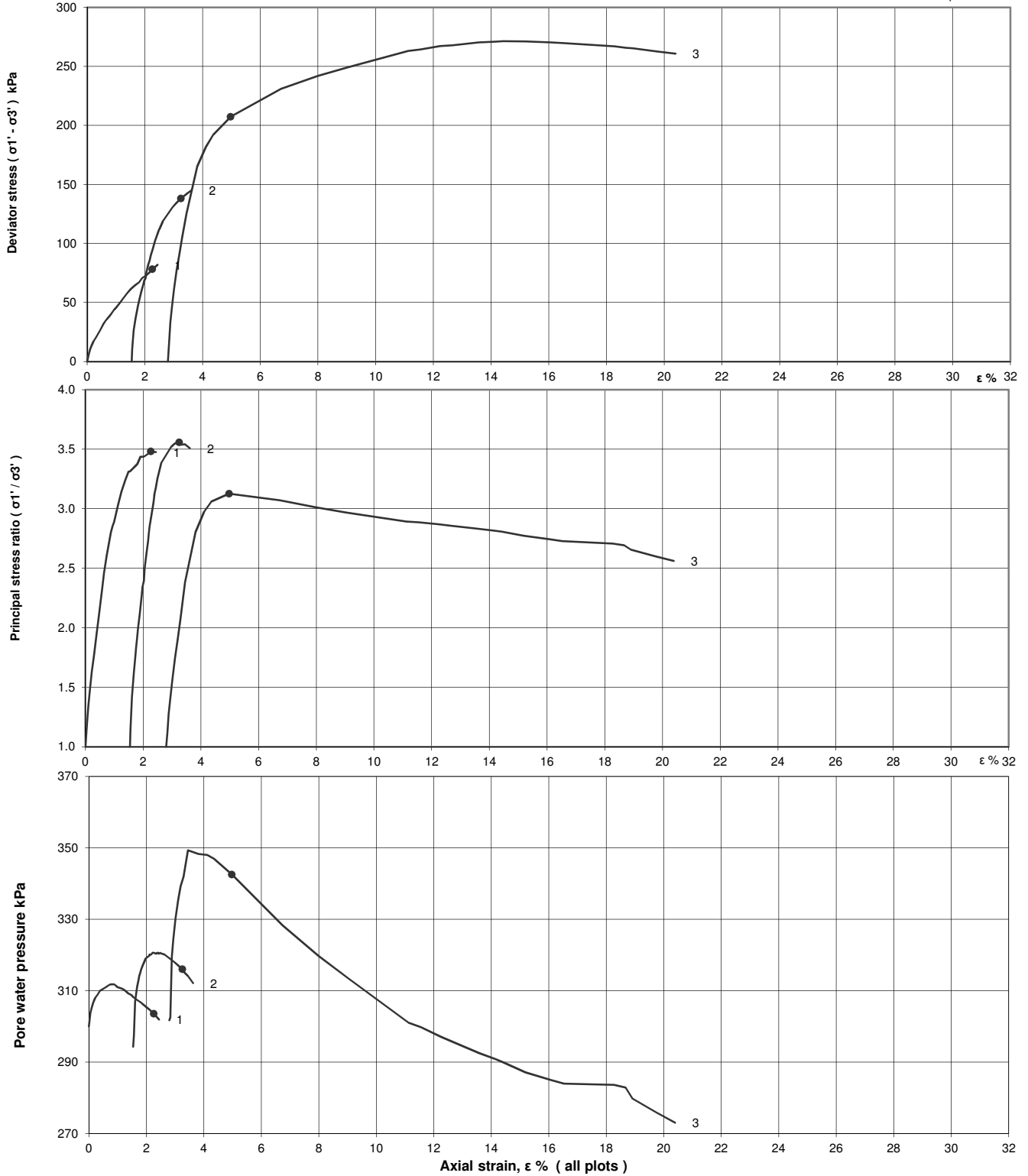
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**Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure
(BS1377 : Part 8 : 1990) - Multistage test on a single specimen**

Project No	A8015-18	Sample Details:	Hole No	BH3		
Project Name	IMMINGHAM		Depth (m BGL)	5 - 5.45		
			No	10	Type	UT
			ID			
		Spec Ref				

Shearing stages - graphical data

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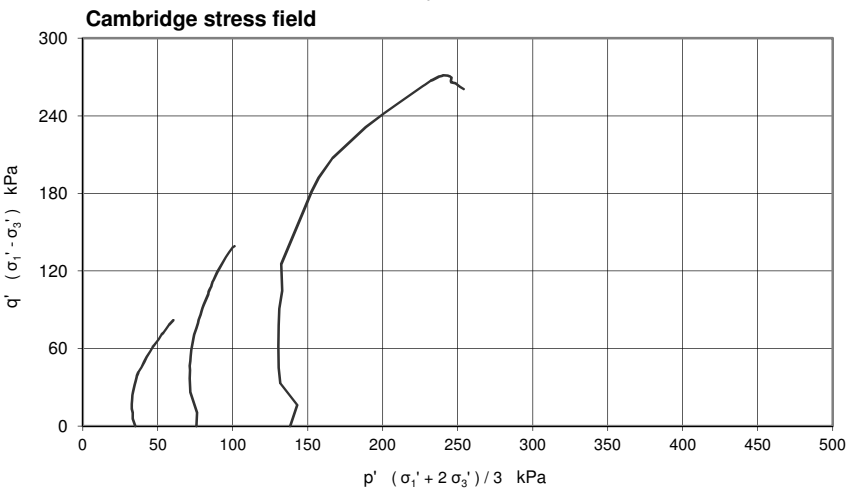
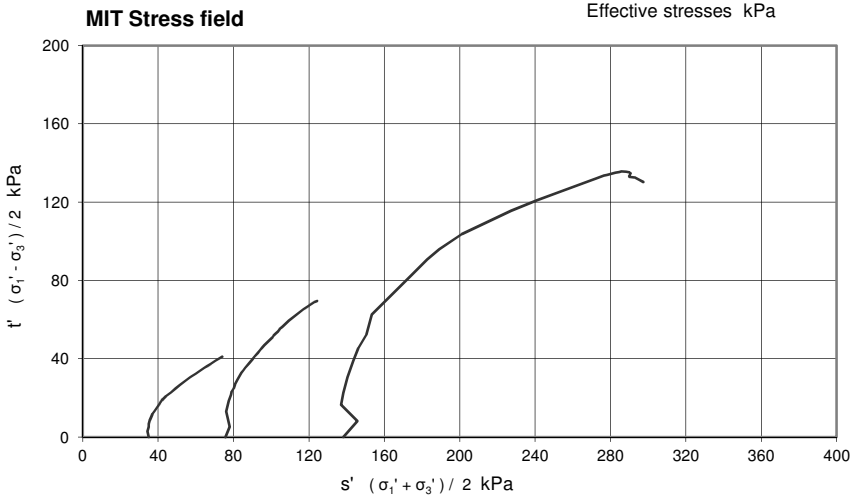
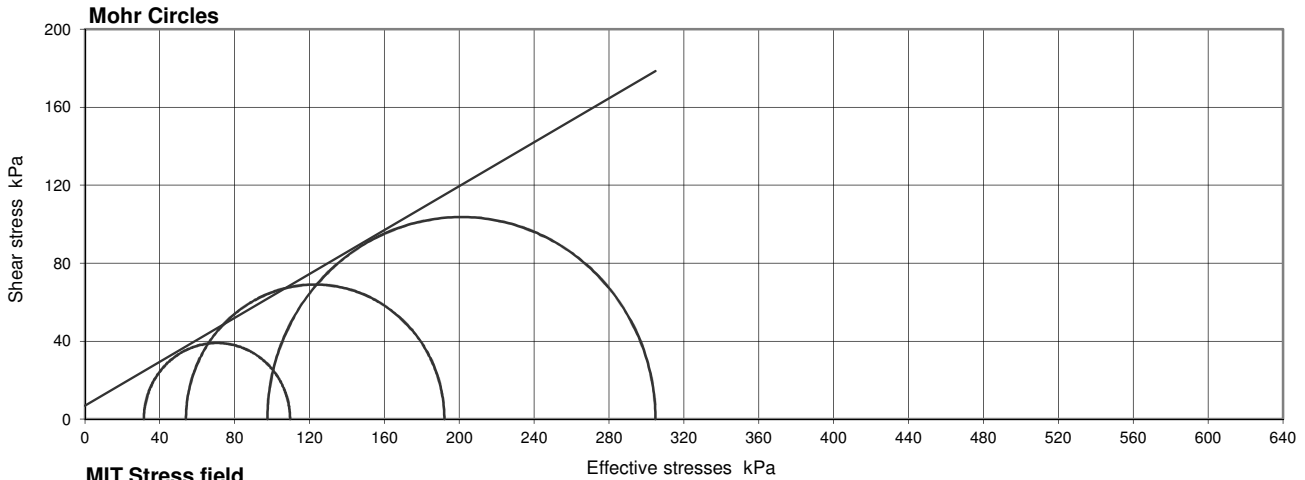


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**Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure
(BS1377 : Part 8 : 1990) - Multistage test on a single specimen**

Project No	A8015-18	Sample Details:	Hole No	BH3		
Project Name	IMMINGHAM		Depth (m BGL)	5 - 5.45		
			No	10	Type	UT
			ID			
		Spec Ref				



Compression stages

Stage	1	2	3	
Cell pressure	335	370	440	kPa
Initial pwp	300	294	302	kPa
Initial σ_3'	35	76	138	kPa
Rate of strain	1.02	1.02	1.02	%/hr

Failure conditions

Criterion	Maximum effective principal stress ratio			
	1	2	3	
Axial strain	2.26	3.25	4.98	%
$(\sigma_1' / \sigma_3')_f$	3.480	3.556	3.126	
$(\sigma_1' - \sigma_3')_f$	78.1	138.0	207.3	kPa
u_f	304	316	343	kPa
$\sigma_3'_f$	32	54	98	kPa
$\sigma_1'_f$	110	192	305	kPa
A_f	0.04	0.16	0.20	
Time to failure	2.2	3.2	4.9	hrs

Shear Strength Parameters

at peak stress ratio

		Linear regression
c'	kPa	6.9
ϕ'	degrees	29.4
		Manual re-assessment
c'	kPa	-
ϕ'	degrees	-

Mode of failure



Notes : Deviator stresses corrected for area change, vertical side drains and 0.595 mm thick rubber membrane(s)

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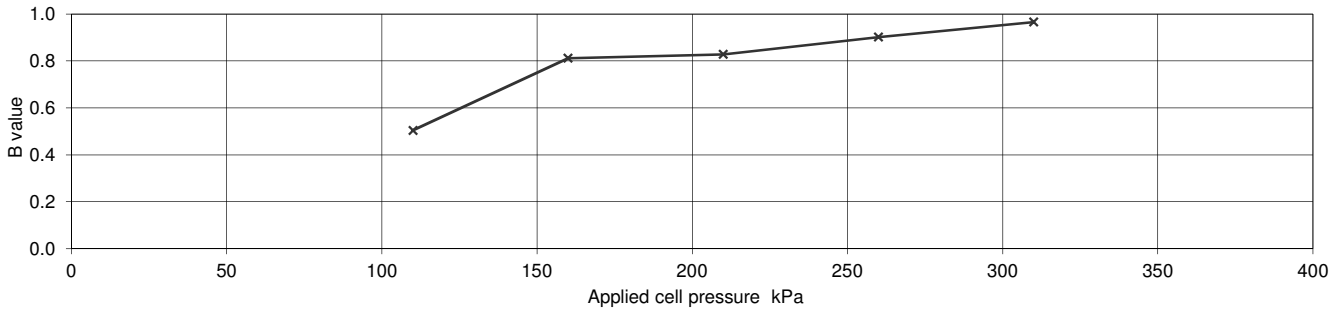
**Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure
(BS1377 : Part 8 : 1990) - Multistage test on a single specimen**

Project No	A8015-18	Sample Details:	Hole No	BH4		
Project Name	IMMINGHAM		Depth (m BGL)	7.50 - 7.95		
			No	18	Type	UT
			ID			
		Spec Ref				

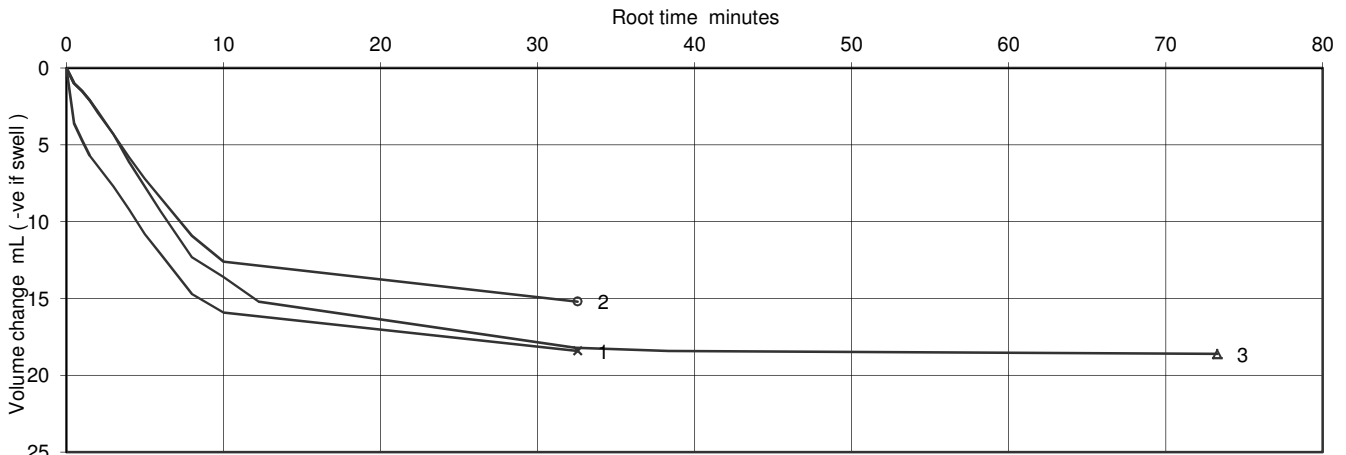
Specimen Details		
Initial		
Length	mm	203.49
Diameter	mm	103.68
Bulk Density	Mg/m ³	2.22
Water Content	%	14
Dry density	Mg/m ³	1.95
After test		
Bulk Density	Mg/m ³	2.23
Water Content	%	13
Dry density	Mg/m ³	1.97

Soil Description	Firm brown slightly sandy slightly gravelly CLAY.
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation
		Increments of cell and back pressure
Cell pressure increments	kPa	50
Differential Pressure	kPa	10
Final Cell Pressure	kPa	310
Final pore water pressure	kPa	287.6
Final B Value		0.97



Consolidation Details	Drainage Conditions		From radial boundary and one end			
	Stage No.		1	2	3	
	Cell Pressure applied		365	430	560	kPa
	Back Pressure applied		300	300	300	kPa
	Effective Pressure		65	130	260	kPa
	Pore pressure at start of consolidation		347	374	457	kPa
	Pore pressure at end of consolidation		303	300	302	kPa
	Pore pressure dissipation at end of consolidation		94	100	99	%
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C _{vi}	2.17	2.09	1.63	m ² /year
	Coefficient of Compressibility	M _{vi}	0.24	0.12	0.07	m ² /MN
	Coefficient of Permeability (calculated)	k _{vi}	1.6E-10	7.7E-11	3.5E-11	m/s



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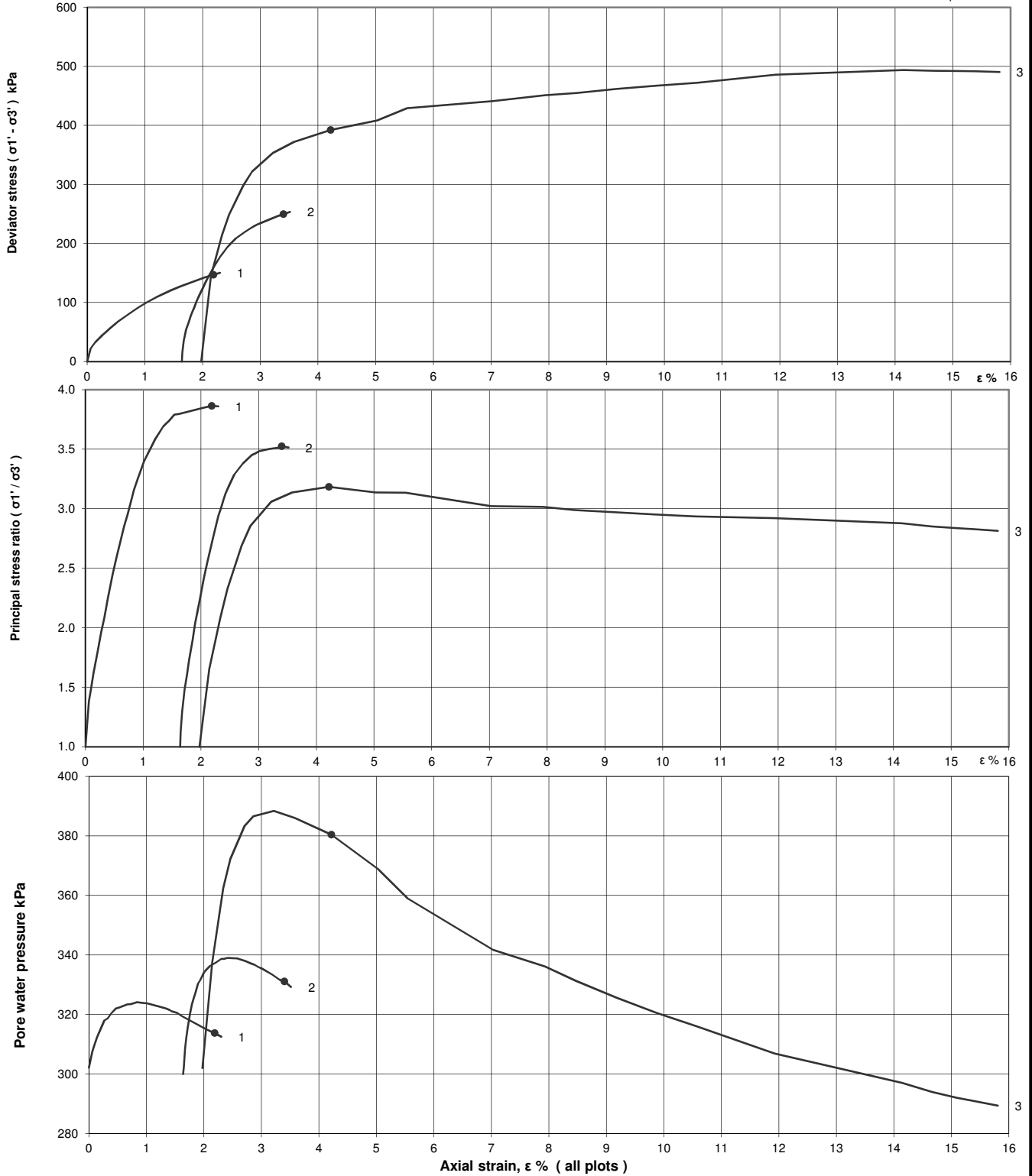
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**Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure
(BS1377 : Part 8 : 1990) - Multistage test on a single specimen**

Project No	A8015-18	Sample Details:	Hole No	BH4		
Project Name	IMMINGHAM		Depth (m BGL)	7.50 - 7.95		
			No	18	Type	UT
			ID			
			Spec Ref			

Shearing stages - graphical data

o failure points



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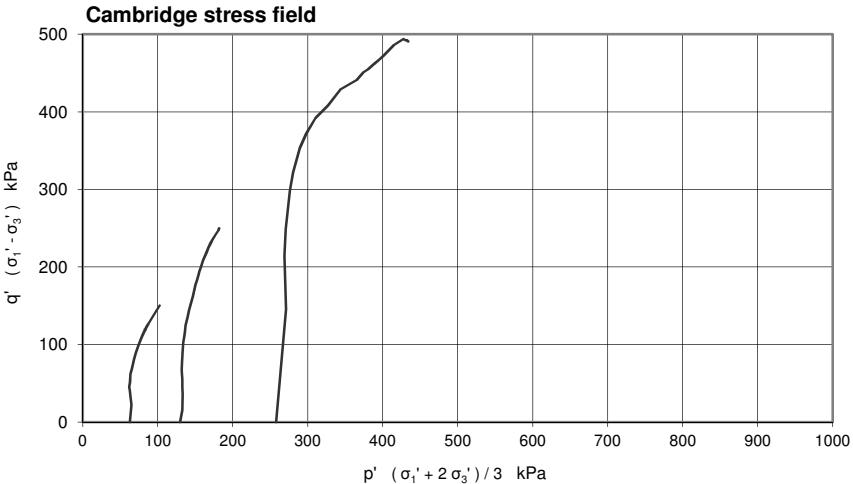
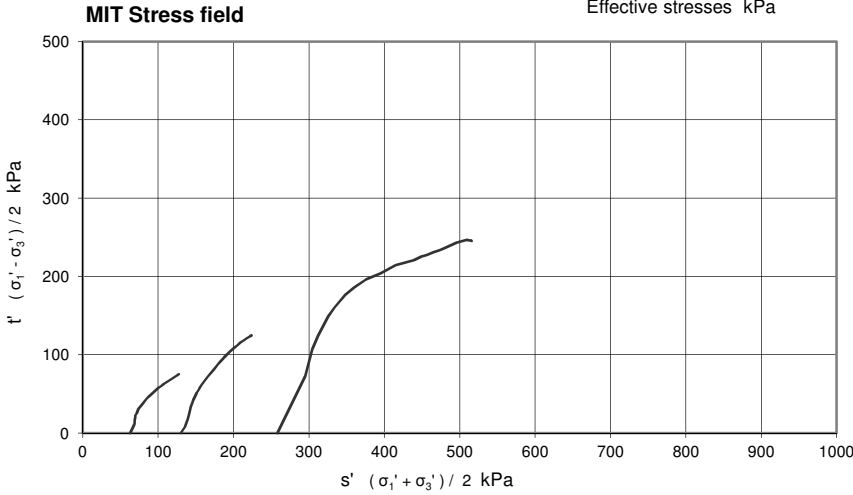
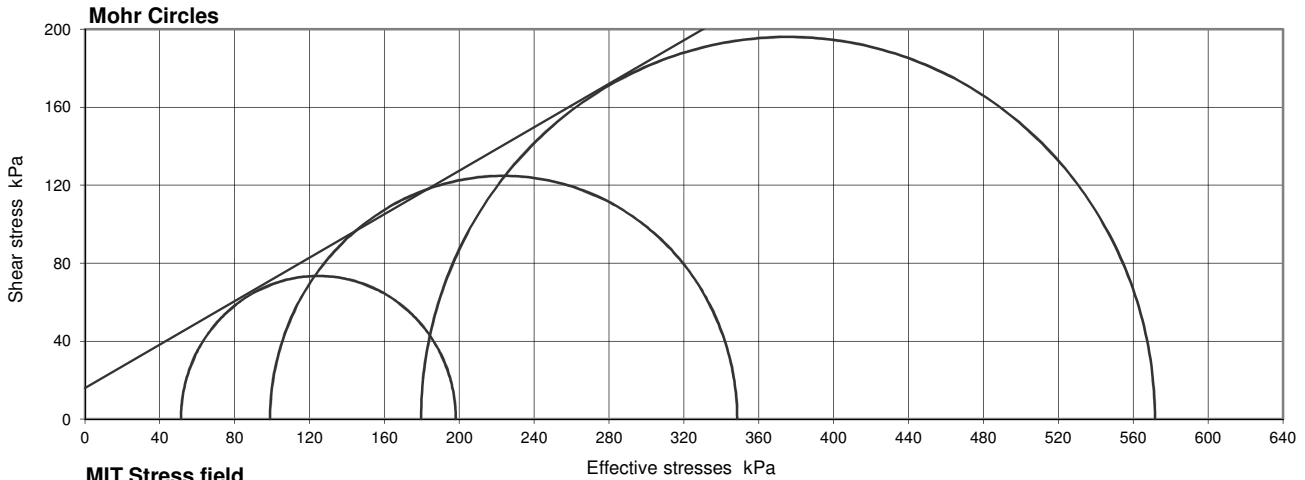
Figure

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sheet 2 of 3

**Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure
(BS1377 : Part 8 : 1990) - Multistage test on a single specimen**

Project No	A8015-18	Sample Details:	Hole No	BH4		
Project Name	IMMINGHAM		Depth (m BGL)	7.50 - 7.95		
			No	18	Type	UT
			ID			
		Spec Ref				



Compression stages

Stage	1	2	3	
Cell pressure	365	430	560	kPa
Initial pwp	302	300	302	kPa
Initial σ_3'	63	130	258	kPa
Rate of strain	1.56	1.56	1.56	%/hr

Failure conditions

Criterion	Maximum effective principal stress ratio			
	1	2	3	
Axial strain	2.19	3.40	4.22	%
$(\sigma_1' / \sigma_3')_f$	3.863	3.523	3.183	
$(\sigma_1' - \sigma_3')_f$	146.9	249.6	392.0	kPa
u_f	314	331	380	kPa
$\sigma_3'_f$	51	99	180	kPa
$\sigma_1'_f$	198	348	572	kPa
A_f	0.08	0.12	0.20	
Time to failure	1.4	2.2	2.7	hrs

Shear Strength Parameters

at peak stress ratio

		Linear regression
c'	kPa	15.9
ϕ'	degrees	29.1
		Manual re-assessment
c'	kPa	-
ϕ'	degrees	-

Mode of failure



Notes : Deviator stresses corrected for area change, vertical side drains and 0.596 mm thick rubber membrane(s)

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Feb18



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Figure
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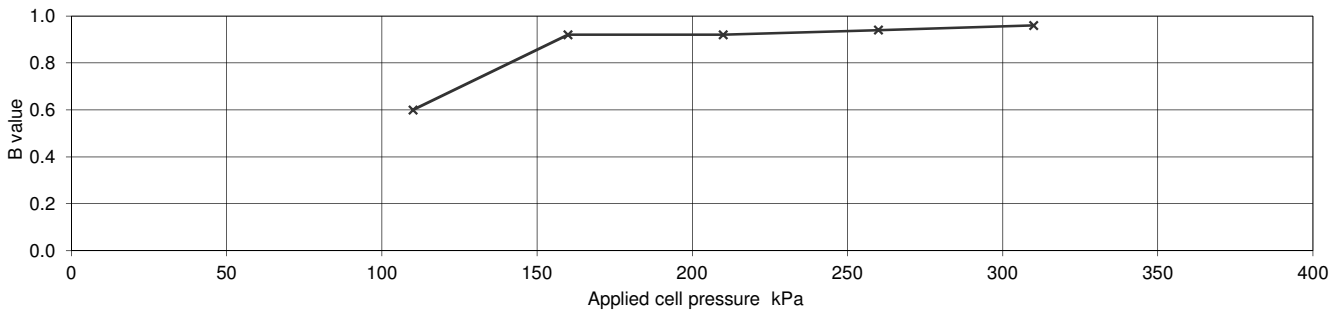
**Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure
(BS1377 : Part 8 : 1990) - Multistage test on a single specimen**

Project No	A8015-18	Sample Details:	Hole No	BH5		
Project Name	IMMINGHAM		Depth (m BGL)	11 - 11.45		
			No	35	Type	UT
			ID			
		Spec Ref				

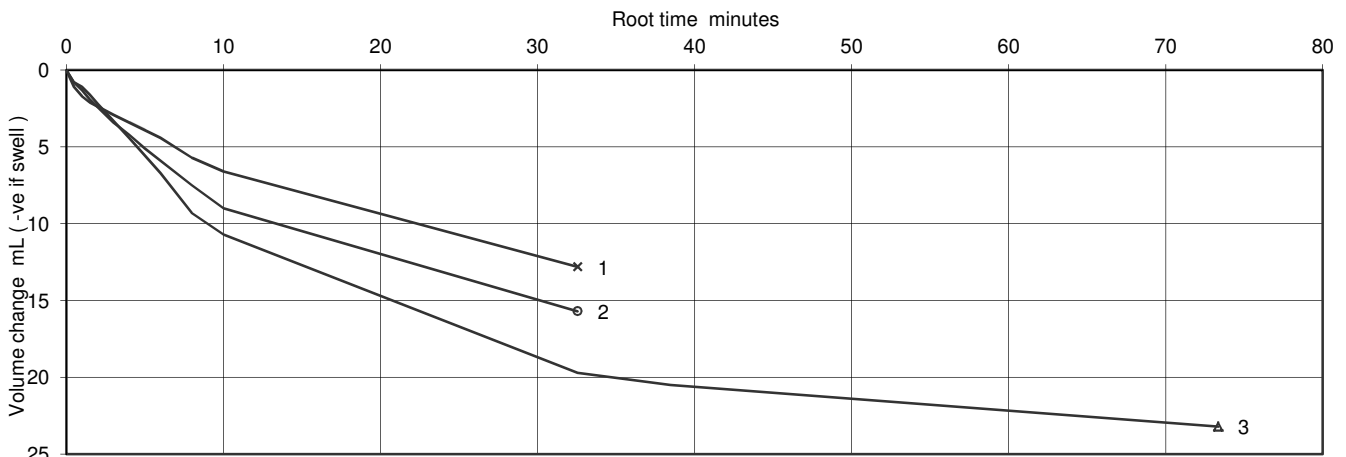
Specimen Details		
Initial		
Length	mm	203.00
Diameter	mm	103.08
Bulk Density	Mg/m ³	2.16
Water Content	%	17
Dry density	Mg/m ³	1.84
After test		
Bulk Density	Mg/m ³	2.17
Water Content	%	17
Dry density	Mg/m ³	1.85

Soil Description	Firm brown slightly sandy slightly gravelly CLAY
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation
		Increments of cell and back pressure
Cell pressure increments	kPa	50
Differential Pressure	kPa	10
Final Cell Pressure	kPa	310
Final pore water pressure	kPa	295
Final B Value		0.96



Consolidation Details	Drainage Conditions	From radial boundary and one end				
	Stage No.	1	2	3		
	Cell Pressure applied	327	355	410	kPa	
	Back Pressure applied	300	300	300	kPa	
	Effective Pressure	27	55	110	kPa	
	Pore pressure at start of consolidation	319	334	369	kPa	
	Pore pressure at end of consolidation	300	300	300	kPa	
	Pore pressure dissipation at end of consolidation	100	100	100	%	
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C _{vi}	0.68	0.76	0.57	m ² /year
	Coefficient of Compressibility	M _{vi}	0.39	0.27	0.20	m ² /MN
	Coefficient of Permeability (calculated)	k _{vi}	8.2E-11	6.3E-11	3.4E-11	m/s



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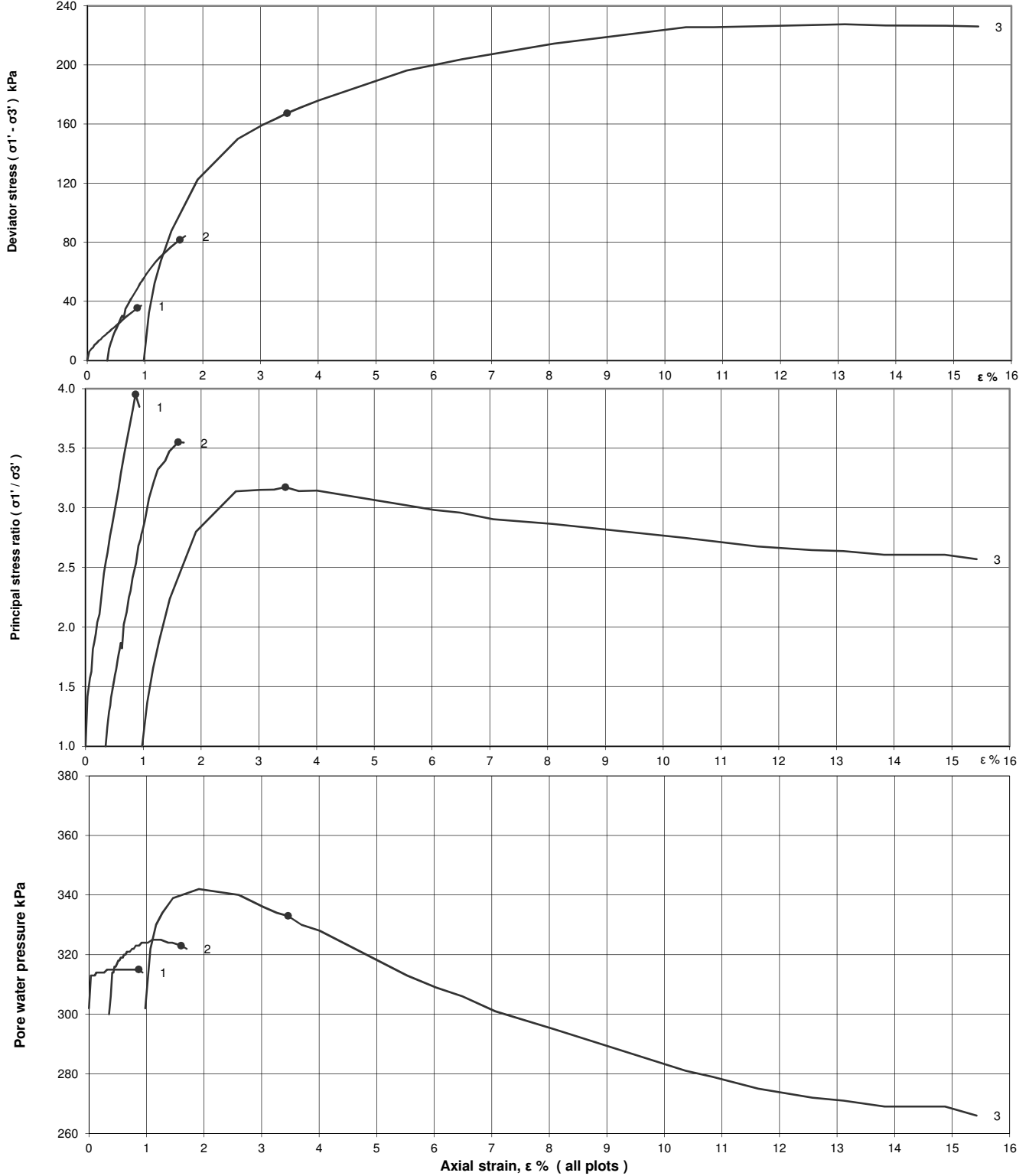
Figure
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**Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure
(BS1377 : Part 8 : 1990) - Multistage test on a single specimen**

Project No	A8015-18	Sample Details:	Hole No	BH5		
Project Name	IMMINGHAM		Depth (m BGL)	11 - 11.45		
			No	35	Type	UT
			ID			
		Spec Ref				

Shearing stages - graphical data

o failure points



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SLR8.1
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Feb18

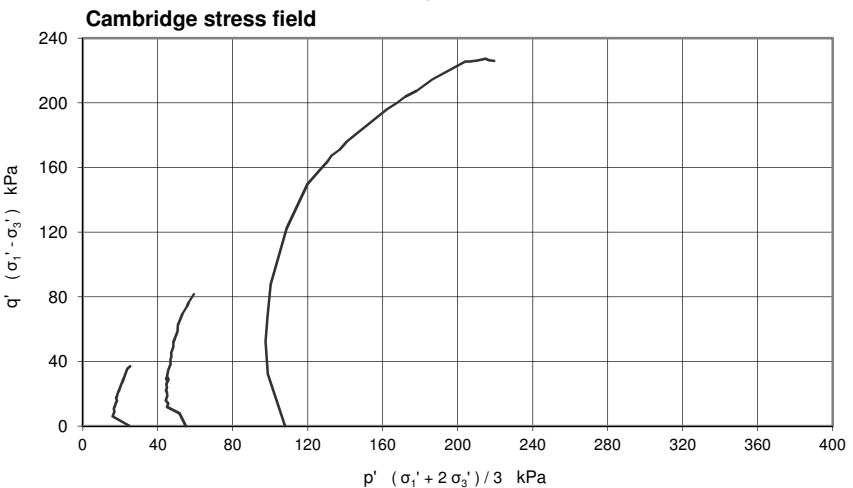
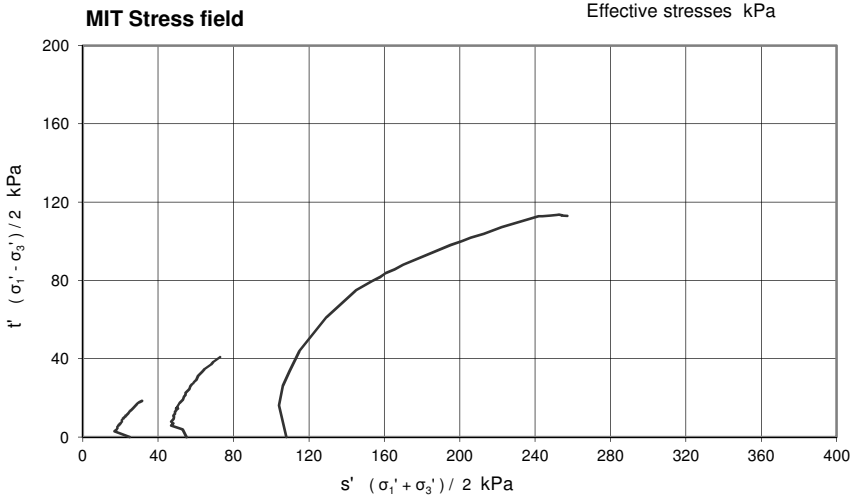
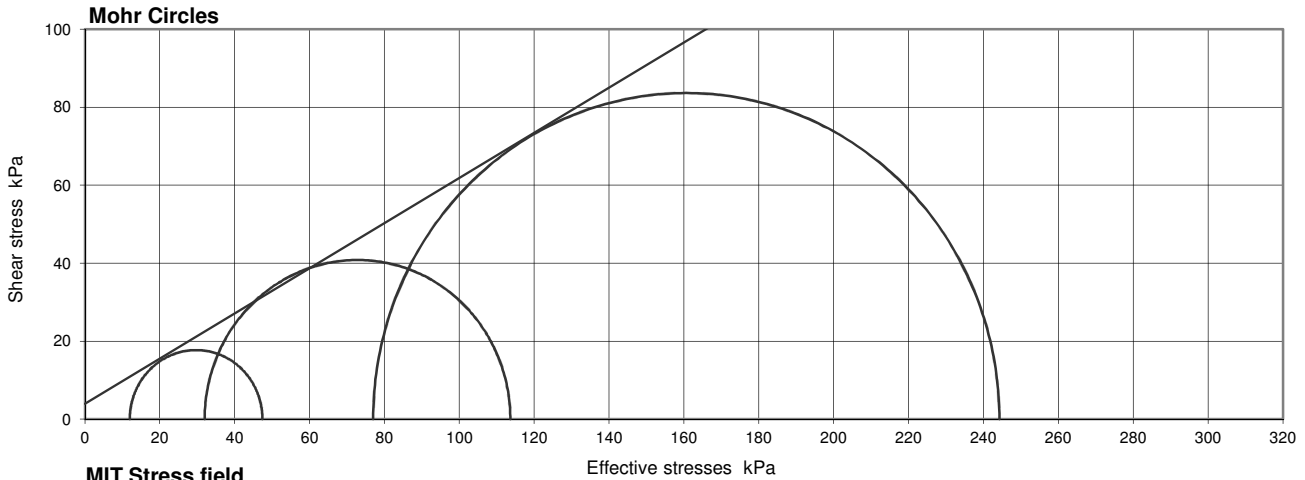


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Figure
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sheet 2 of 3

**Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure
(BS1377 : Part 8 : 1990) - Multistage test on a single specimen**

Project No	A8015-18	Sample Details:	Hole No	BH5		
Project Name	IMMINGHAM		Depth (m BGL)	11 - 11.45		
			No	35	Type	UT
			ID			
		Spec Ref				



Compression stages

Stage	1	2	3	
Cell pressure	327	355	410	kPa
Initial pwp	302	300	302	kPa
Initial σ_3'	25	55	108	kPa
Rate of strain	0.50	0.50	0.50	%/hr

Failure conditions

Criterion	Maximum effective principal stress ratio			
	1	2	3	
Axial strain	0.87	1.60	3.46	%
$(\sigma_1' / \sigma_3')_f$	3.952	3.551	3.172	
$(\sigma_1' - \sigma_3')_f$	35.4	81.6	167.3	kPa
u_f	315	323	333	kPa
σ_{3f}'	12	32	77	kPa
σ_{1f}'	47	114	244	kPa
A_f	0.37	0.28	0.19	
Time to failure	1.7	3.2	6.9	hrs

Shear Strength Parameters

at peak stress ratio

		Linear regression
c'	kPa	4.0
ϕ'	degrees	30.1
		Manual re-assessment
c'	kPa	-
ϕ'	degrees	-

Mode of failure



Notes : Deviator stresses corrected for area change, vertical side drains and 0.595 mm thick rubber membrane(s)

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Rev 86.0
Feb18



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Figure
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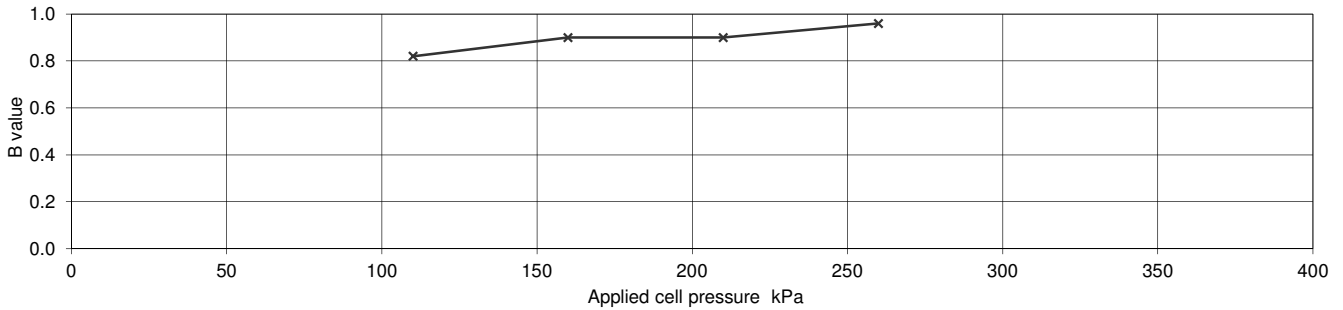
**Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure
(BS1377 : Part 8 : 1990) - Multistage test on a single specimen**

Project No	A8015-18	Sample Details:	Hole No	BH6		
Project Name	IMMINGHAM		Depth (m BGL)	9 - 9.45		
			No	19	Type	UT
			ID			
		Spec Ref				

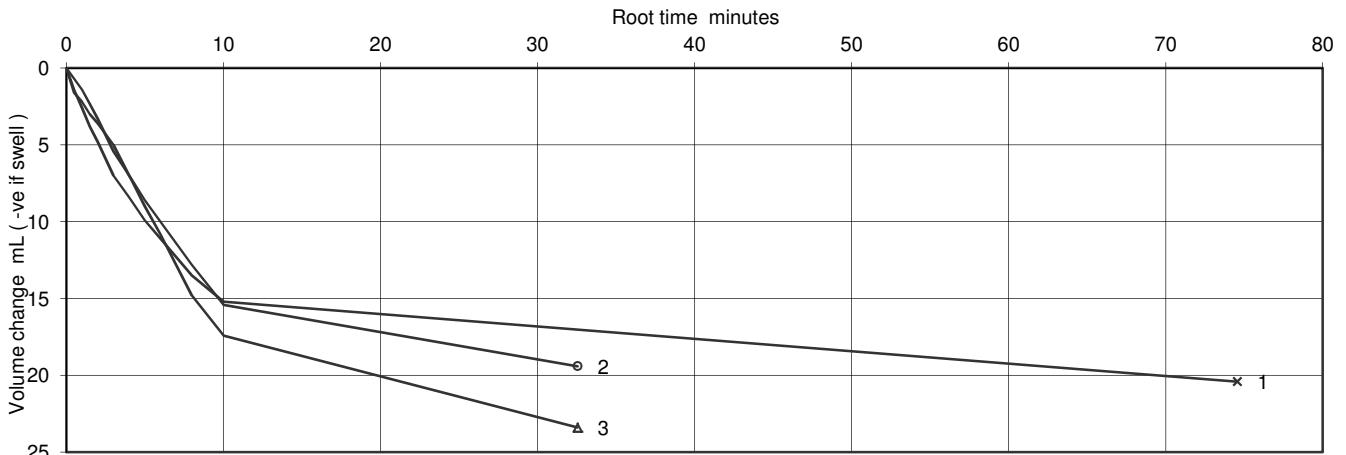
Specimen Details		
Initial		
Length	mm	203.49
Diameter	mm	102.79
Bulk Density	Mg/m ³	2.14
Water Content	%	17
Dry density	Mg/m ³	1.84
After test		
Bulk Density	Mg/m ³	2.17
Water Content	%	15
Dry density	Mg/m ³	1.88

Soil Description	Soft to firm brown slightly sandy slightly gravelly CLAY.
Specimen Type /Preparation	UNDISTURBED

Saturation Details		Method of Saturation
		Increments of cell and back pressure
Cell pressure increments	kPa	50
Differential Pressure	kPa	10
Final Cell Pressure	kPa	260
Final pore water pressure	kPa	238
Final B Value		0.96



Consolidation Details	Drainage Conditions	From radial boundary and one end				
	Stage No.	1	2	3		
	Cell Pressure applied	355	410	520	kPa	
	Back Pressure applied	300	300	300	kPa	
	Effective Pressure	55	110	220	kPa	
	Pore pressure at start of consolidation	333	371	459	kPa	
	Pore pressure at end of consolidation	300	303	300	kPa	
	Pore pressure dissipation at end of consolidation	100	96	100	%	
Consolidation parameters (see note to BS1377 : pt 8, clause 6.3.4)	Coefficient of Consolidation	C _{vi}	2.41	1.42	1.38	m ² /year
	Coefficient of Compressibility	M _{vi}	0.36	0.17	0.09	m ² /MN
	Coefficient of Permeability (calculated)	k _{vi}	2.7E-10	7.4E-11	3.8E-11	m/s



Ref
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Feb18



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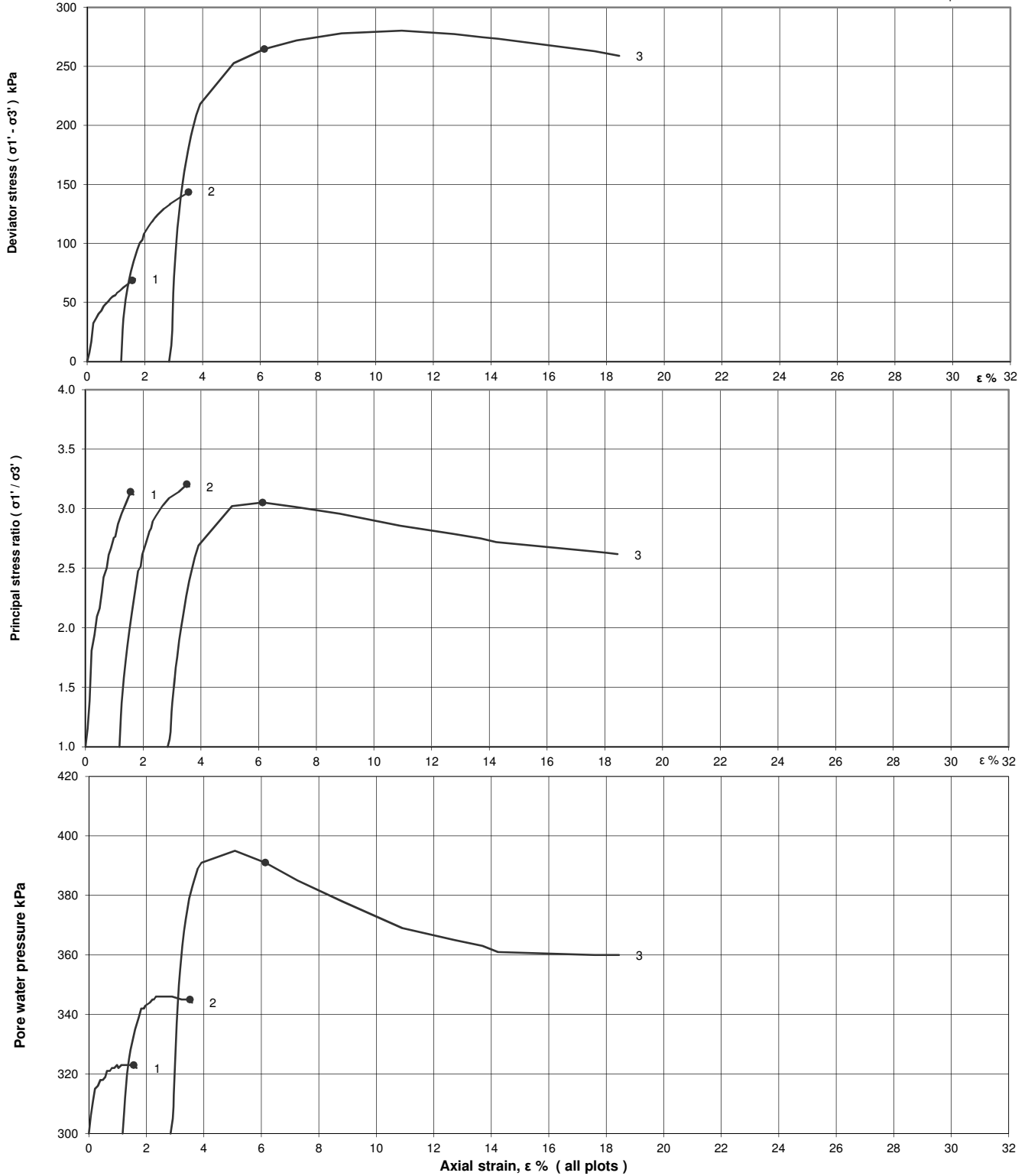
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sheet 1 of 3

**Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure
(BS1377 : Part 8 : 1990) - Multistage test on a single specimen**

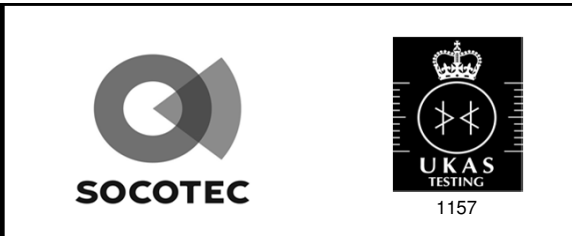
Project No	A8015-18	Sample Details:	Hole No	BH6		
Project Name	IMMINGHAM		Depth (m BGL)	9 - 9.45		
			No	19	Type	UT
			ID			
		Spec Ref				

Shearing stages - graphical data

o failure points



Ref
SLR8.1
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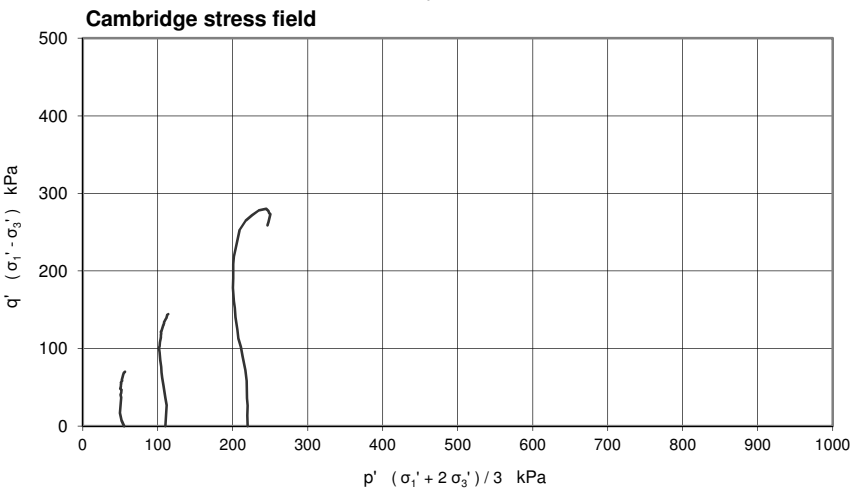
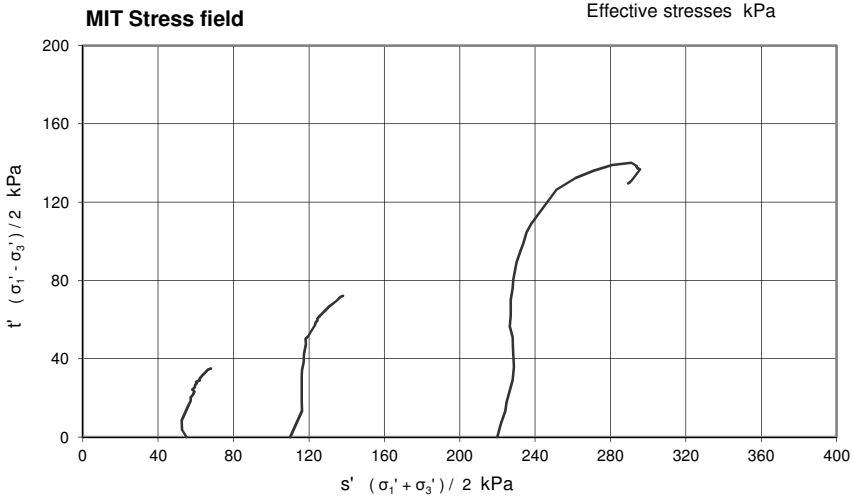
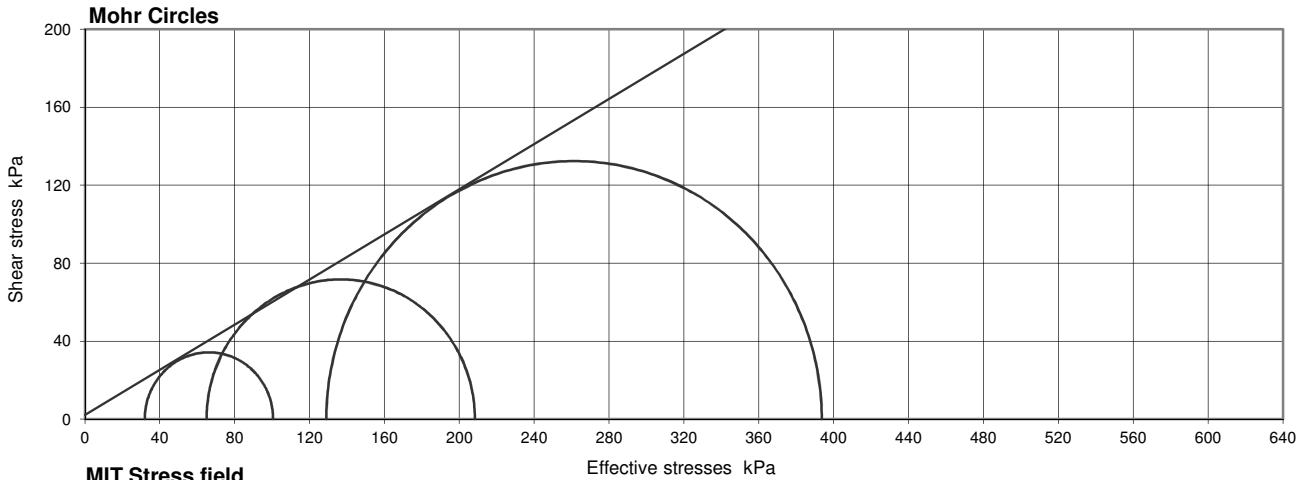


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Figure
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sheet 2 of 3

**Consolidated Undrained Triaxial Compression test with Measurement of Pore Water Pressure
(BS1377 : Part 8 : 1990) - Multistage test on a single specimen**

Project No	A8015-18	Sample Details:	Hole No	BH6	
Project Name	IMMINGHAM		Depth (m BGL)	9 - 9.45	
		No	19	Type	UT
		ID			
		Spec Ref			



Compression stages

Stage	1	2	3	
Cell pressure	355	410	520	kPa
Initial pwp	300	300	300	kPa
Initial σ_3'	55	110	220	kPa
Rate of strain	1.80	1.80	1.80	%/hr

Failure conditions

Criterion	Maximum effective principal stress ratio			
	1	2	3	
Axial strain	1.57	3.52	6.15	%
$(\sigma_1' / \sigma_3')_f$	3.142	3.205	3.052	
$(\sigma_1' - \sigma_3')_f$	68.5	143.3	264.7	kPa
u_f	323	345	391	kPa
σ_{3f}'	32	65	129	kPa
σ_{1f}'	101	208	394	kPa
A_f	0.34	0.31	0.34	
Time to failure	0.9	2.0	3.4	hrs

Shear Strength Parameters

at peak stress ratio

		Linear regression
c'	kPa	2.2
ϕ'	degrees	30.1
		Manual re-assessment
c'	kPa	-
ϕ'	degrees	-

Mode of failure



Notes : Deviator stresses corrected for area change, vertical side drains and 0.595 mm thick rubber membrane(s)

Ref
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Rev 86.0
Feb18

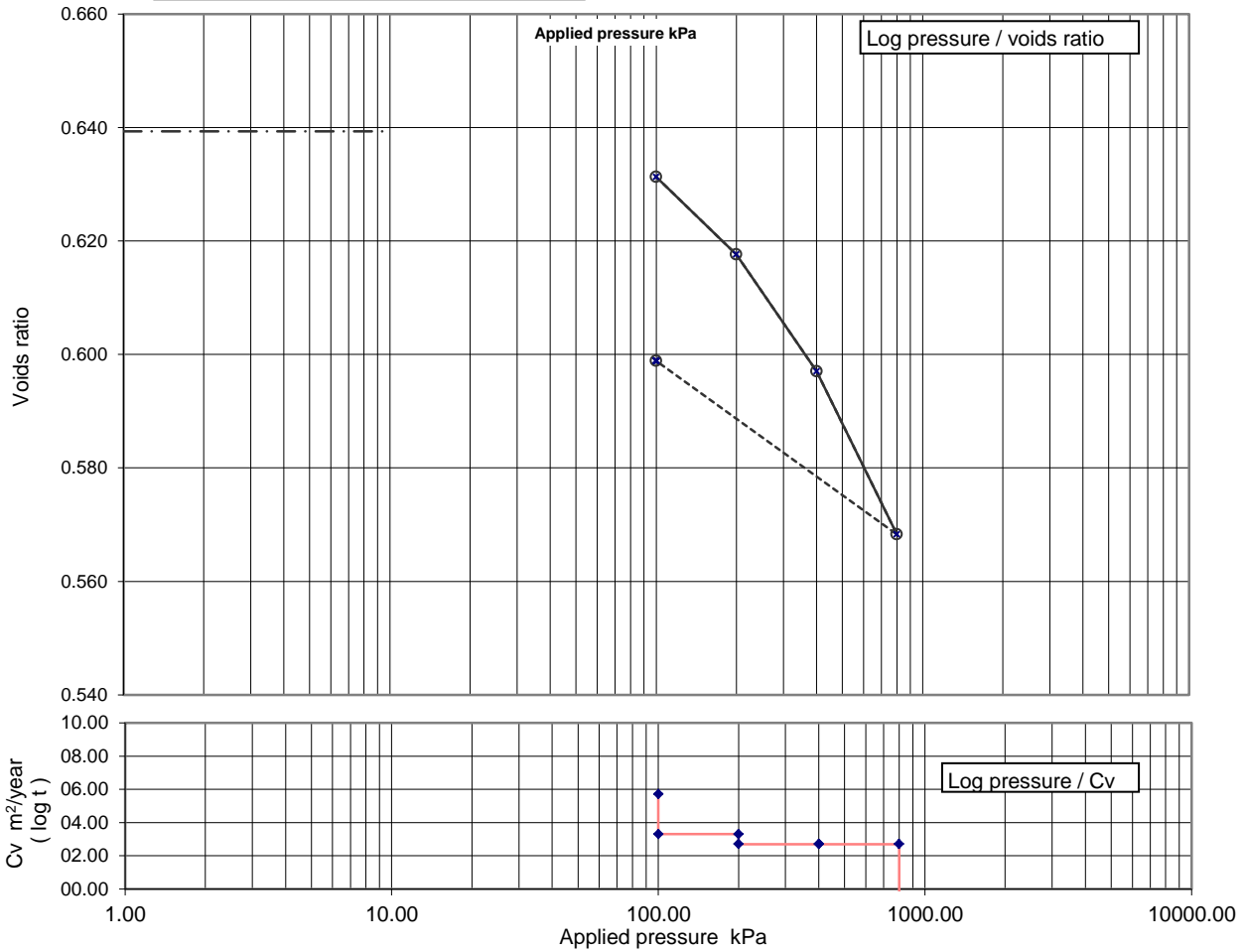


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Figure
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ONE DIMENSIONAL CONSOLIDATION TEST

Sample Details:	SAMPLE ID:	Hole No	BH5
	A8015-1820180418120528	Sample Depth (m BGL)	3.40 - 3.85
		Sample Type and No	UT15
		Specimen Ref	



Soil description

Firm to stiff brown slightly sandy slightly gravelly CLAY.
Gravel is chalk.

Preparation

Undisturbed

Index properties

Liquid limit %		Plastic limit %	
----------------	--	-----------------	--

(if available)

Specimen details

Particle density

Initial	Final	
2.75	assumed	Mg/m3

Diameter

75.17		mm
-------	--	----

Height

18.97	18.50	mm
-------	-------	----

Voids ratio

0.639	0.599	
-------	-------	--

Moisture content

23	22	%
----	----	---

Bulk density

2.06	2.10	Mg/m3
------	------	-------

Dry density

1.68	1.72	Mg/m3
------	------	-------

Saturation

99	102	%
----	-----	---

Average temperature for test

20		oC
----	--	----

Swelling pressure

>50		kPa
-----	--	-----

Notes :

Specimen taken 10 mm from base of sample

Applied Pressure kPa	Voids ratio	mv m2/MN	cv (t50, log) m2/year	cv (t90, root) m2/year
50	0.6393	/	/	/
100	0.6313	0.098	5.7	6.1
200	0.6176	0.084	3.3	1.8
400	0.5970	0.064	2.7	2.9
800	0.5683	0.045	2.7	2.9
100	0.5989	0.028	-	-

QA Ref
SLR 5.3
Rev 2.16
Nov 16



Project No A8015-18
Project Name VPI IMMINGHAM

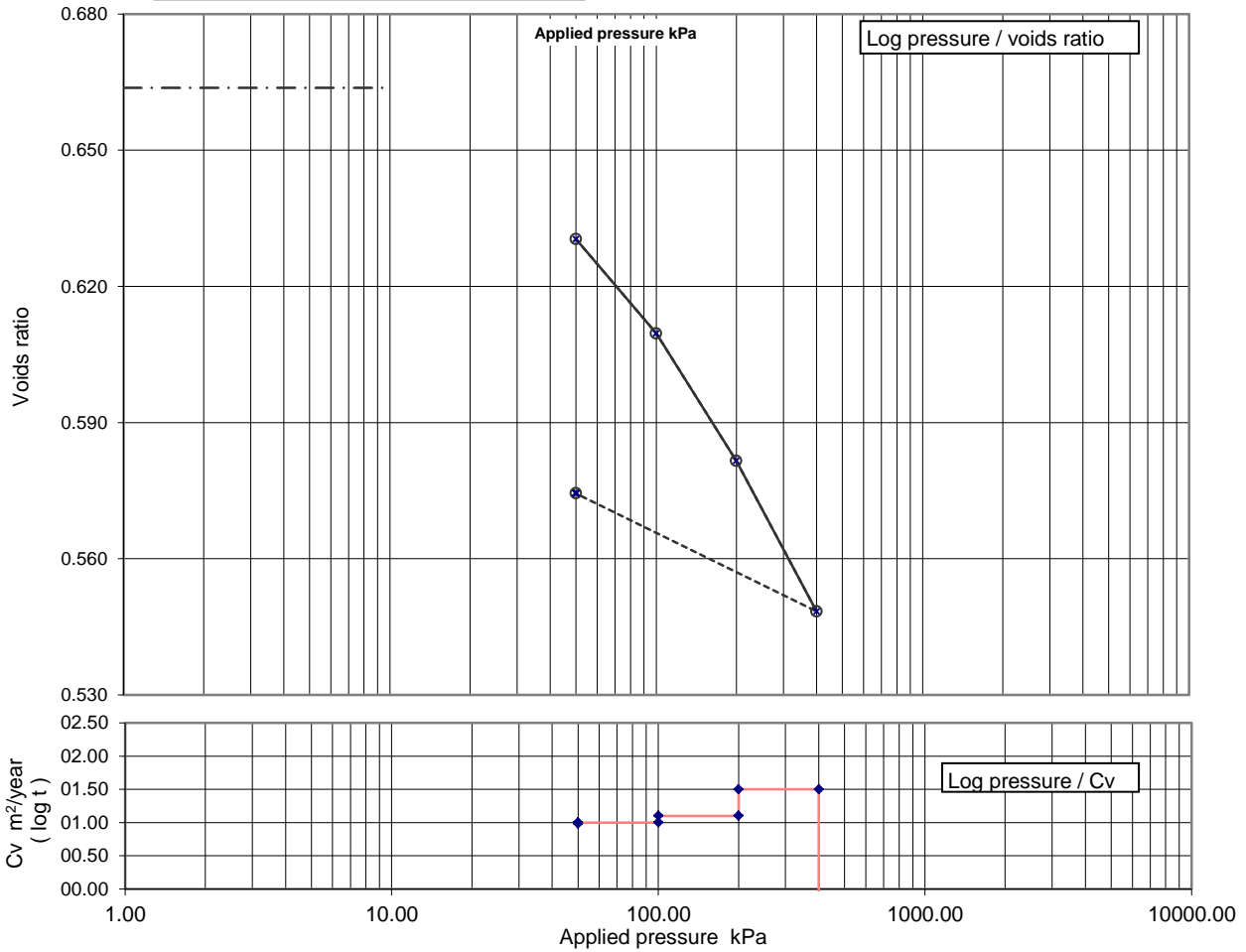
Figure
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ONE DIMENSIONAL CONSOLIDATION TEST



Sample Details:	SAMPLE ID:	Hole No	BH6
	A8015-1820180409092542	Sample Depth (m BGL)	4.00 - 4.45
		Sample Type and No	UT10
		Specimen Ref	



Soil description	Soft brown slightly sandy CLAY.		
Preparation	Undisturbed		
Index properties	Liquid limit %		Plastic limit %
(if available)			
Specimen details	Initial	Final	
Particle density	2.75	assumed	Mg/m3
Diameter	75.19		mm
Height	19.12	18.09	mm
Voids ratio	0.664	0.574	
Moisture content	24	21	%
Bulk density	2.05	2.12	Mg/m3
Dry density	1.65	1.75	Mg/m3
Saturation	99	103	%
Average temperature for test	20		oC
Swelling pressure	not measured		kPa

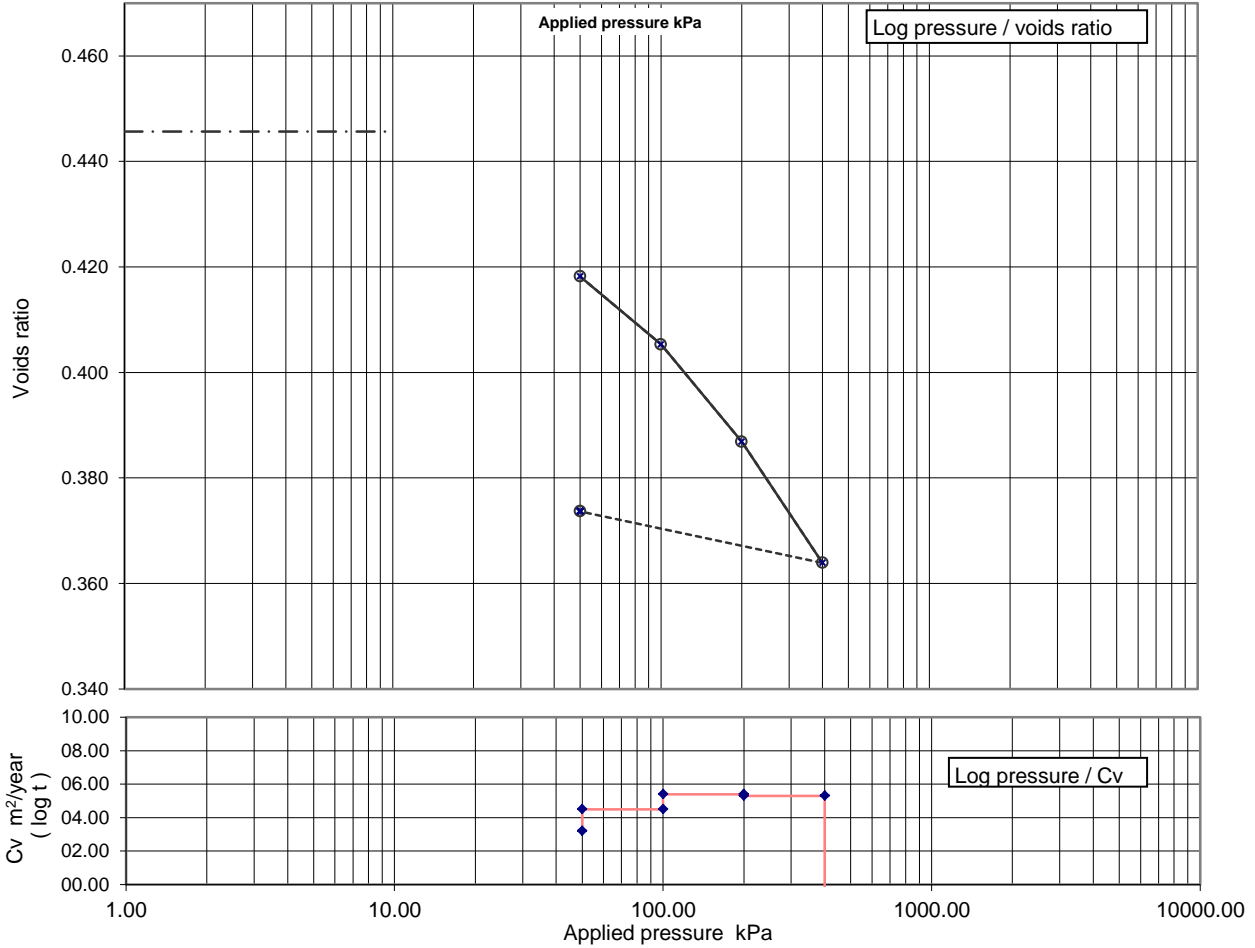
Applied Pressure kPa	Voids ratio	mv m2/MN	cv (t50, log) m2/year	cv (t90, root) m2/year
0	0.6638			
50	0.6304	0.401	0.98	1.1
100	0.6096	0.255	1	1
200	0.5815	0.175	1.1	1.1
400	0.5484	0.105	1.5	1.5
50	0.5744	0.048	-	-

Notes :
Specimen taken 40 mm from base of sample

QA Ref SLR 5.3 Rev 2.16 Nov 16	 	Project No	A8015-18	Figure OED
		Project Name	VPI IMMINGHAM	
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ONE DIMENSIONAL CONSOLIDATION TEST

Sample Details:	SAMPLE ID:	Hole No	BH6
	A8015-1820180409092658	Sample Depth (m BGL)	9.00 - 9.45
		Sample Type and No	UT19
		Specimen Ref	



Soil description	Firm brown slightly sandy slightly gravelly CLAY. Gravel is chalk.			Applied Pressure kPa	Voids ratio	mv m2/MN	cv (t50, log) m2/year	cv (t90, root) m2/year
Preparation	Undisturbed			0	0.4456	/	/	/
Index properties	Liquid limit %		Plastic limit %	50	0.4182	0.380	3.2	3.3
(if available)				100	0.4053	0.182	4.5	4.8
Specimen details	Initial		Final	200	0.3868	0.131	5.4	5.7
Particle density	2.65		assumed	400	0.3639	0.083	5.3	5.5
Diameter	75.04			50	0.3737	0.020	-	-
Height	18.96		18.02					
Voids ratio	0.446		0.374					
Moisture content	17		15					
Bulk density	2.14		2.21					
Dry density	1.83		1.93					
Saturation	98		105					
Average temperature for test	20							
Swelling pressure	not measured							
Notes :								


Specimen taken 10 mm from base of sample

QA Ref SLR 5.3 Rev 2.16 Nov 16	 	Project No	A8015-18	Figure	OED
		Project Name	VPI IMMINGHAM		
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Determination of consolidation properties using a hydraulic cell

BS 1377: Part 6: 1990

Sample Details:	SAMPLE ID:	Hole No	BH2				
	A8015-1820180413011428	Sample Depth (m BGL)	1.20 - 1.65				
		Sample Type and No	UT7				
		Specimen Ref					
Specimen Description	Firm brown slightly sandy slightly gravelly CLAY						
Test Method	BS 1377: Part 6: 1990, clause 3.7	Date of test	26/06/2018				
SPECIMEN DETAILS	Type of sample Preparation	Undisturbed					
	Height	Initial	Final				
	Diameter	19.32		mm			
	Bulk density	71.94		mm			
	Moisture content	2.08	3.52	Mg/m3			
	Dry density	18.0	23.0	%			
	Voids Ratio	1.76	2.67	Mg/m3			
	Degree of Saturation	0.502		%			
	Particle density	95		%			
		2.65		Mg/m3 Assumed			
SWELLING	Swelling pressure			kPa			
	Water taken in during swelling stage			ml			
SATURATION	Cell pressure increments	50		kPa			
Back pressure	Pressure differential	10		kPa			
	Final diaphragm pressure	460		kPa			
	Final back pressure	443		kPa			
	Final pore pressure ratio, $\bar{\sigma}_u / \bar{\sigma}_o$	1.00					
	Water taken in during saturation stage	28.9		ml			
	Voids ratio at end of saturation stage	0.500					
CONSOLIDATION STAGES	Type of drainage	Radial outwards		Centre drain (if applicable)			
	Type of loading	Free strain		Diameter			
	PWP location	Centre base		mm			
				Material			
				Method of formation			
Stage number		1	2	3	4	5	
Diaphragm pressure		475	500	550	650	500	kPa
Back pressure		450	450	450	450	450	kPa
Initial Pore pressure built up		459	476	486	493	362	kPa
Final pore pressure		450	450	451	450	450	kPa
Effective stress (actual) at end of stage		25	50	99	200	50	kPa
Voids at start		0.500	0.173	0.173	0.121	0.102	
Voids at end		0.222	0.173	0.121	0.102	-0.009	
PWP dissipation		100	100	97	100	100	%
Settlement in stage		0.37	0.24	0.17	0.29	-0.12	mm
Volume change in stage	(water out = +ve)	14.5	2.6	2.7	1.0	5.8	ml
Mv		7.4	1.6	0.9	0.17	-0.671	m2/MN
Cro		400	1.5	1.4	0.53	0	0
Csec		0	0	0	0		
Cro method		Settlement, root time, t90	Settlement, root time, t90	Settlement, root time, t90	Settlement, root time, t90		
Average stage temperature		20.6	20.6	21.5	21.0	19.6	oC
Remarks							

QA Ref SLD 3, 5/9 Rev 2.7		Project No A8015-18 Project Name VPI IMMINGHAM	Figure HC
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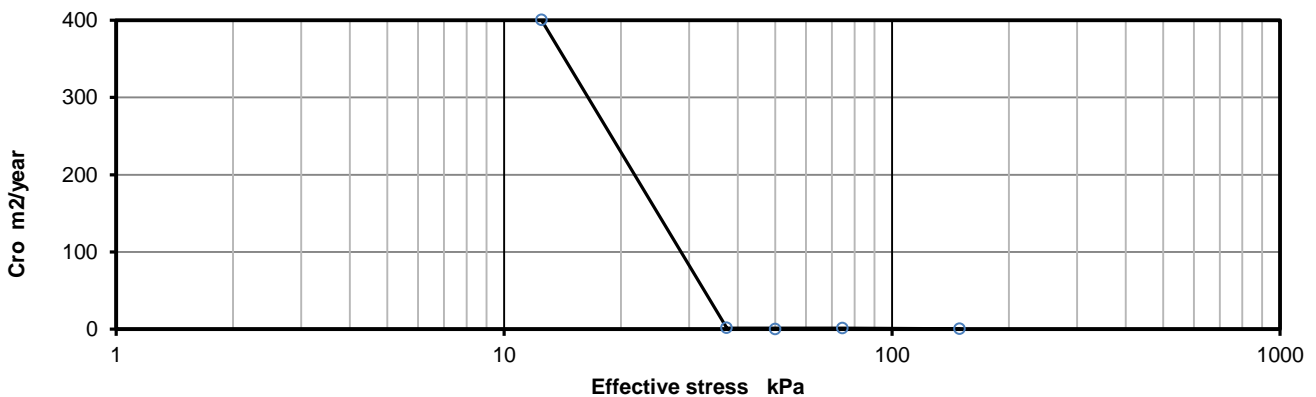
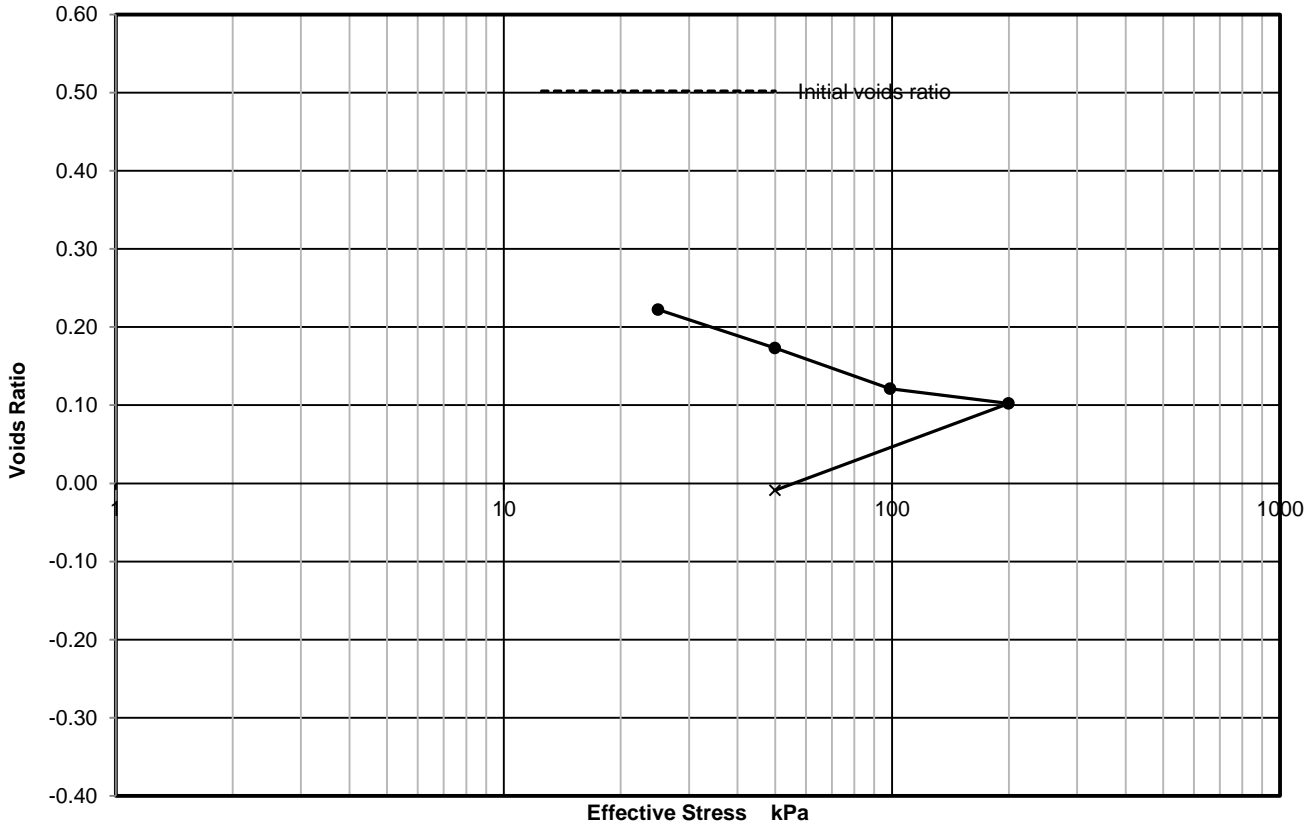
Determination of consolidation properties using a hydraulic cell
BS 1377: Part 6: 1990

Sample Details:	SAMPLE ID:	Hole No	BH2
	A8015-1820180413011428	Sample Depth (m BGL)	1.20 - 1.65
		Sample Type and No	UT7
		Specimen Ref	

Graphical data

Voids Ratio v Log Effective Stress

● Loading stage × Unloading stage



Voids ratio plotted at effective stress at the end of the stage.

Cro plotted at the average effective stress during the stage.

QA Ref
SLD 3, 5/9
Rev 2.7



Project No A8015-18
 Project Name VPI IMMINGHAM

Figure
HC


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Determination of consolidation properties using a hydraulic cell

BS 1377: Part 6: 1990

Sample Details:	SAMPLE ID:	Hole No	BH4				
	A8015-1820180418115015	Sample Depth (m BGL)	2.00 - 2.45				
		Sample Type and No	UT4				
		Specimen Ref					
Specimen Description							
Test Method	BS 1377: Part 6: 1990, clause 3.7	Date of test	26/06/2018				
SPECIMEN DETAILS	Type of sample Preparation	Undisturbed					
	Height	Initial	Final				
	Diameter	18.86					
	Bulk density	72.13					
	Moisture content	2.04	3.32				
	Dry density	22.0	25.0				
	Voids Ratio	1.67	2.41				
	Degree of Saturation	0.585					
	Particle density	100					
		2.65					
			Mg/m3				
			%				
			Mg/m3				
			%				
			Mg/m3				
			Assumed				
SWELLING	Swelling pressure		kPa				
	Water taken in during swelling stage		ml				
SATURATION	Cell pressure increments	50	kPa				
Back pressure	Pressure differential	10	kPa				
	Final diaphragm pressure	310	kPa				
	Final back pressure	298	kPa				
	Final pore pressure ratio, $\bar{\sigma}_u / \bar{\sigma}_\sigma$	0.99					
	Water taken in during saturation stage	27.2	ml				
	Voids ratio at end of saturation stage	0.560					
CONSOLIDATION STAGES	Type of drainage	Radial outwards	Centre drain (if applicable)				
	Type of loading	Free strain	Diameter				
	PWP location	Centre base	Material				
			Method of formation				
	Stage number	1	2	3	4	5	
	Diaphragm pressure	325	350	400	500	350	kPa
	Back pressure	300	300	300	300	300	kPa
	Initial Pore pressure built up	315	321	335	330	255	kPa
	Final pore pressure	300	300	300	300	294	kPa
	Effective stress (actual) at end of stage	25	50	100	200	56	kPa
	Voids at start	0.560	0.312	0.312	0.235	0.182	
	Voids at end	0.388	0.312	0.235	0.182	0.102	
	PWP dissipation	100	100	100	100	86	%
	Settlement in stage	0.00	0.11	0.26	0.21	-0.09	mm
	Volume change in stage	8.4	3.7	3.7	2.6	3.9	ml
	Mv	4.4	2.2	1.2	0.43	-0.471	m2/MN
	Cro	0	36	8.6	7	0	0
	Csec		0	0	0		
	Cro method	Settlement, root time, t90	Settlement, root time, t90	Settlement, root time, t90	Settlement, root time, t90		
	Average stage temperature	21.1	20.8	20.3	21.1	21.8	oC
Remarks							

QA Ref SLD 3, 5/9 Rev 2.7	 SOCOTEC	Project No A8015-18 Project Name VPI IMMINGHAM	Figure HC
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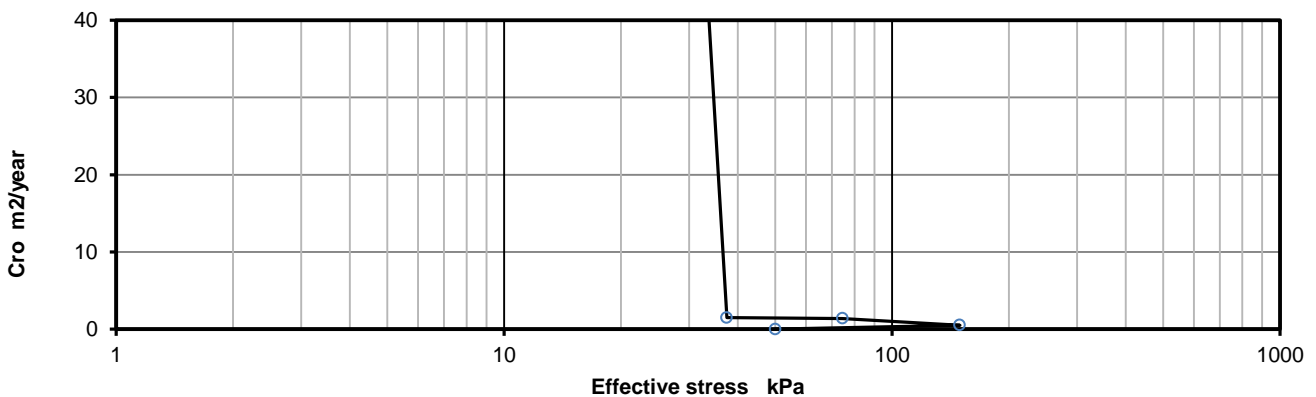
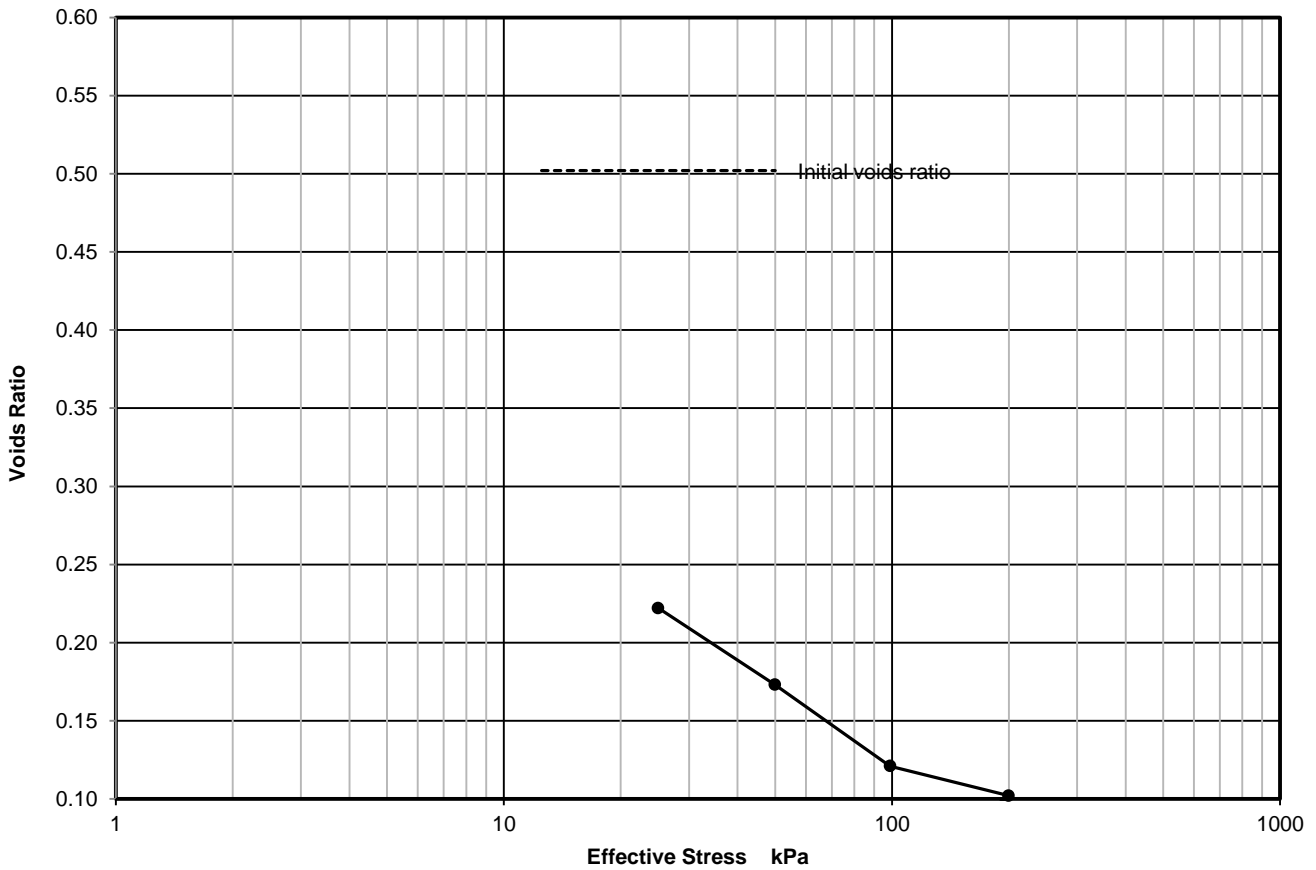
Determination of consolidation properties using a hydraulic cell
BS 1377: Part 6: 1990

Sample Details:	SAMPLE ID:	Hole No	BH4
	A8015-1820180418115015	Sample Depth (m BGL)	2.00 - 2.45
		Sample Type and No	UT4
		Specimen Ref	

Graphical data

Voids Ratio v Log Effective Stress

● Loading stage × Unloading stage



Voids ratio plotted at effective stress at the end of the stage.

Cro plotted at the average effective stress during the stage.

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 Project Name VPI IMMINGHAM

Figure
HC

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Determination of consolidation properties using a hydraulic cell

BS 1377: Part 6: 1990

Sample Details:	SAMPLE ID:	Hole No	BH5				
	A8015-1820180418120419	Sample Depth (m BGL)	1.20 - 1.65				
		Sample Type and No	UT7				
		Specimen Ref					
Specimen Description	Soft to firm brown slightly sandy slightly gravelly CLAY.						
Test Method	BS 1377: Part 6: 1990, clause 3.7	Date of test	11/07/2018				
SPECIMEN DETAILS	Type of sample Preparation	Undisturbed					
	Height	Initial	Final				
	Diameter	18.55		mm			
	Bulk density	72.06		mm			
	Moisture content	2.24	4.58	Mg/m3			
	Dry density	15.0	20.0	%			
	Voids Ratio	1.95	4.02	Mg/m3			
	Degree of Saturation	0.359		%			
	Particle density	111		%			
		2.65		Mg/m3 Assumed			
SWELLING	Swelling pressure			kPa			
	Water taken in during swelling stage			ml			
SATURATION	Cell pressure increments	50		kPa			
Back pressure	Pressure differential	10		kPa			
	Final diaphragm pressure	360		kPa			
	Final back pressure	341		kPa			
	Final pore pressure ratio, $\bar{\sigma}_u / \bar{\sigma}_\sigma$	0.96					
	Water taken in during saturation stage	22.3		ml			
	Voids ratio at end of saturation stage	0.290					
CONSOLIDATION STAGES	Type of drainage	Radial outwards		Centre drain (if applicable)			
	Type of loading	Free strain		Diameter			
	PWP location	Centre base		mm			
				Material			
				Method of formation			
Stage number		1	2	3	4	5	
Diaphragm pressure		375	400	450	550	400	kPa
Back pressure		350	350	350	350	350	kPa
Initial Pore pressure built up		356	369	385	422	246	kPa
Final pore pressure		350	350	350	350	350	kPa
Effective stress (actual) at end of stage		25	50	100	200	50	kPa
Voids at start		0.290	0.145	0.145	0.093	0.041	
Voids at end		0.215	0.145	0.093	0.041	-0.340	
PWP dissipation		100	100	100	100	100	%
Settlement in stage		0.01	0.19	0.22	0.22	-0.62	mm
Volume change in stage	(water out = +ve)	4.2	3.9	2.9	2.9	21.2	ml
Mv		2.3	2.3	0.91	0.48	-2.44	m2/MN
Cro		1.3	29	19	2.7	0	0
Csec		0	0	0	0		
Cro method		Settlement, root time, t90	Settlement, root time, t90	Settlement, root time, t90	Settlement, root time, t90		
Average stage temperature		20.3	20.1	20.3	21.3	20.6	oC
Remarks							

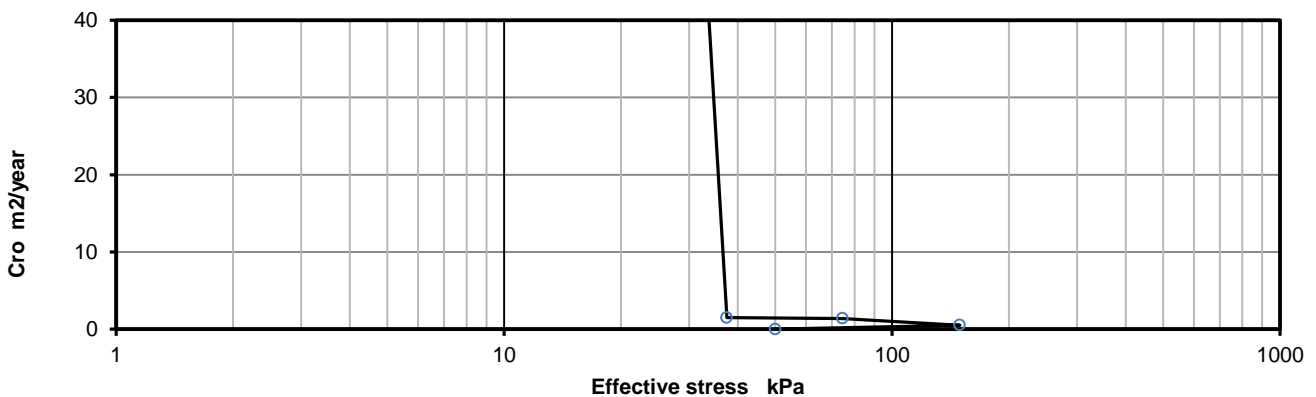
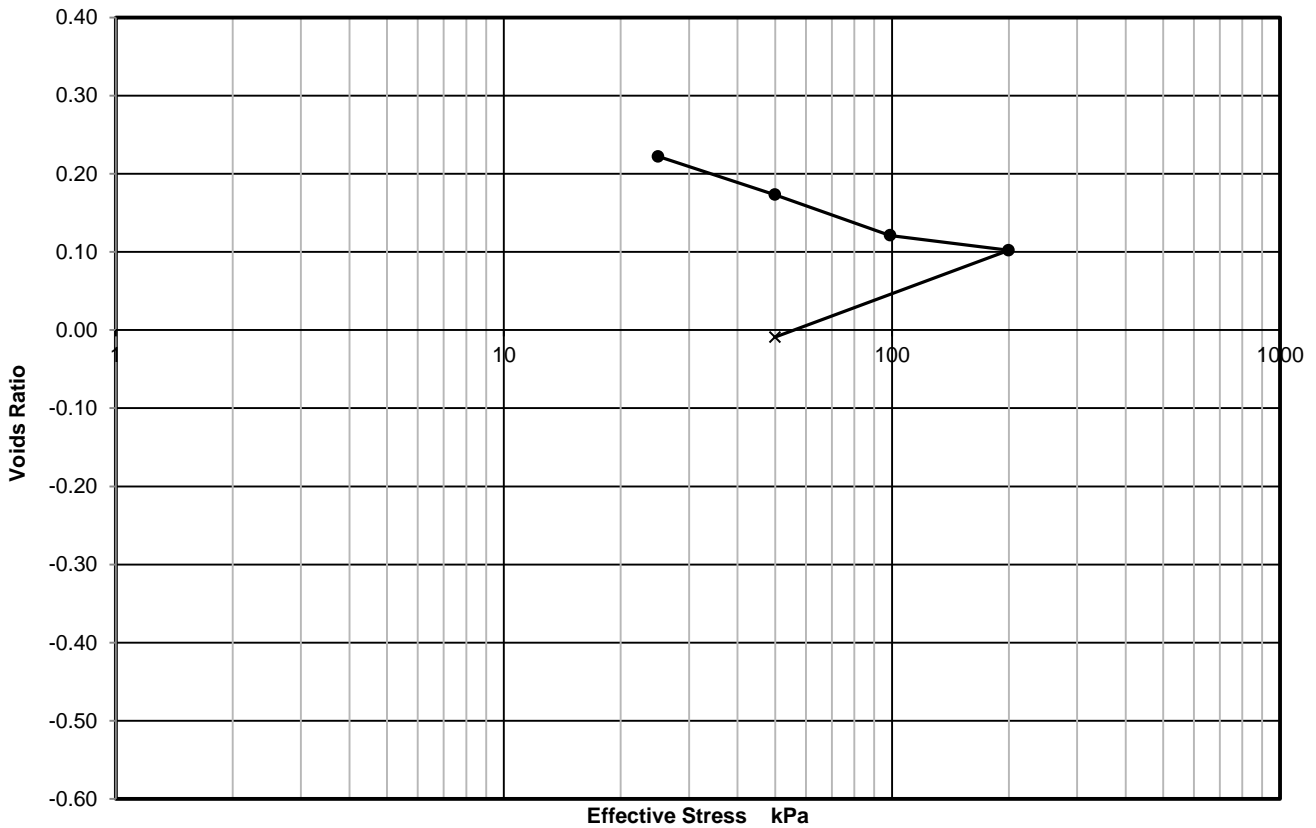
Determination of consolidation properties using a hydraulic cell
BS 1377: Part 6: 1990

Sample Details:	SAMPLE ID:	Hole No	BH5
	A8015-1820180418120419	Sample Depth (m BGL)	1.20 - 1.65
		Sample Type and No	UT7
		Specimen Ref	

Graphical data

Voids Ratio v Log Effective Stress

● Loading stage × Unloading stage



Voids ratio plotted at effective stress at the end of the stage.

Cro plotted at the average effective stress during the stage.

QA Ref
SLD 3, 5/9
Rev 2.7



Project No A8015-18
 Project Name VPI IMMINGHAM

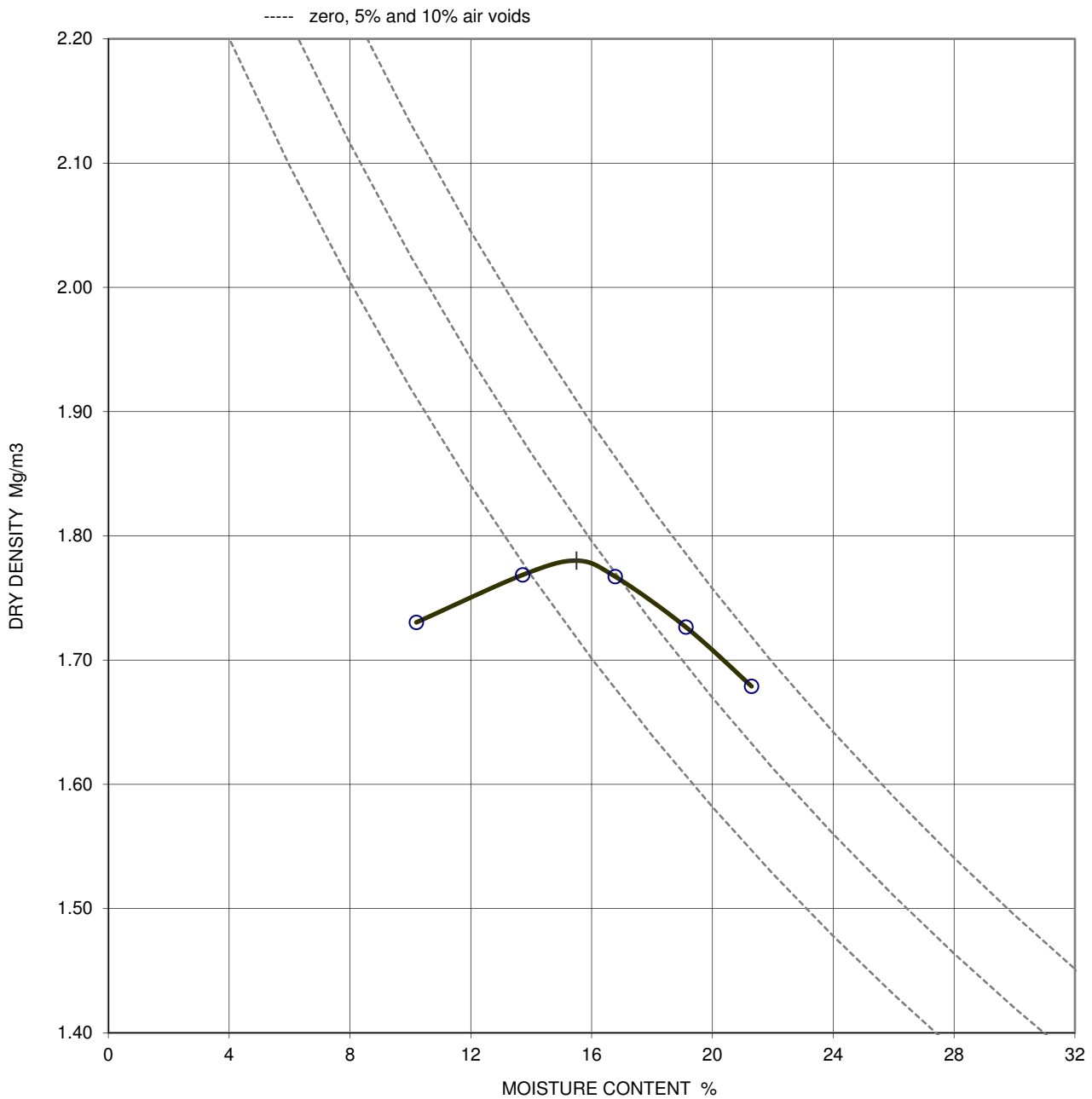
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	BH1
	A8015-1820180409104626	Sample Depth (m BGL)	2.50 - 3.00
		Sample Type and No	B9
		Specimen Ref	

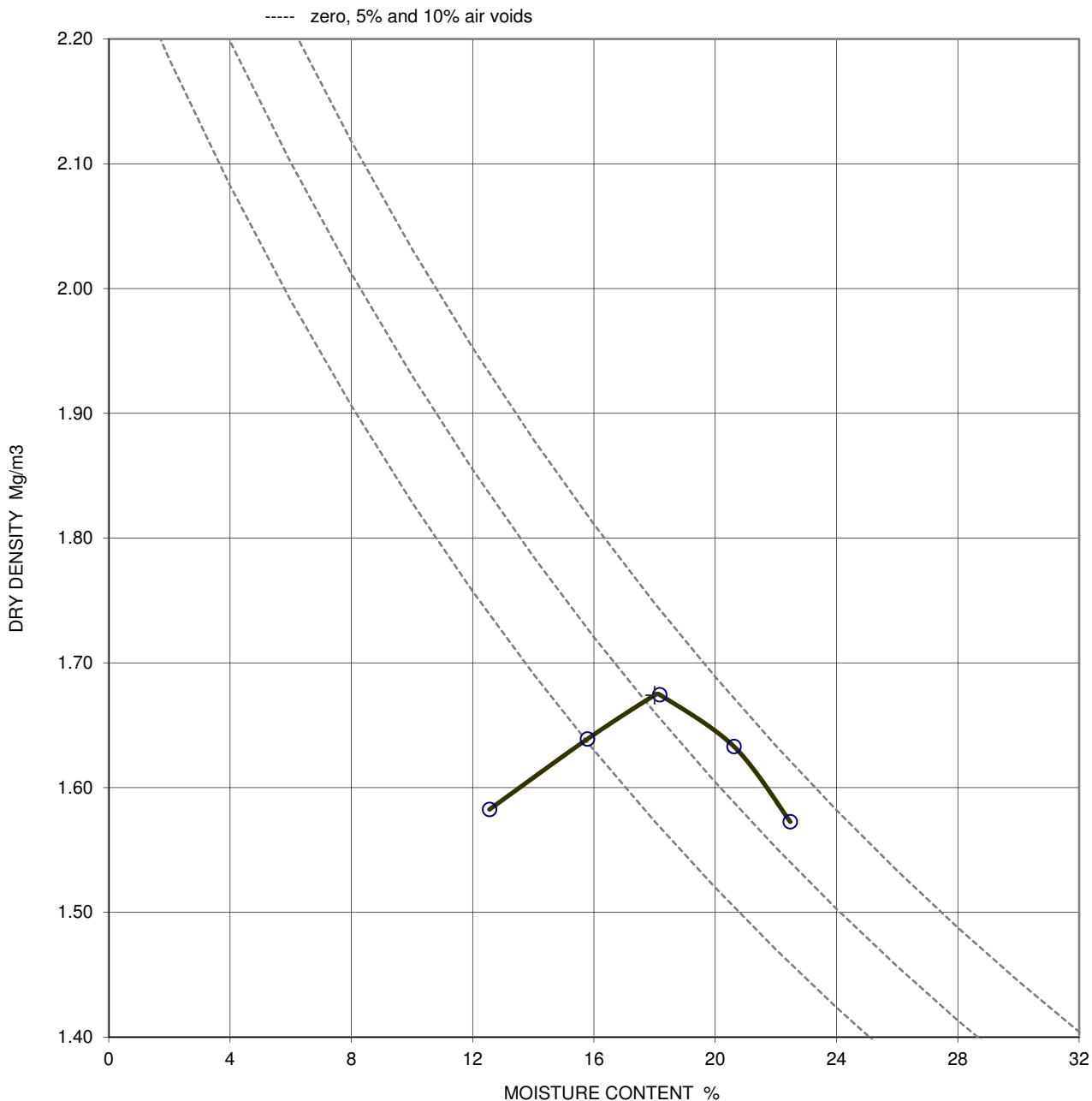


Soil description	Brown CLAY with chalk fragments.	Derived Parameters +
Test method	BS 1377:part 4:1990: clause 3.5, 2.5 kg rammer in a 1 litre mould	Maximum dry density, Mg/m ³
Preparation	Original material was natural, single sample tested	1.78
Material > 37.5mm	0 %	Optimum moisture content, %
Material < 37.5mm > 20mm	0 %	16
Particle density	2.71 measured - small pycnometer	
Remarks		



QA Ref SLD 4, 3.5/6 Rev 2.5 Sep 17	 1157	 SOCOTEC	Project No	A8015-18	Figure
			Project Name	VPI IMMINGHAM	
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	BH5
	A8015-1820180418120410	Sample Depth (m BGL)	0.50 - 0.80
		Sample Type and No	B4
		Specimen Ref	

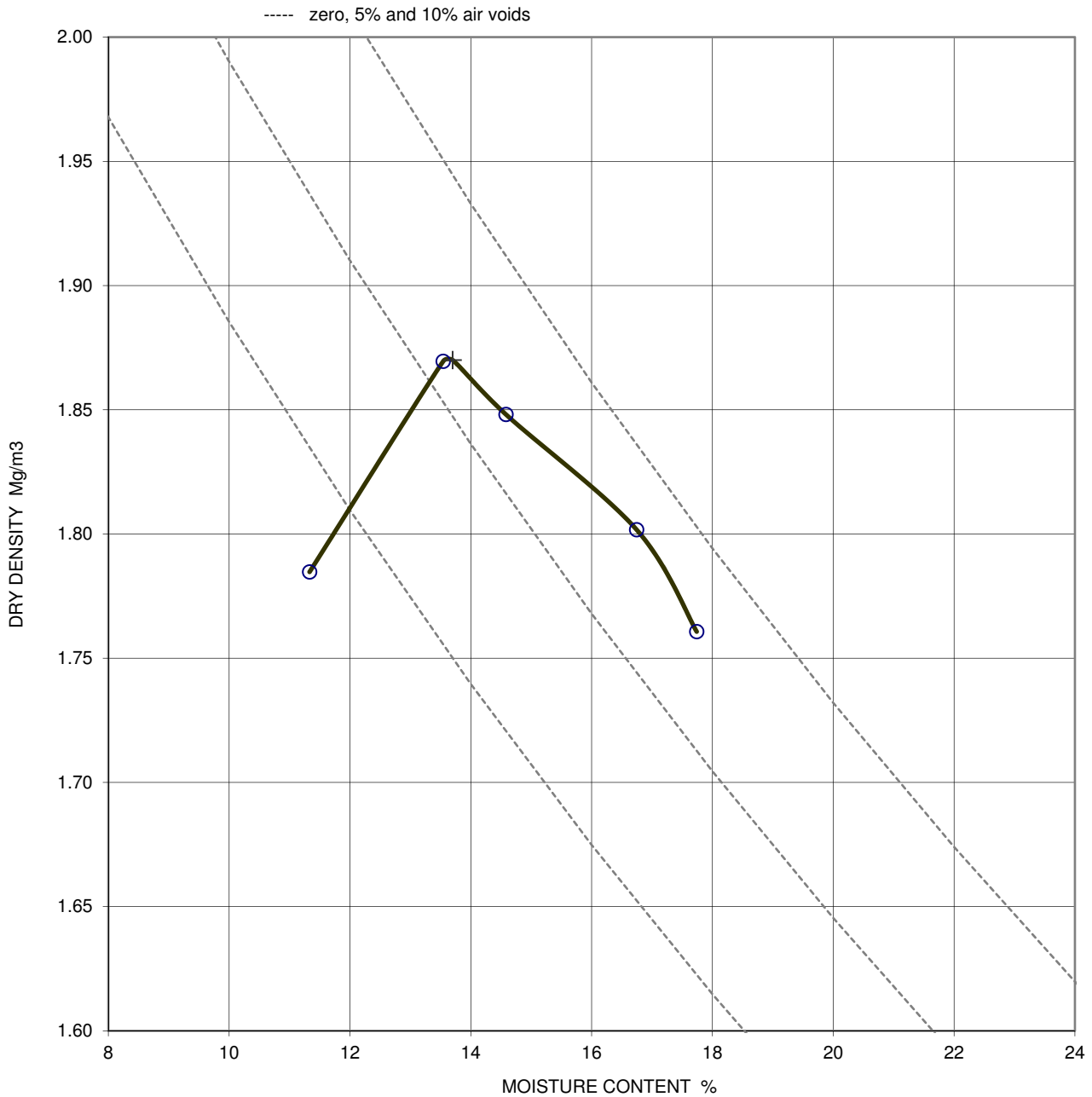


Soil description	Brown slightly sandy CLAY.	Derived Parameters +
Test method	BS 1377:part 4:1990: clause 3.5, 2.5 kg rammer in a 1 litre mould	Maximum dry density, Mg/m ³
Preparation	Original material wassingle sample tested	1.67
Material > 37.5mm	0 %	Optimum moisture content, %
Material < 37.5mm > 20mm	0 %	18
Particle density	2.55 assumed	
Remarks		



QA Ref SLD 4, 3.5/6 Rev 2.5 Sep 17	 1157		Project No	A8015-18	Figure
			Project Name	VPI IMMINGHAM	
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	TP1
	A8015-18-20180413084026	Sample Depth (m BGL)	0.10 - 0.30
		Sample Type and No	B2
		Specimen Ref	

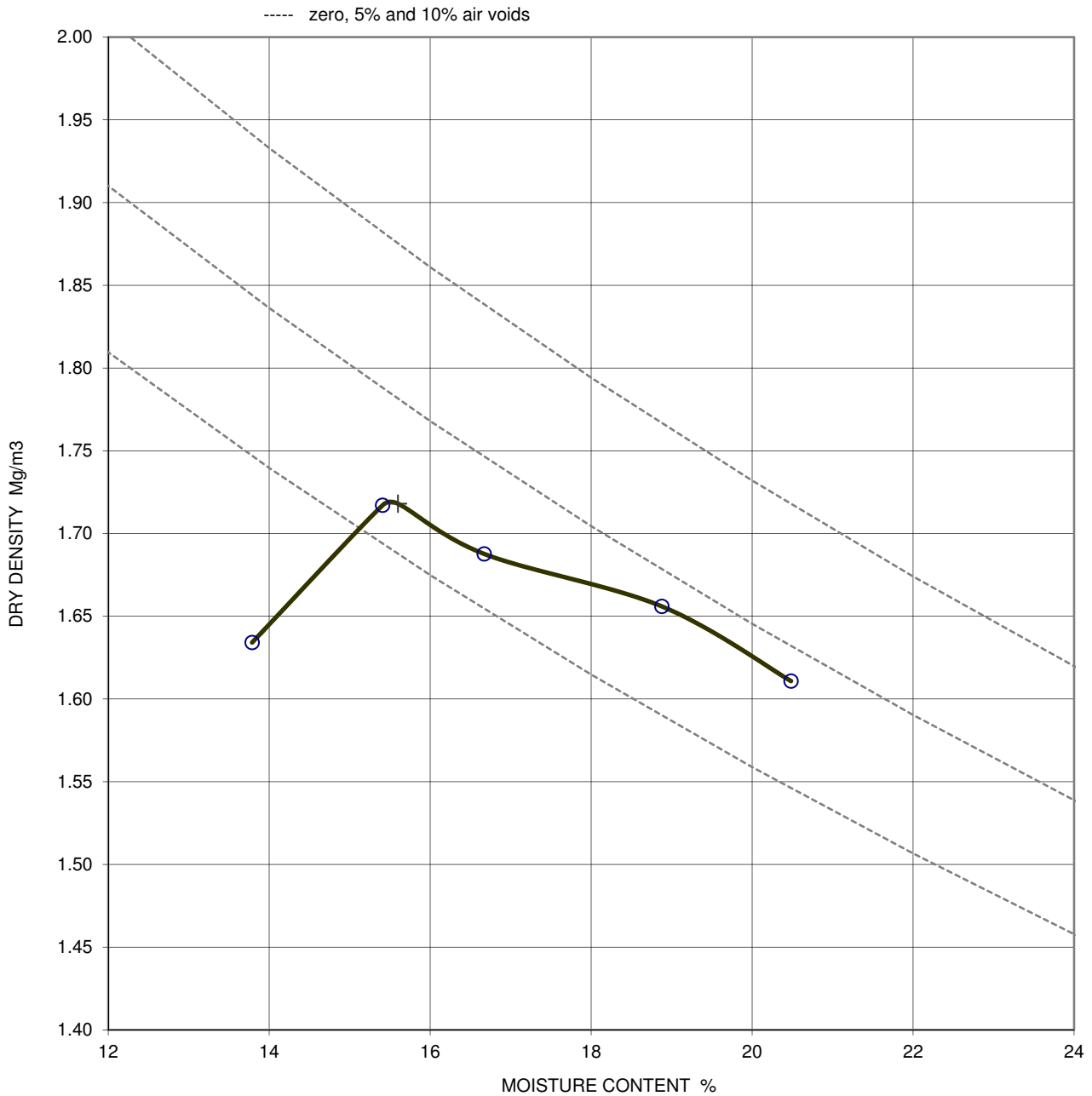


Soil description	Brown slightly sandy gravelly CLAY.	Derived Parameters +
Test method	BS 1377:part 4:1990: clause 3.5, 2.5 kg rammer in a 1 litre mould	Maximum dry density, Mg/m ³
Preparation	Original material was natural, single sample tested	1.87
Material > 37.5mm	0 %	Optimum moisture content, %
Material < 37.5mm > 20mm	4 %	14
Particle density	2.65 assumed	
Remarks		



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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	TP3
	A8015-18-20180410084322	Sample Depth (m BGL)	0.10 - 0.20
		Sample Type and No	B2
		Specimen Ref	

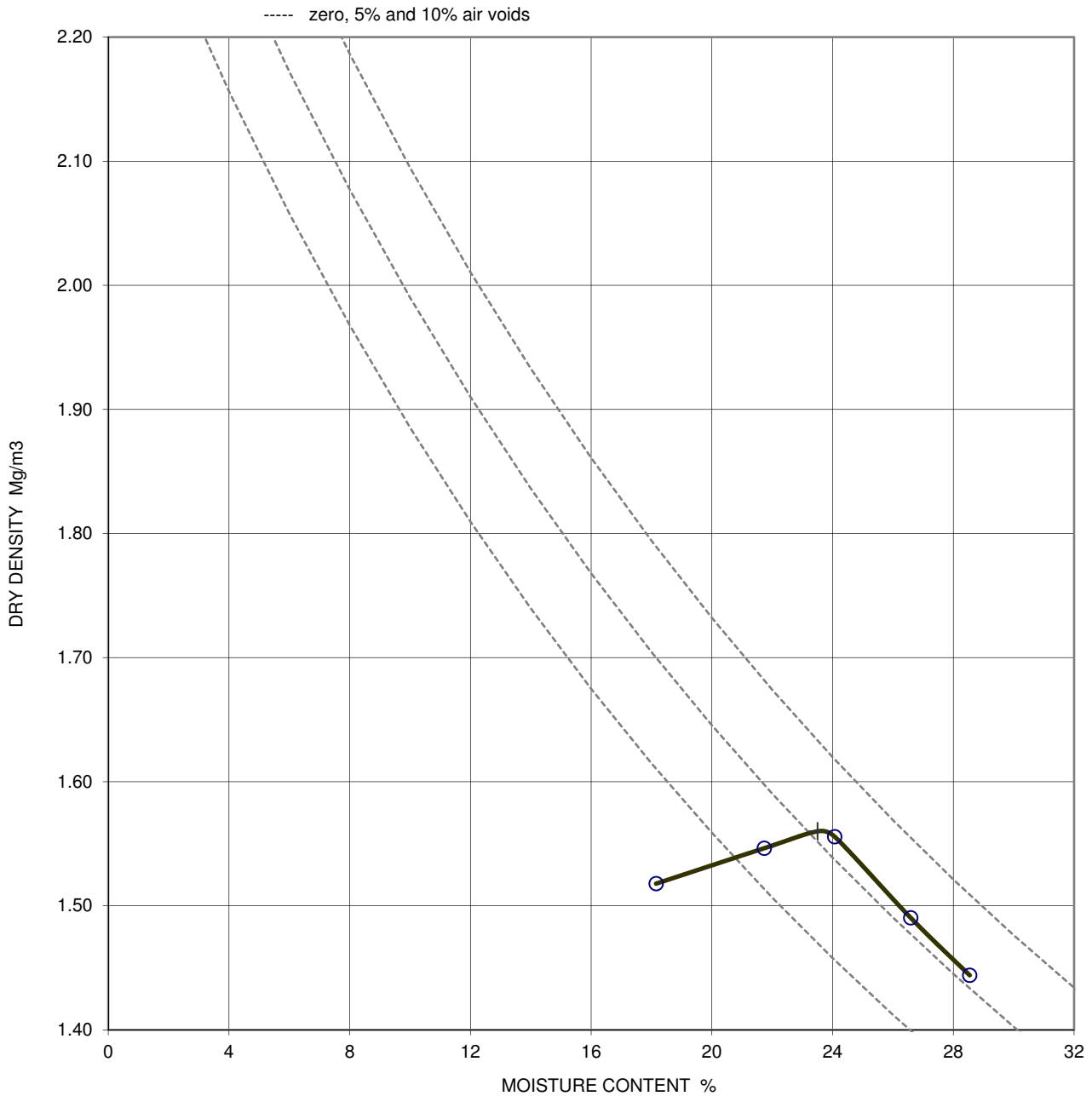


Soil description	Brown slightly sandy CLAY.	Derived Parameters +
Test method	BS 1377:part 4:1990: clause 3.6, 2.5 kg rammer in a CBR mould	Maximum dry density, Mg/m ³
Preparation	Original material was natural, single sample tested	1.72
Material > 37.5mm	0 %	Optimum moisture content, %
Material < 37.5mm > 20mm	8 %	16
Particle density	2.65 assumed	
Remarks		



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			Project Name	VPI IMMINGHAM	
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	TP5
	A8015-18-20180410090003	Sample Depth (m BGL)	0.10 - 0.20
		Sample Type and No	B2
		Specimen Ref	

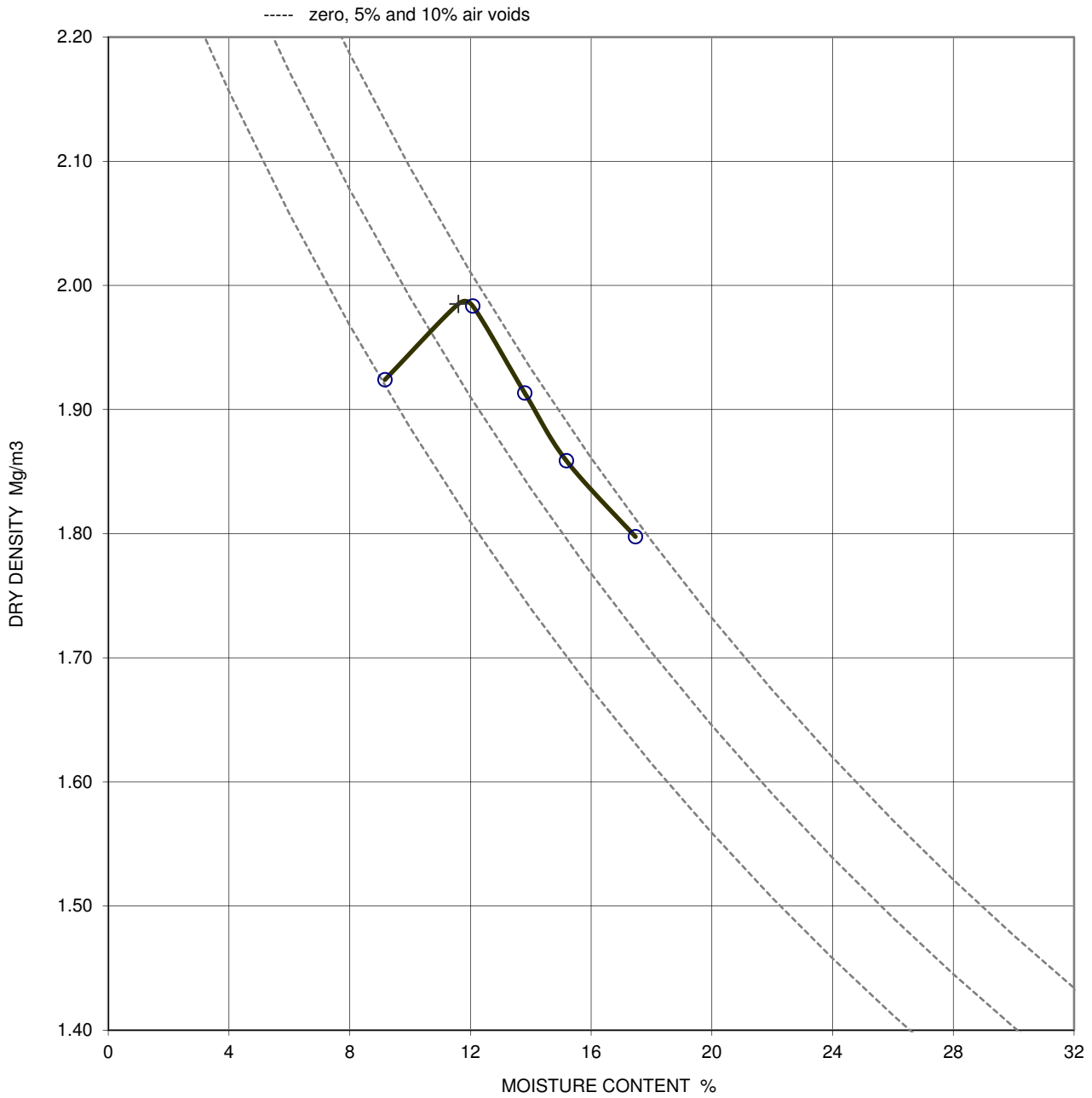


Soil description	Greenish brown slightly sandy slightly gravelly CLAY.	Derived Parameters +
Test method	BS 1377:part 4:1990: clause 3.5, 2.5 kg rammer in a 1 litre mould	Maximum dry density, Mg/m ³
Preparation	Original material was natural, single sample tested	1.56
Material > 37.5mm	0 %	Optimum moisture content, %
Material < 37.5mm > 20mm	1 %	24
Particle density	2.65 assumed	
Remarks		



QA Ref SLD 4, 3.5/6 Rev 2.5 Sep 17	 1157	 SOCOTEC	Project No	A8015-18	Figure	COMPL
			Project Name	VPI IMMINGHAM		
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	TP9
	A8015-18-20180410091510	Sample Depth (m BGL)	0.30 - 0.40
		Sample Type and No	B4
		Specimen Ref	

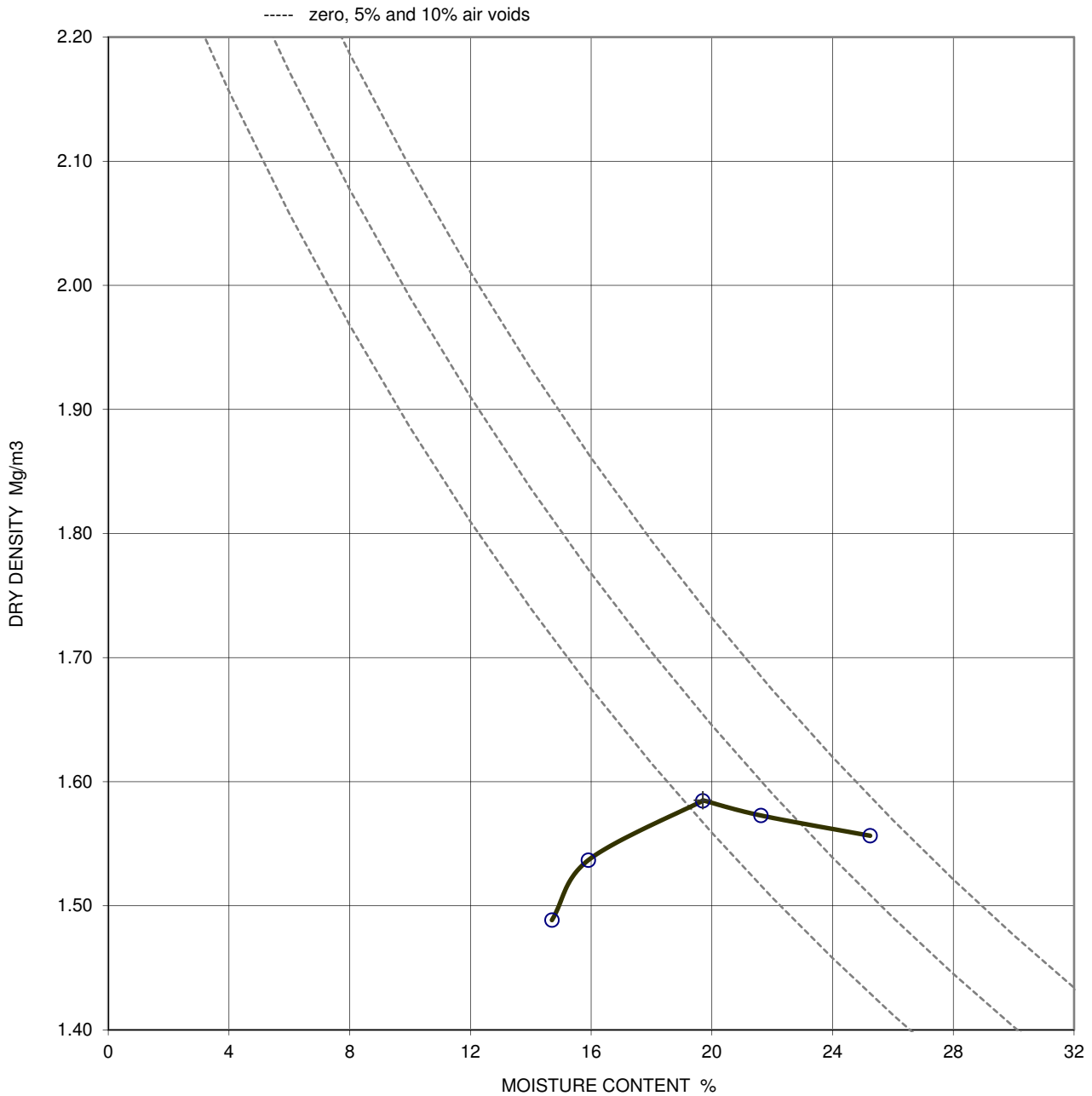


Soil description	Light brown slightly sandy slightly gravelly CLAY.	Derived Parameters +
Test method	BS 1377:part 4:1990: clause 3.5, 2.5 kg rammer in a 1 litre mould	Maximum dry density, Mg/m ³
Preparation	Original material was natural, single sample tested	1.99
Material > 37.5mm	0 %	Optimum moisture content, %
Material < 37.5mm > 20mm	15 %	12
Particle density	2.65 assumed	
Remarks		



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			Project Name	VPI IMMINGHAM	
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : LIGHT COMPACTION, 2.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	TT1
	A8015-18-20180413014653	Sample Depth (m BGL)	0.10 - 0.30
		Sample Type and No	B2
		Specimen Ref	

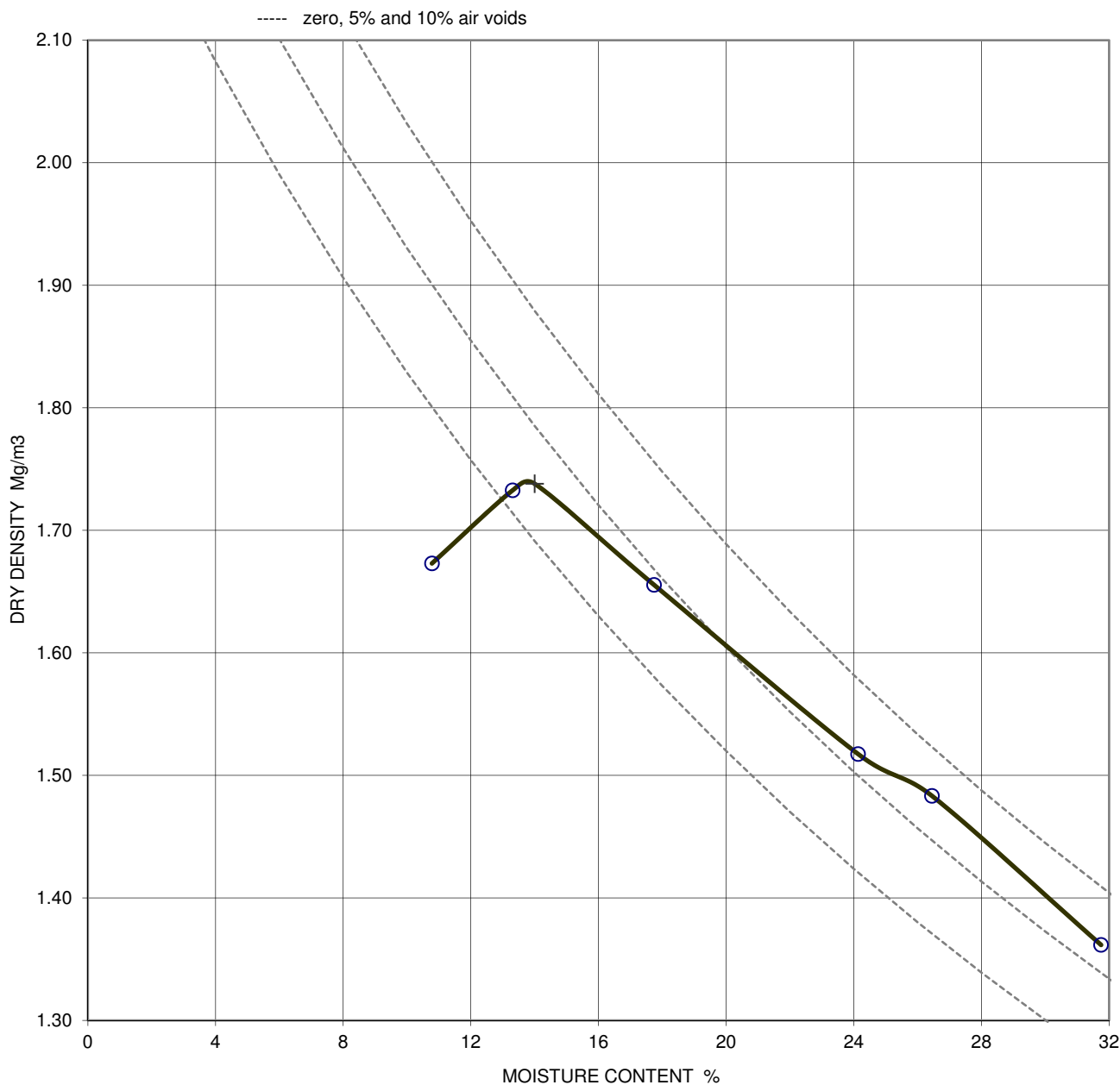


Soil description	Brown slightly sandy slightly gravelly CLAY.	Derived Parameters +
Test method	BS 1377:part 4:1990: clause 3.5, 2.5 kg rammer in a 1 litre mould	Maximum dry density, Mg/m ³
Preparation	Original material wassingle sample tested	1.59
Material > 37.5mm	0 %	Optimum moisture content, %
Material < 37.5mm > 20mm	3 %	20
Particle density	2.65 assumed	
Remarks		

QA Ref SLD 4, 3.5/6 Rev 2.5 Sep 17	 1157	 SOCOTEC	Project No	A8015-18	Figure
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : HEAVY COMPACTION, 4.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	BH1
	A8015-1820180409104548	Sample Depth (m BGL)	0.50 - 0.70
		Sample Type and No	B4
		Specimen Ref	



Soil description Greyish brown slightly sandy slightly gravelly CLAY.

Test method BS 1377:part 4:1990: clause 3.5, 4.5 kg rammer in a 1 litre mould

Preparation Original material was natural, separate specimens tested

Material > 37.5mm 0 %

Material < 37.5mm > 20mm 0 %

Particle density 2.55 assumed

Remarks

Derived Parameters +

Maximum dry density, Mg/m³
1.74

Optimum moisture content, %
14

QA Ref
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Project Name VPI IMMINGHAM

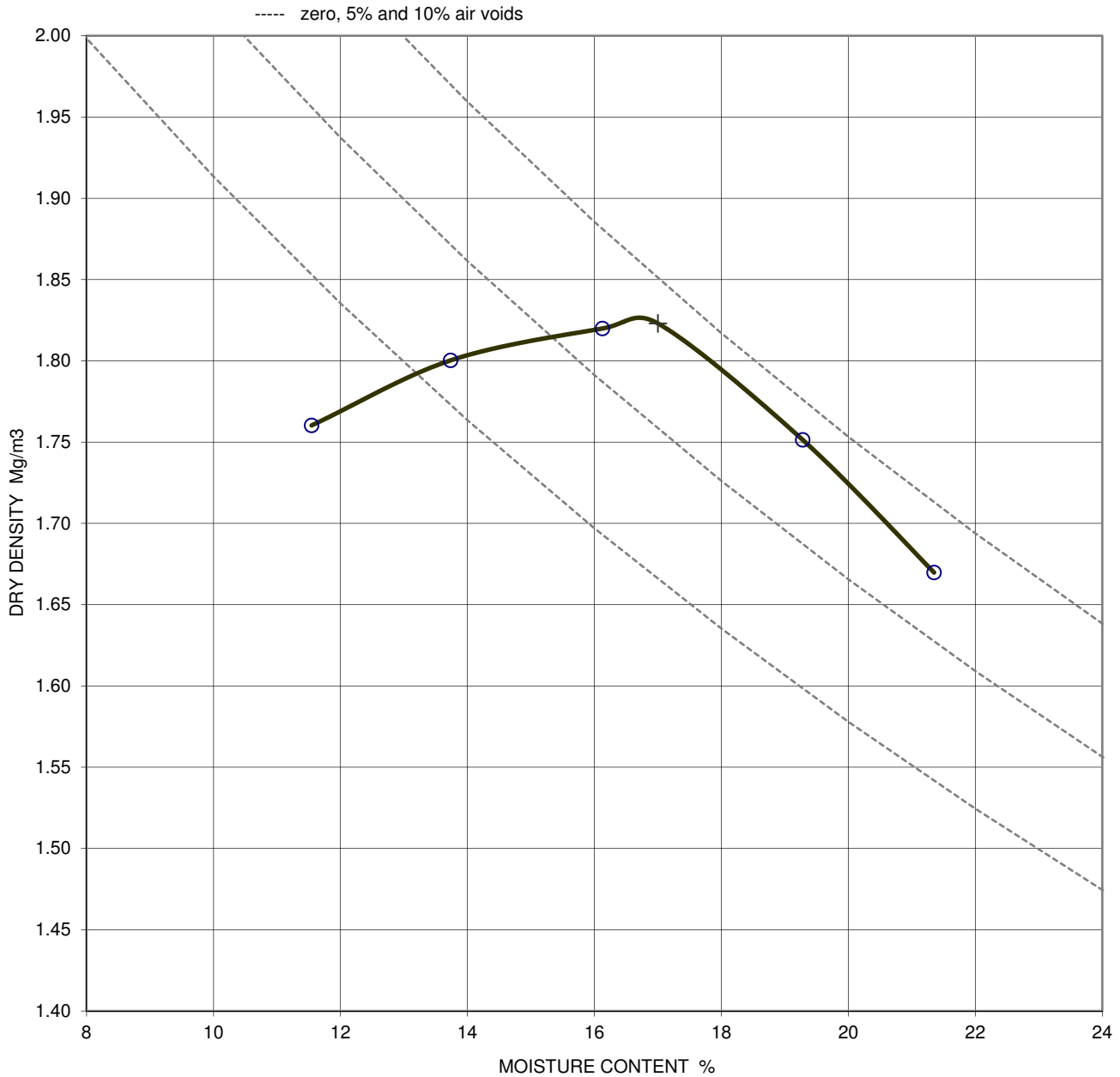
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : HEAVY COMPACTION, 4.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	BH2
	A8015-1820180413011454	Sample Depth (m BGL)	1.80 - 2.25
		Sample Type and No	B10
		Specimen Ref	



Soil description Brown slightly gravelly CLAY. Gravel is chalk

Test method BS 1377:part 4:1990: clause 3.5, 4.5 kg rammer in a 1 litre mould

Preparation Original material was natural, single sample tested

Material > 37.5mm 0 %

Material < 37.5mm > 20mm 0 %

Particle density 2.70 assumed

Remarks

Derived Parameters +

Maximum dry density, Mg/m3
1.82

Optimum moisture content, %
17

QA Ref
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Project Name VPI IMMINGHAM

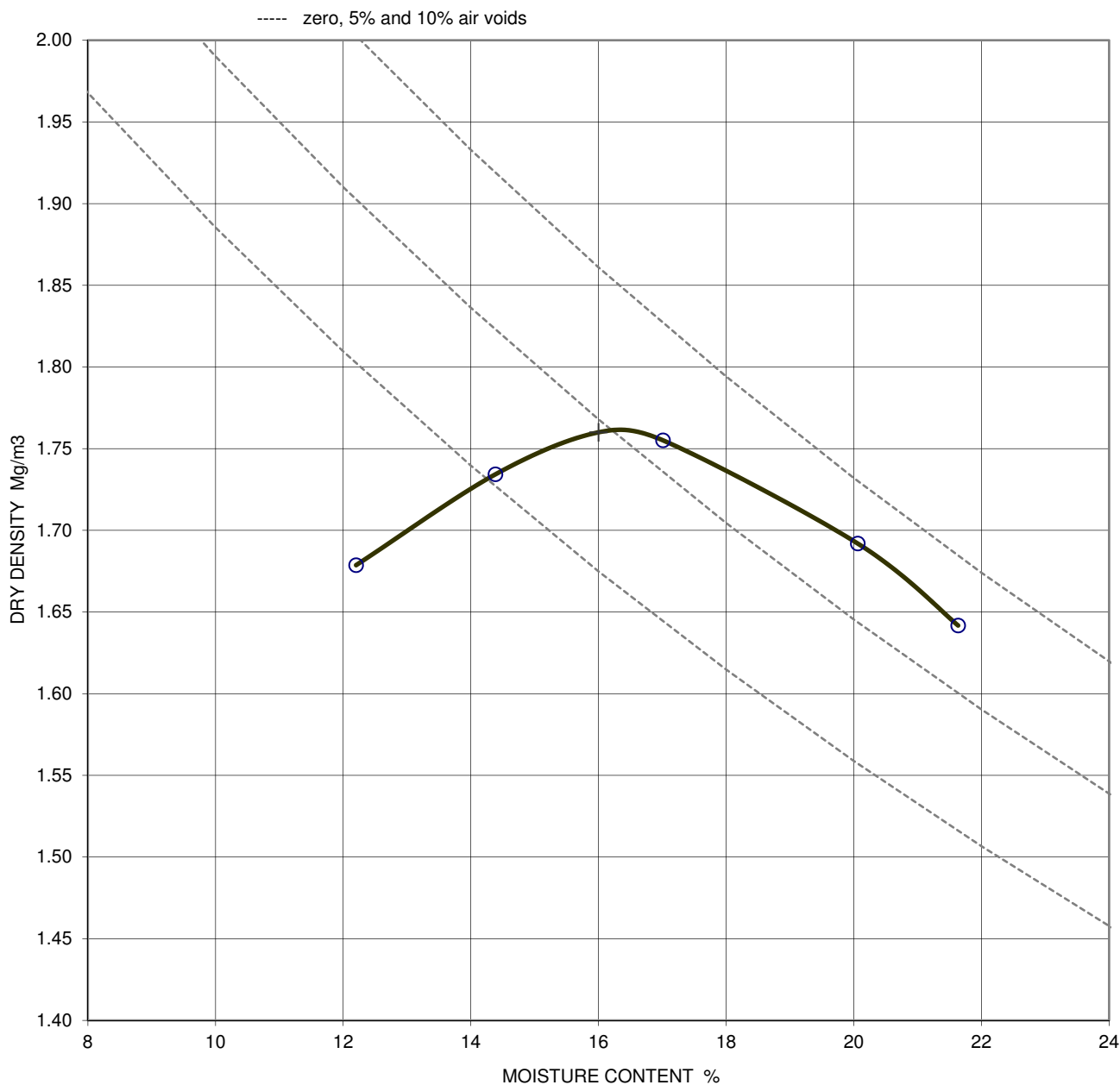
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : HEAVY COMPACTION, 4.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	BH3
	A8015-1820180413102609	Sample Depth (m BGL)	0.40 - 1.20
		Sample Type and No	B1
		Specimen Ref	



Soil description Brown slightly sandy CLAY with chalk fragments.

Test method BS 1377:part 4:1990: clause 3.5, 4.5 kg rammer in a 1 litre mould

Preparation Original material was natural, single sample tested

Material > 37.5mm 0 %

Material < 37.5mm > 20mm 0 %

Particle density 2.65 assumed

Remarks

Derived Parameters +

Maximum dry density, Mg/m³
1.76

Optimum moisture content, %
16

QA Ref
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Sep 17



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Project Name VPI IMMINGHAM

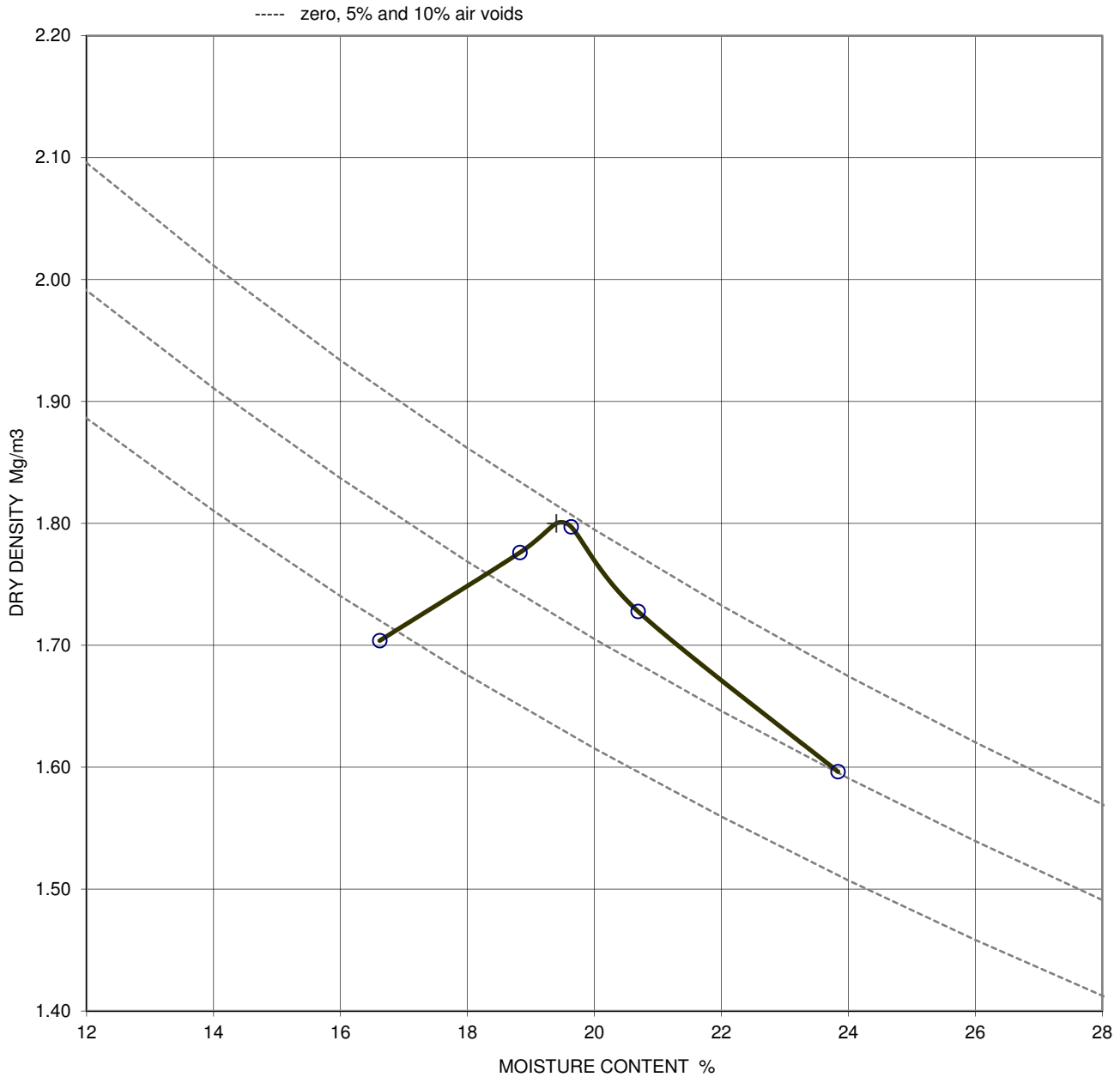
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : HEAVY COMPACTION, 4.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	BH6
	A8015-1820180409092443	Sample Depth (m BGL)	0.30 - 0.55
		Sample Type and No	B2
		Specimen Ref	



Soil description Brown slightly sandy CLAY.

Test method BS 1377:part 4:1990: clause 3.5, 4.5 kg rammer in a 1 litre mould

Preparation Original material was natural, single sample tested

Material > 37.5mm 0 %

Material < 37.5mm > 20mm 0 %

Particle density 2.80 assumed

Remarks

Derived Parameters +

Maximum dry density, Mg/m³
1.80

Optimum moisture content, %
19

QA Ref
 SLD 4, 3.5/6
 Rev 2.5
 Sep 17



Project No A8015-18

Project Name VPI IMMINGHAM

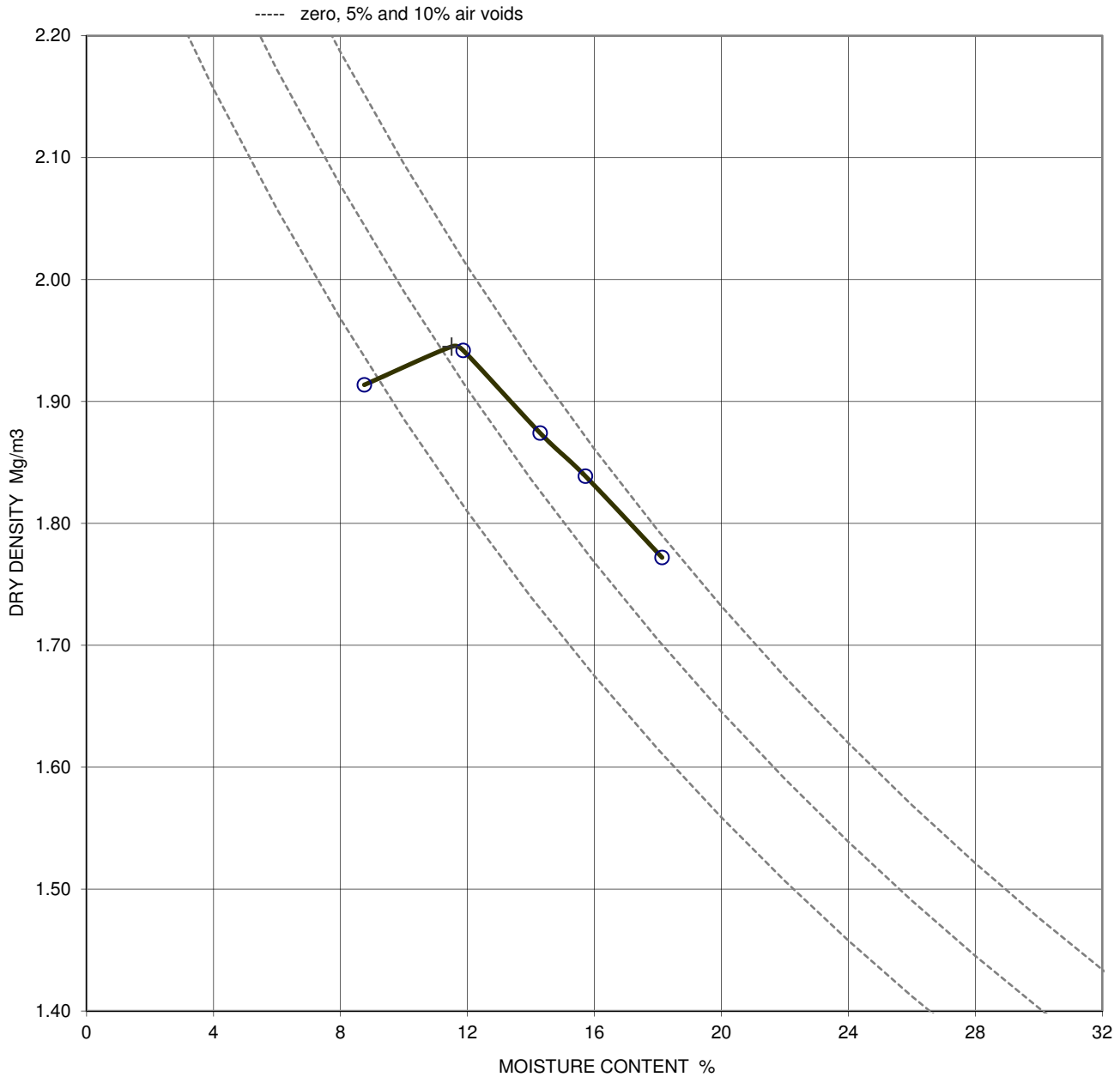
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : HEAVY COMPACTION, 4.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	TP10
	A8015-18-20180408084806	Sample Depth (m BGL)	0.40 - 0.60
		Sample Type and No	B4
		Specimen Ref	



Soil description Brown slightly sandy CLAY.

Test method BS 1377:part 4:1990: clause 3.5, 4.5 kg rammer in a 1 litre mould

Preparation Original material was natural, single sample tested

Material > 37.5mm 0 %

Material < 37.5mm > 20mm 0 %

Particle density 2.65 assumed

Remarks

Derived Parameters +

Maximum dry density, Mg/m³
1.95

Optimum moisture content, %
12

QA Ref
 SLD 4, 3.5/6
 Rev 2.5
 Sep 17



Project No A8015-18
 Project Name VPI IMMINGHAM

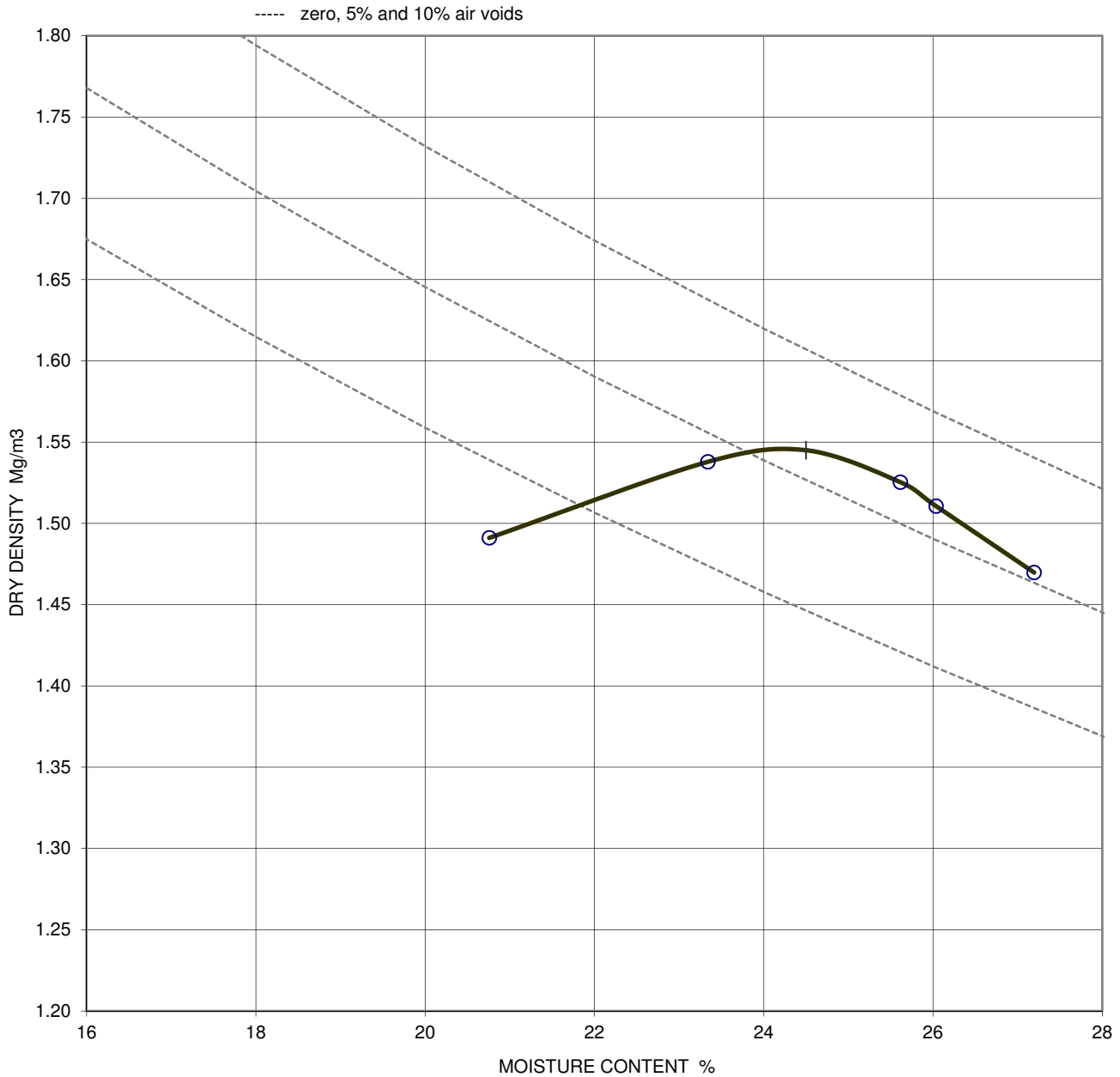
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : HEAVY COMPACTION, 4.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	TP2
	A8015-18-20180413090338	Sample Depth (m BGL)	0.10 - 0.30
		Sample Type and No	B2
		Specimen Ref	



Soil description Dark brown slightly gravelly silty CLAY.

Test method BS 1377:part 4:1990: clause 3.5, 4.5 kg rammer in a 1 litre mould

Preparation Original material was natural, single sample tested

Material > 37.5mm 0 %

Material < 37.5mm > 20mm 4 %

Particle density 2.65 assumed

Remarks

Derived Parameters +

Maximum dry density, Mg/m³
1.55

Optimum moisture content, %
25

QA Ref
SLD 4, 3.5/6
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Project No A8015-18
Project Name VPI IMMINGHAM

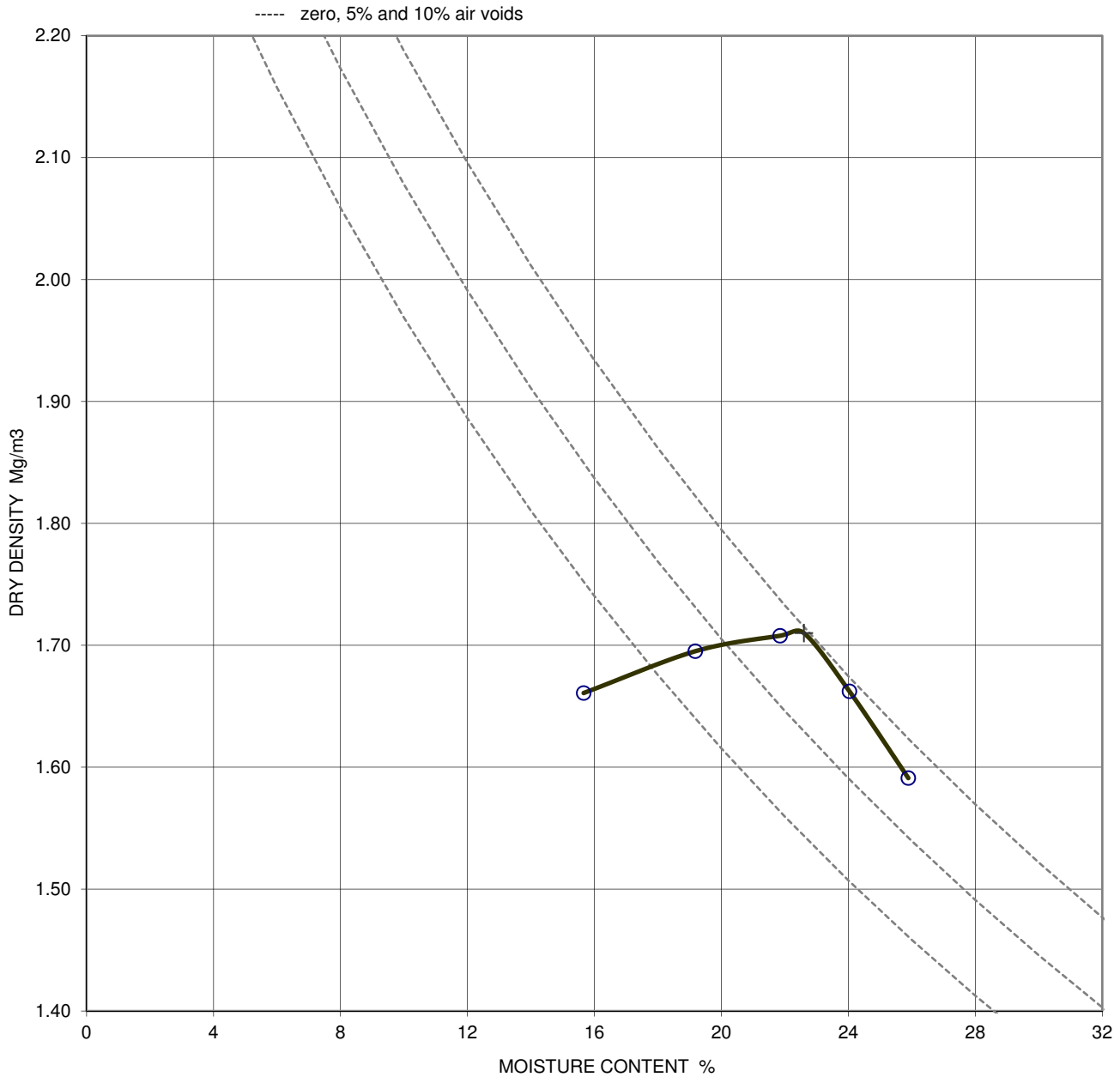
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DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : HEAVY COMPACTION, 4.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	TP4
	A8015-18-20180410075427	Sample Depth (m BGL)	0.10 - 0.30
		Sample Type and No	B2
		Specimen Ref	



Soil description Brown silty CLAY.

Test method BS 1377:part 4:1990: clause 3.5, 4.5 kg rammer in a 1 litre mould

Preparation Original material was natural, single sample tested

Material > 37.5mm 0 %

Material < 37.5mm > 20mm 0 %

Particle density 2.80 assumed

Remarks

Derived Parameters +

Maximum dry density, Mg/m³
1.71

Optimum moisture content, %
23

QA Ref
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Project Name VPI IMMINGHAM

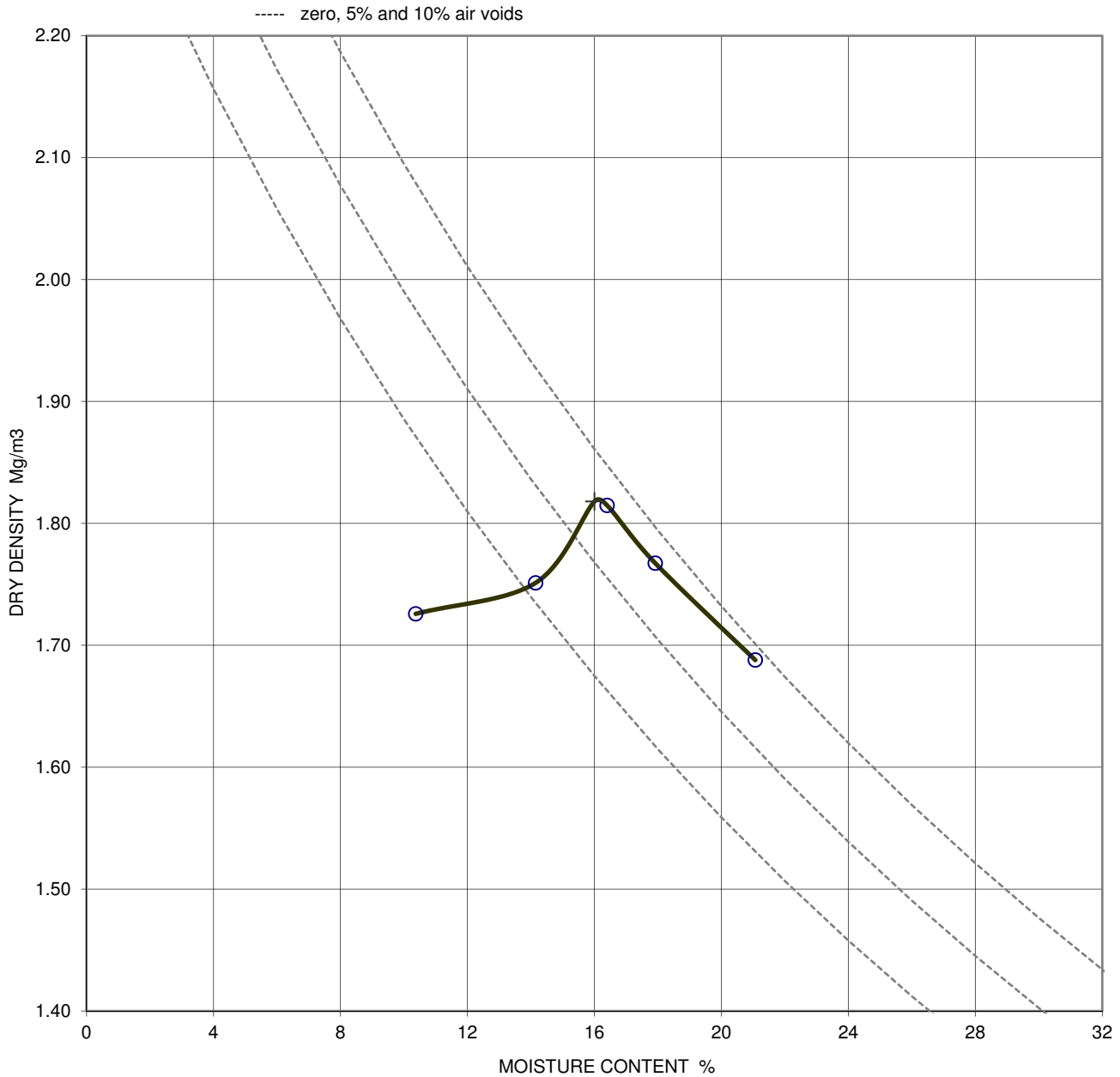
Figure
COMPH

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15:42

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : HEAVY COMPACTION, 4.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	TP6
	A8015-18-20180410082549	Sample Depth (m BGL)	0.10 - 0.30
		Sample Type and No	B2
		Specimen Ref	



Soil description Brown CLAY with chalk fragments.

Test method BS 1377:part 4:1990: clause 3.5, 4.5 kg rammer in a 1 litre mould

Preparation Original material was natural, single sample tested

Material > 37.5mm 0 %

Material < 37.5mm > 20mm 2 %

Particle density 2.65 assumed

Remarks

Derived Parameters +

Maximum dry density, Mg/m³
1.82

Optimum moisture content, %
16

QA Ref
 SLD 4, 3.5/6
 Rev 2.5
 Sep 17



Project No A8015-18
 Project Name VPI IMMINGHAM

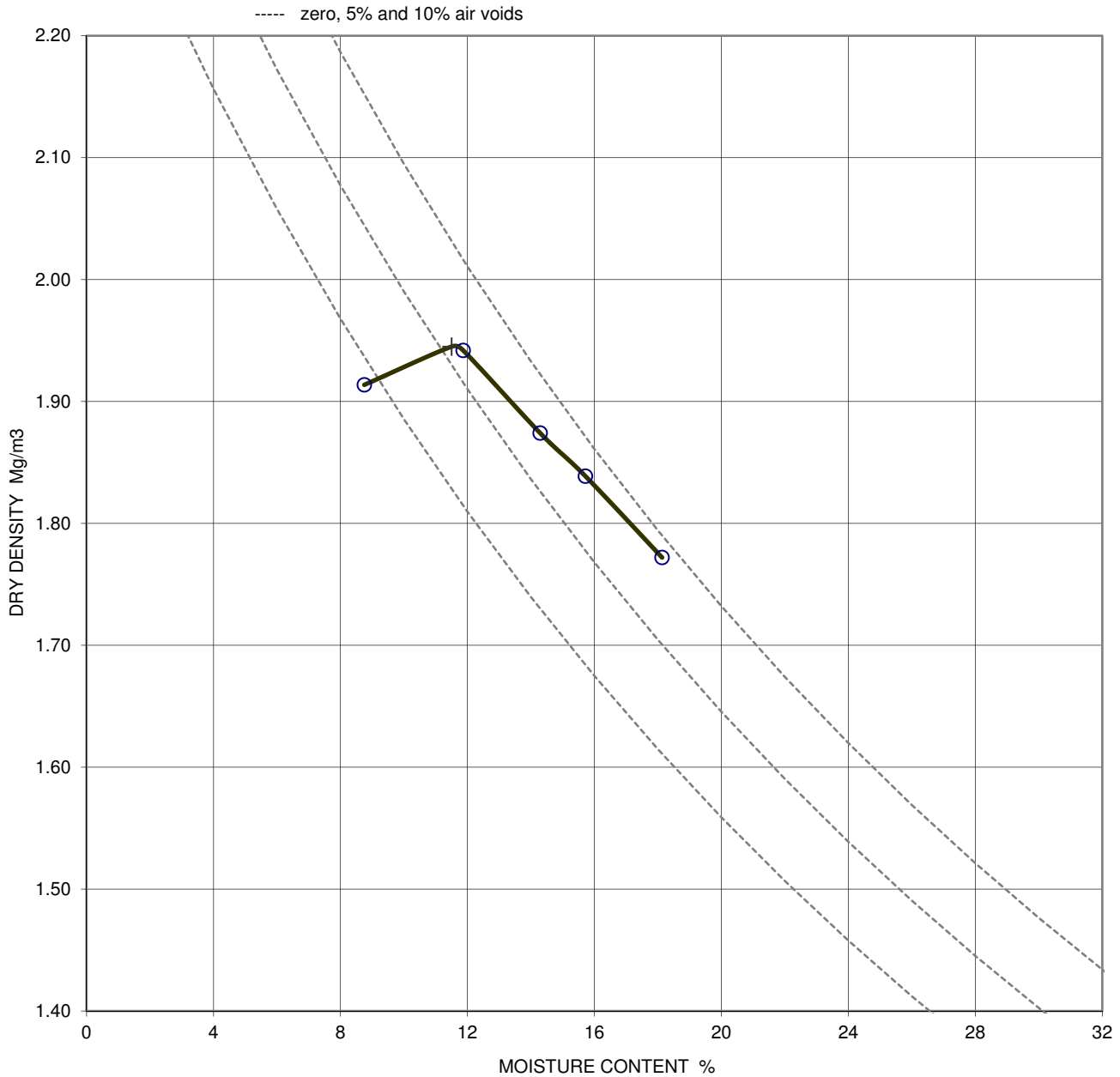
Figure
COMPH

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 15:42

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP
BS1377 : PART 4 : 1990 : HEAVY COMPACTION, 4.5 kg rammer

Sample Details:	SAMPLE ID:	Hole No	TP10
	A8015-18-20180408084806	Sample Depth (m BGL)	0.40 - 0.60
		Sample Type and No	B4
		Specimen Ref	



Soil description Brown slightly sandy CLAY.

Test method BS 1377:part 4:1990: clause 3.5, 4.5 kg rammer in a 1 litre mould

Preparation Original material was natural, single sample tested

Material > 37.5mm 0 %

Material < 37.5mm > 20mm 0 %

Particle density 2.65 assumed

Remarks

Derived Parameters +

Maximum dry density, Mg/m³
1.95

Optimum moisture content, %
12

QA Ref
 SLD 4, 3.5/6
 Rev 2.5
 Sep 17



Project No A8015-18
 Project Name VPI IMMINGHAM

Figure
COMPH

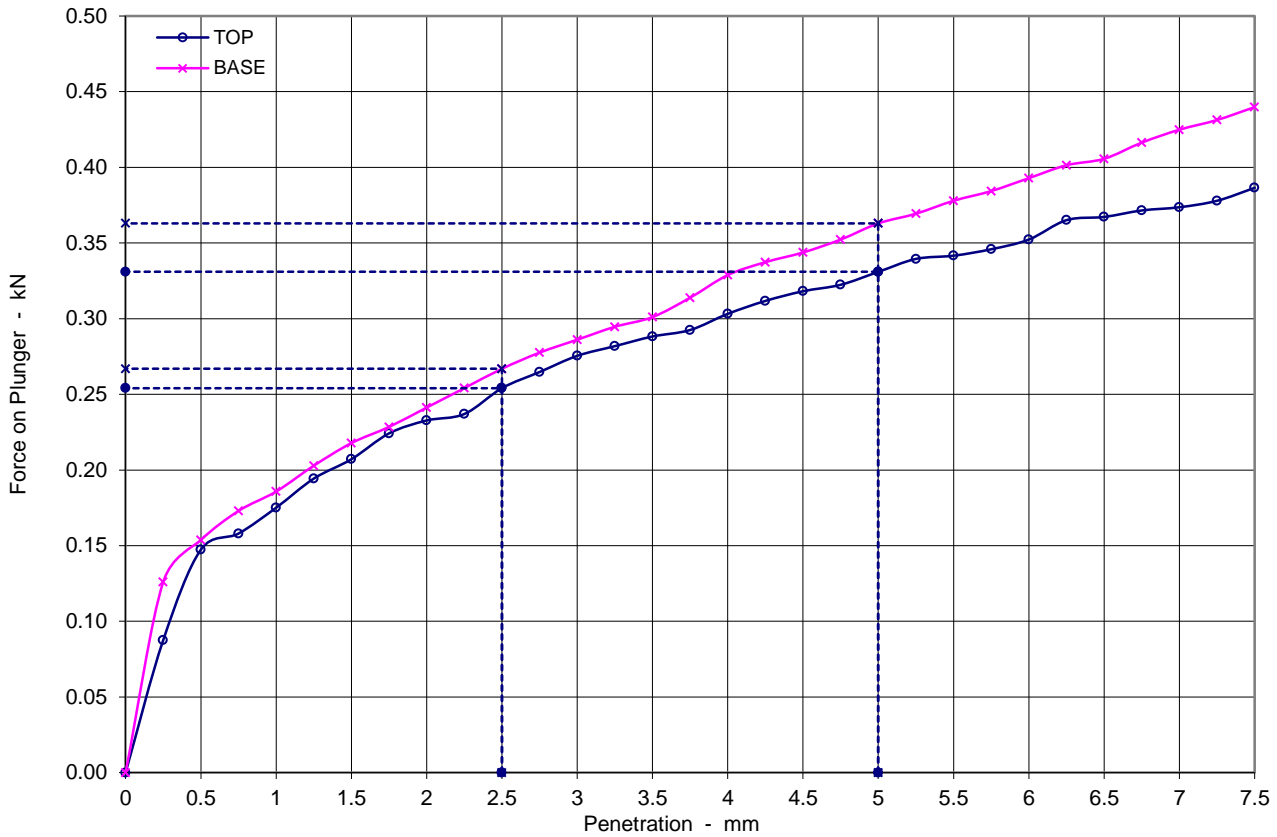
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Printed:
 02/07/2018
 15:40

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Sample Details:	SAMPLE ID:
	A8015-1820180409104552

Hole No	BH1
Sample Depth (m)	1.00 - 1.20
Sample Type and No	B5
Specimen Ref	1



Soil description	Brown slightly sandy slightly gravelly CLAY with rare rootlets.
------------------	---

Test Conditions		
Sample Retained on 20 mm sieve	%	27

Sample Conditions		
Initial Moisture Content	%	22.0
Bulk Density	Mg/m ³	2.02
Dry Density	Mg/m ³	1.66
Moisture Content - TOP	%	22.0
Moisture Content - BASE	%	21.0


Preparation	Method of Compaction	
	Recompacted - Rammer compaction with specified effort (4.5kg)	
	Soaked test	NO
	Soaking Period	days N/A
	Amount of Swell	mm N/A

Penetration mm	CBR Values %	
	TOP	BASE
2.5	1.9	2.0
5	1.7	1.8

Surcharge applied	kg	16
	kPa	10

Notes :

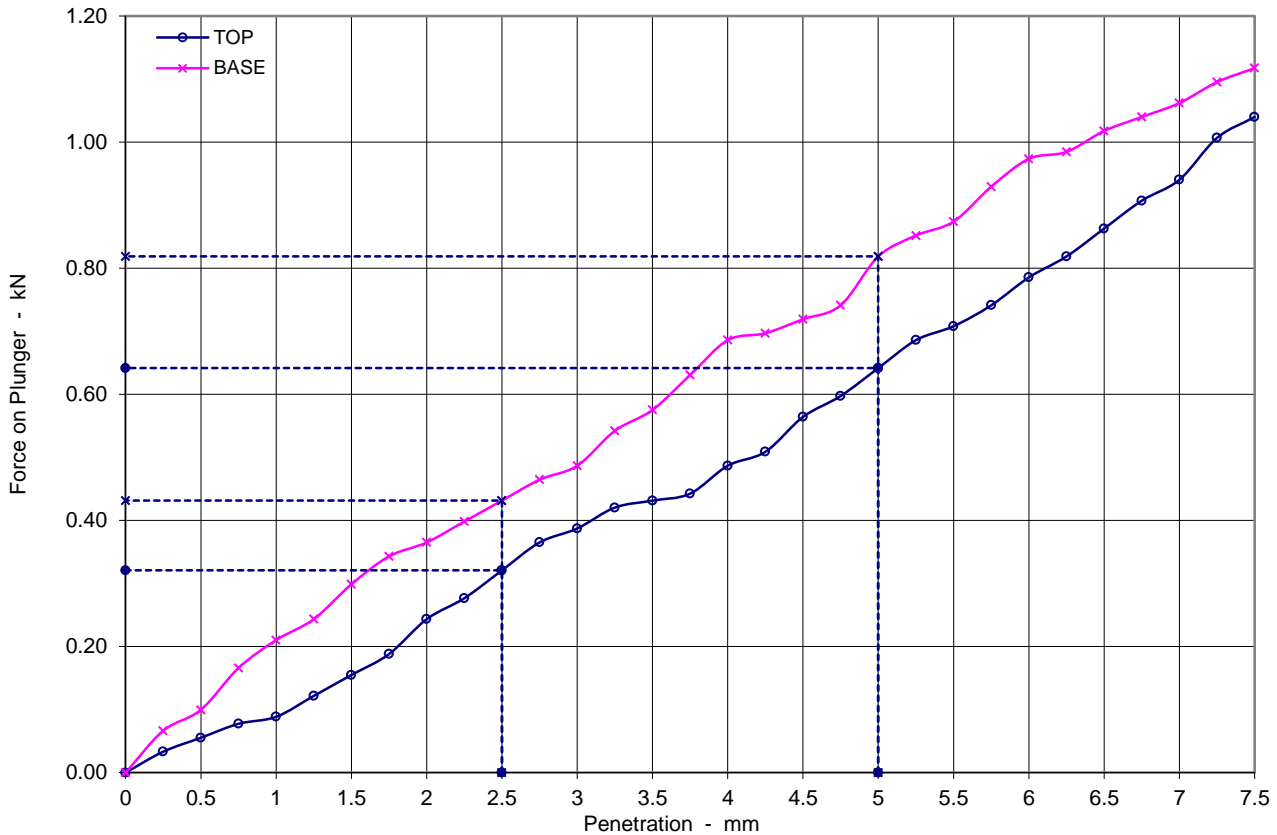
Accepted CBR %	1.9	2.0
-----------------------	------------	------------

QA Ref SLR 2 Rev 2.7 Apr 15	 SOCOTEC	Project No	A8015-18	Figure CBR
		Project Name	VPI IMMINGHAM	
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California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Sample Details:	SAMPLE ID:
	A8015-1820180413011424

Hole No	BH2
Sample Depth (m)	1.00 - 1.20
Sample Type and No	B6
Specimen Ref	1



Soil description	Brown slightly sandy CLAY.
------------------	----------------------------

Test Conditions		
Sample Retained on 20 mm sieve	%	3

Sample Conditions		
Initial Moisture Content	%	25.0
Bulk Density	Mg/m ³	1.97
Dry Density	Mg/m ³	1.58
Moisture Content - TOP	%	26.0
Moisture Content - BASE	%	24.0


Preparation	Method of Compaction	
	Recompacted - Rammer compaction with specified effort (4.5kg)	
	Soaked test	NO
	Soaking Period	days N/A
	Amount of Swell	mm N/A

Penetration mm	CBR Values %	
	TOP	BASE
2.5	2.4	3.3
5	3.2	4.1

Surcharge applied	kg	16
	kPa	10

Notes :

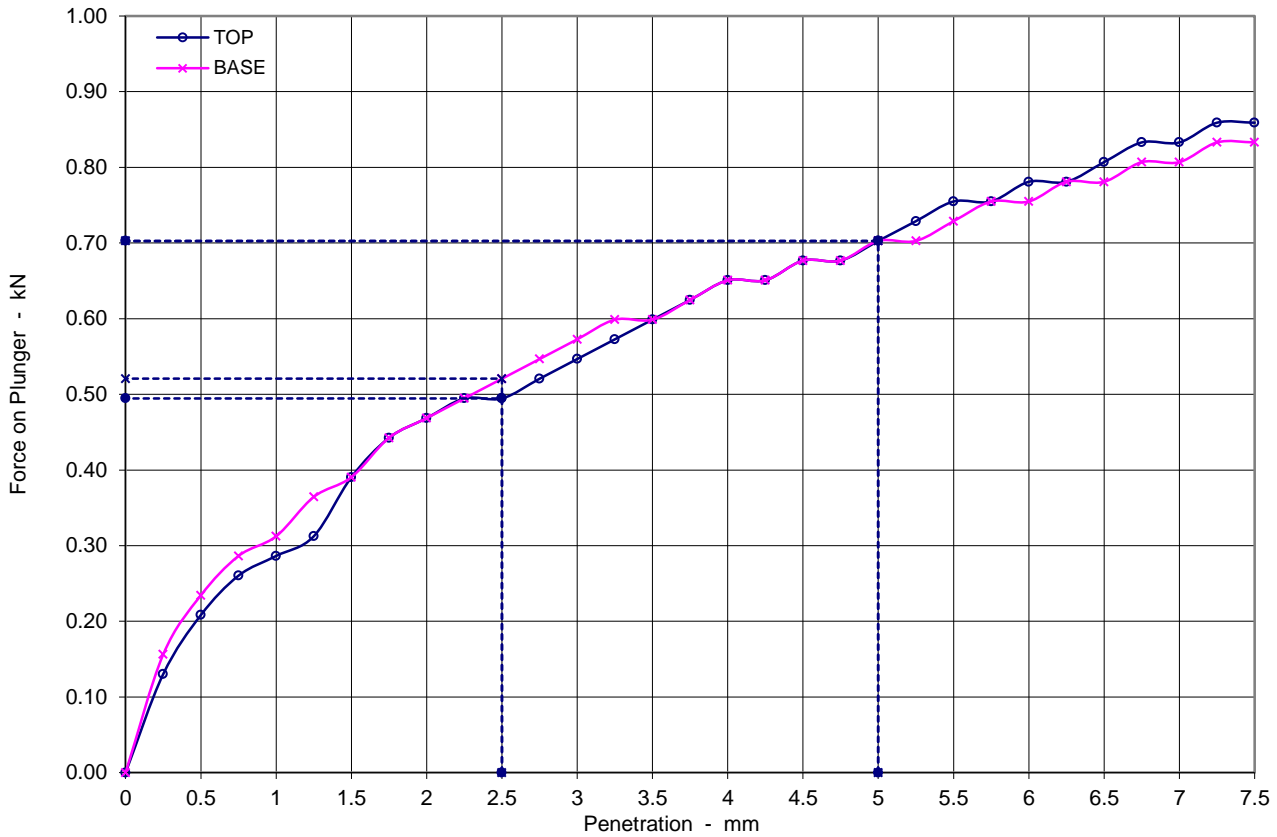
Accepted CBR %	3.2	4.1
-----------------------	------------	------------

QA Ref SLR 2 Rev 2.7 Apr 15	 SOCOTEC	Project No A8015-18 Project Name VPI IMMINGHAM	Figure CBR
		Test carried out outside the scope of UKAS accreditation. © Copyright 2015 SOCOTEC UK Limited	Printed: 14/08/2018 11:15

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Sample Details:	SAMPLE ID:
	A8015-1820180413102609

Hole No	BH3
Sample Depth (m)	0.40 - 1.20
Sample Type and No	B1
Specimen Ref	1



Soil description	Brown slightly sandy CLAY with chalk fragments.
------------------	---

Test Conditions		
Sample Retained on 20 mm sieve	%	0

Sample Conditions		
Initial Moisture Content	%	21.0
Bulk Density	Mg/m ³	2.03
Dry Density	Mg/m ³	1.68
Moisture Content - TOP	%	22.0
Moisture Content - BASE	%	22.0


Preparation	Method of Compaction	
	Undisturbed	
	Soaked test	NO
	Soaking Period	days N/A
	Amount of Swell	mm N/A

Penetration mm	CBR Values %	
	TOP	BASE
2.5	3.7	3.9
5	3.5	3.5

Surcharge applied	kg	16
	kPa	10

Notes :

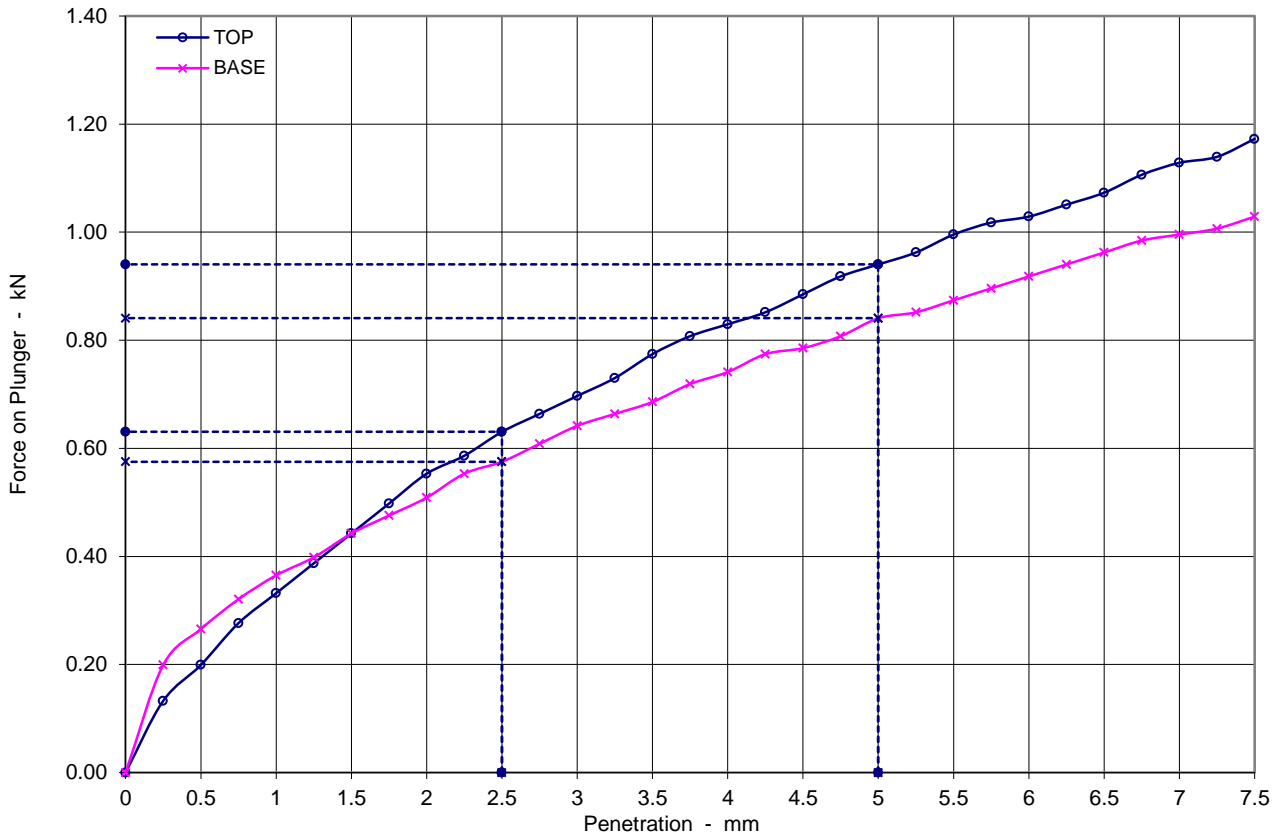
Accepted CBR %	3.7	3.9
-----------------------	------------	------------

QA Ref SLR 2 Rev 2.7 Apr 15	 SOCOTEC	Project No A8015-18 Project Name VPI IMMINGHAM	Figure CBR
		Test carried out outside the scope of UKAS accreditation. © Copyright 2015 SOCOTEC UK Limited	Printed: 14/08/2018 11:15

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Sample Details:	SAMPLE ID:
	A8015-1820180418115011

Hole No	BH4
Sample Depth (m)	1.65 - 2.00
Sample Type and No	B3
Specimen Ref	1



Soil description	Brown slightly sandy CLAY with chalk fragments.
------------------	---

Test Conditions		
Sample Retained on 20 mm sieve	%	0

Sample Conditions		
Initial Moisture Content	%	19.0
Bulk Density	Mg/m ³	2.12
Dry Density	Mg/m ³	1.78
Moisture Content - TOP	%	20.0
Moisture Content - BASE	%	19.0


Preparation	Method of Compaction	
	Recompacted - Rammer compaction with specified effort (4.5kg)	
	Soaked test	NO
	Soaking Period	days N/A
	Amount of Swell	mm N/A

Penetration mm	CBR Values %	
	TOP	BASE
2.5	4.8	4.4
5	4.7	4.2

Surcharge applied	kg	16
	kPa	10

Notes :

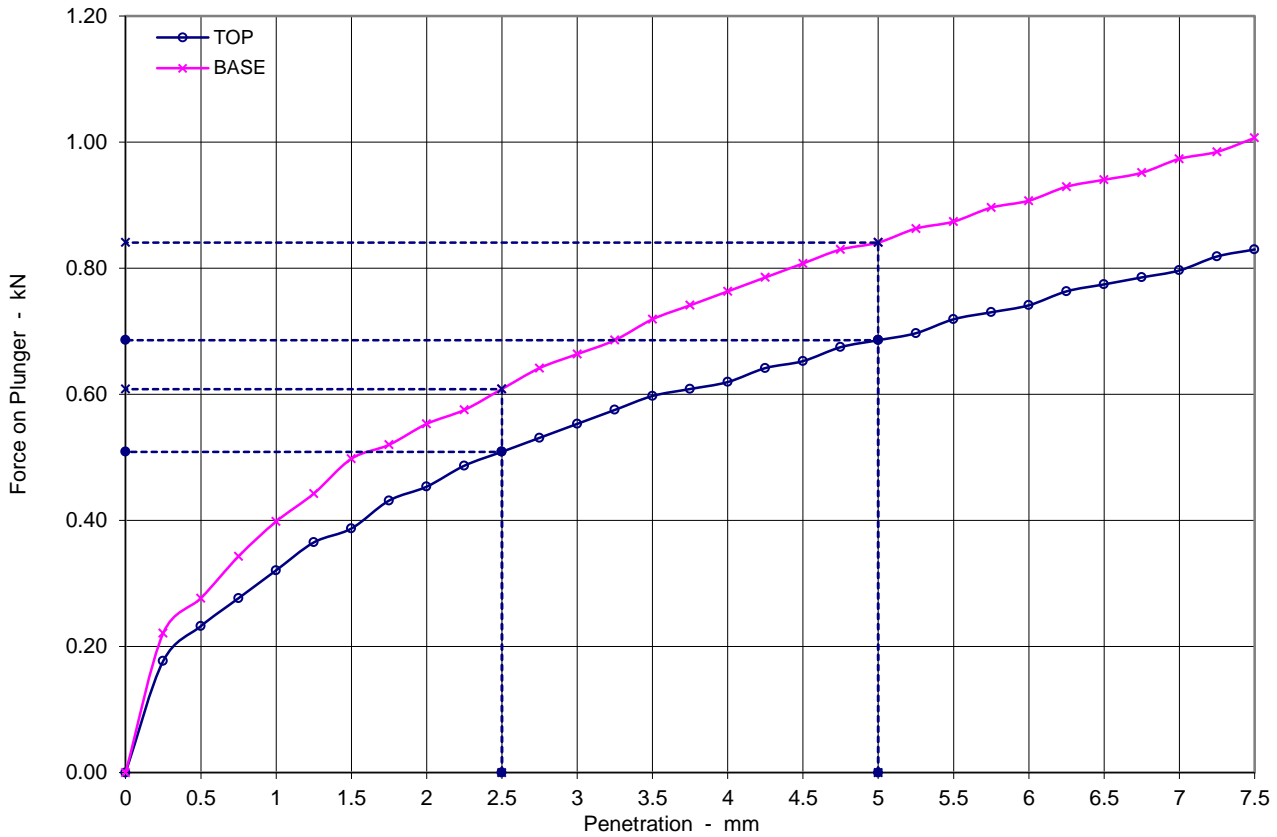
Accepted CBR %	4.8	4.4
-----------------------	------------	------------

QA Ref SLR 2 Rev 2.7 Apr 15	 SOCOTEC	Project No	A8015-18	Figure CBR
		Project Name	VPI IMMINGHAM	
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California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Sample Details:	SAMPLE ID:
	A8015-18-20180413084055

Hole No	TP1
Sample Depth (m)	0.70 - 0.90
Sample Type and No	B4
Specimen Ref	1



Soil description	Brown slightly sandy CLAY with occasional chalk fragments.
------------------	--

Test Conditions		
Sample Retained on 20 mm sieve	%	0

Sample Conditions		
Initial Moisture Content	%	23.0
Bulk Density	Mg/m ³	1.98
Dry Density	Mg/m ³	1.61
Moisture Content - TOP	%	22.0
Moisture Content - BASE	%	22.0


Preparation	Method of Compaction	
	Recompacted - Rammer compaction with specified effort (4.5kg)	
	Soaked test	NO
	Soaking Period	days N/A
	Amount of Swell	mm N/A

Penetration mm	CBR Values %	
	TOP	BASE
2.5	3.9	4.6
5	3.4	4.2

Surcharge applied	kg	16
	kPa	10

Notes :

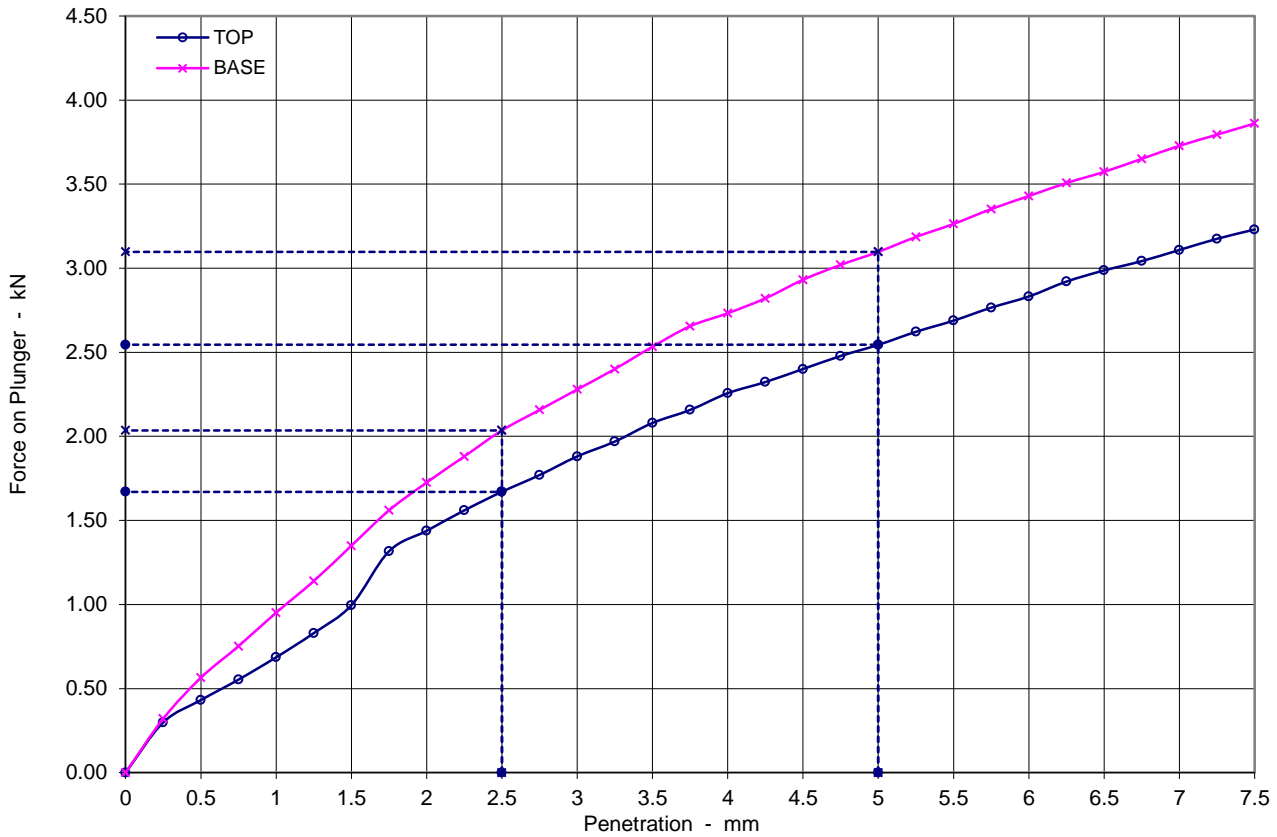
Accepted CBR %	3.9	4.6
-----------------------	------------	------------

QA Ref SLR 2 Rev 2.7 Apr 15	 SOCOTEC	Project No	A8015-18	Figure CBR
		Project Name	VPI IMMINGHAM	
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California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Sample Details:	SAMPLE ID:
	A8015-18-20180413084231

Hole No	TP1
Sample Depth (m)	3.40 - 3.60
Sample Type and No	B10
Specimen Ref	1



Soil description	Light brown slightly sandy CLAY.
------------------	----------------------------------

Test Conditions		
Sample Retained on 20 mm sieve	%	0

Sample Conditions		
Initial Moisture Content	%	14.0
Bulk Density	Mg/m ³	2.19
Dry Density	Mg/m ³	1.92
Moisture Content - TOP	%	13.0
Moisture Content - BASE	%	13.0


Preparation	Method of Compaction	
	Recompacted - Rammer compaction with specified effort (4.5kg)	
	Soaked test	NO
	Soaking Period	days N/A
	Amount of Swell	mm N/A

Penetration mm	CBR Values %	
	TOP	BASE
2.5	13.0	15.0
5	13.0	15.0

Surcharge applied	kg	16
	kPa	10

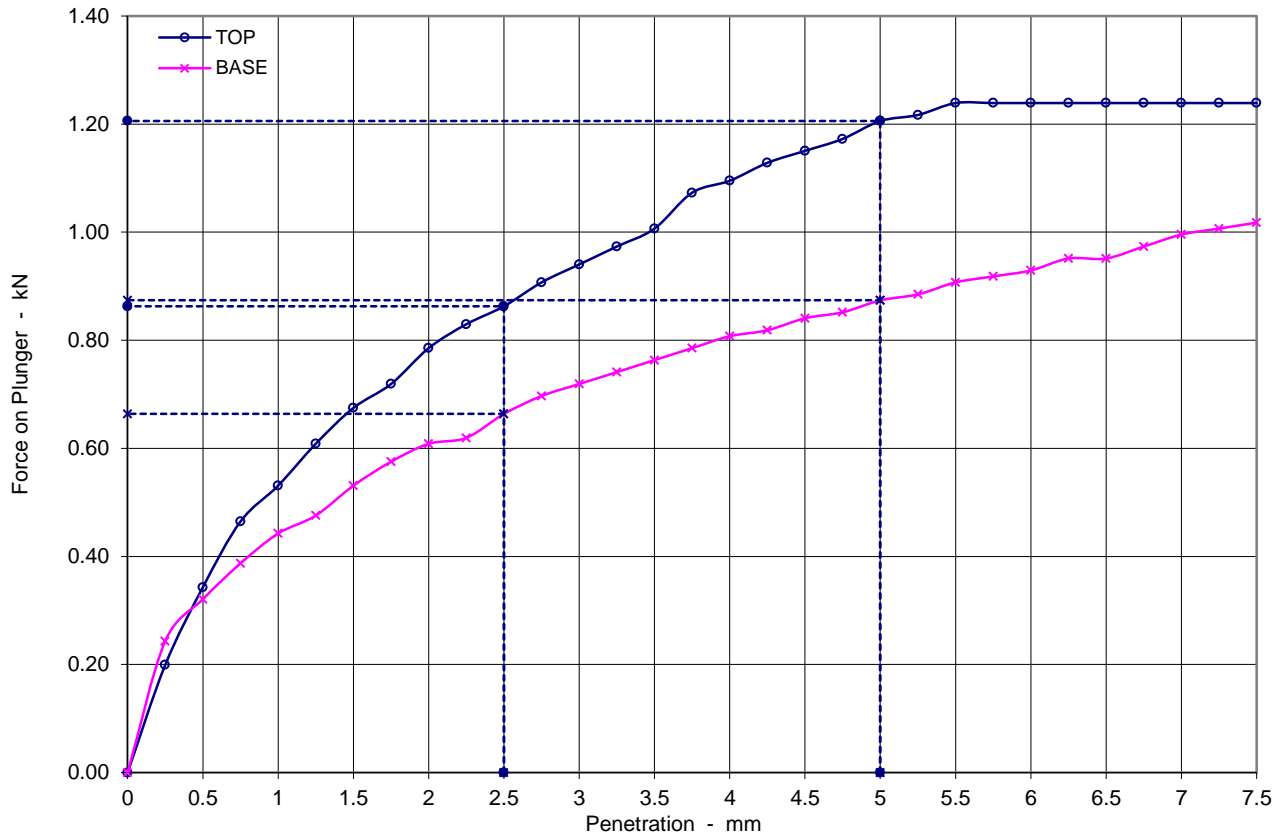
Notes :

Accepted CBR %	13.0	15.0
-----------------------	-------------	-------------

QA Ref SLR 2 Rev 2.7 Apr 15	 SOCOTEC	Project No	A8015-18	Figure CBR
		Project Name	VPI IMMINGHAM	
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California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Sample Details:	SAMPLE ID:	Hole No	TP2
	A8015-18-20180413090359	Sample Depth (m)	0.30 - 0.50
		Sample Type and No	B4
		Specimen Ref	1



Soil description: Brown slightly sandy slightly gravelly CLAY.

Test Conditions		
Sample Retained on 20 mm sieve	%	0

Sample Conditions		
Initial Moisture Content	%	20.0
Bulk Density	Mg/m ³	1.92
Dry Density	Mg/m ³	1.60
Moisture Content - TOP	%	21.0
Moisture Content - BASE	%	22.0


Preparation	Method of Compaction	
	Recompacted - Rammer compaction with specified effort (4.5kg)	
	Soaked test	NO
	Soaking Period	days N/A
	Amount of Swell	mm N/A

Penetration mm	CBR Values %	
	TOP	BASE
2.5	6.5	5.0
5	6.0	4.4

Surcharge applied	kg	16
	kPa	10

Notes :

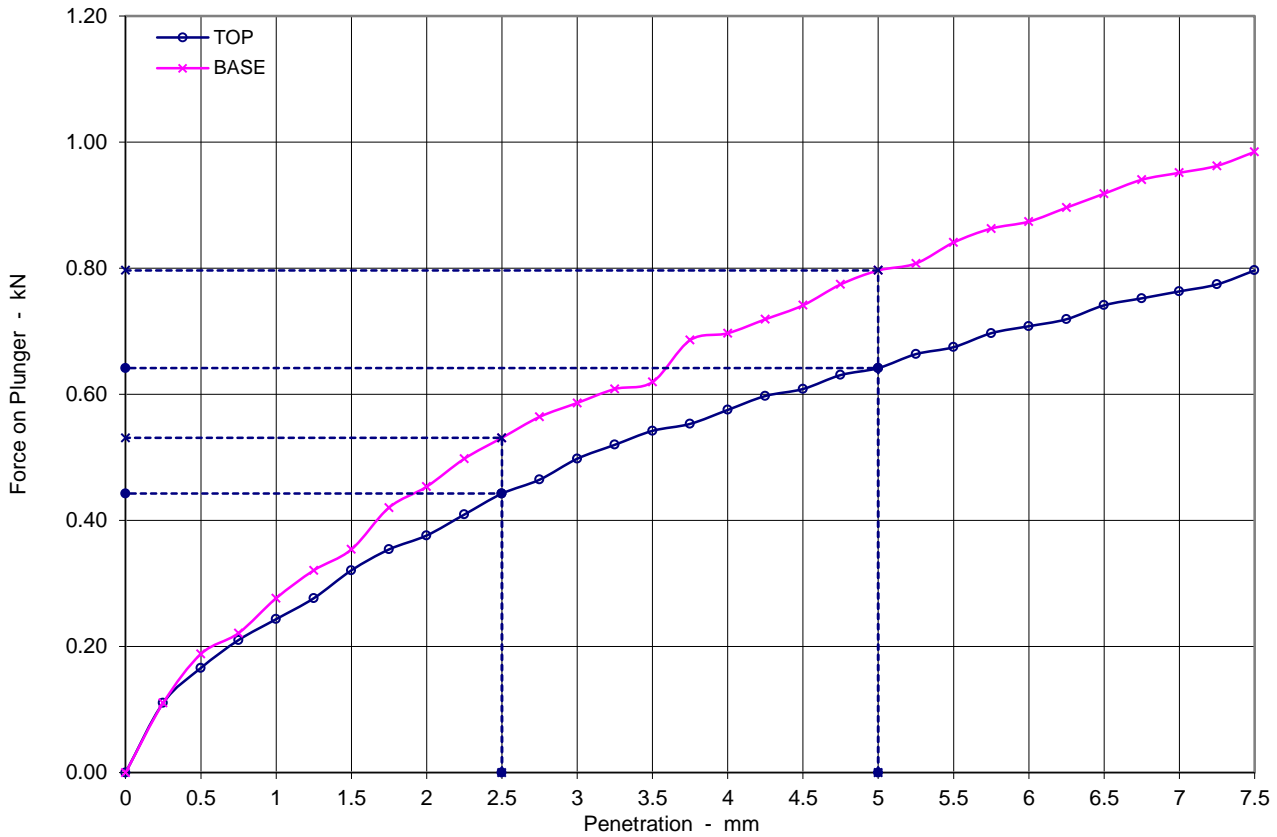
Accepted CBR %	6.5	5.0
-----------------------	------------	------------

QA Ref SLR 2 Rev 2.7 Apr 15	 SOCOTEC	Project No	A8015-18	Figure CBR
		Project Name	VPI IMMINGHAM	
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California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Sample Details:	SAMPLE ID:
	A8015-18-20180410092425

Hole No	TP7
Sample Depth (m)	1.30 - 1.60
Sample Type and No	B4
Specimen Ref	1



Soil description	Brown slightly sandy CLAY with chalk fragments.
------------------	---

Test Conditions		
Sample Retained on 20 mm sieve	%	0

Sample Conditions		
Initial Moisture Content	%	17.0
Bulk Density	Mg/m ³	2.14
Dry Density	Mg/m ³	1.83
Moisture Content - TOP	%	17.0
Moisture Content - BASE	%	17.0


Preparation	Method of Compaction	
	Recompacted - Rammer compaction with specified effort (4.5kg)	
	Soaked test	NO
	Soaking Period	days N/A
	Amount of Swell	mm N/A

Penetration mm	CBR Values %	
	TOP	BASE
2.5	3.4	4.0
5	3.2	4.0

Surcharge applied	kg	16
	kPa	10

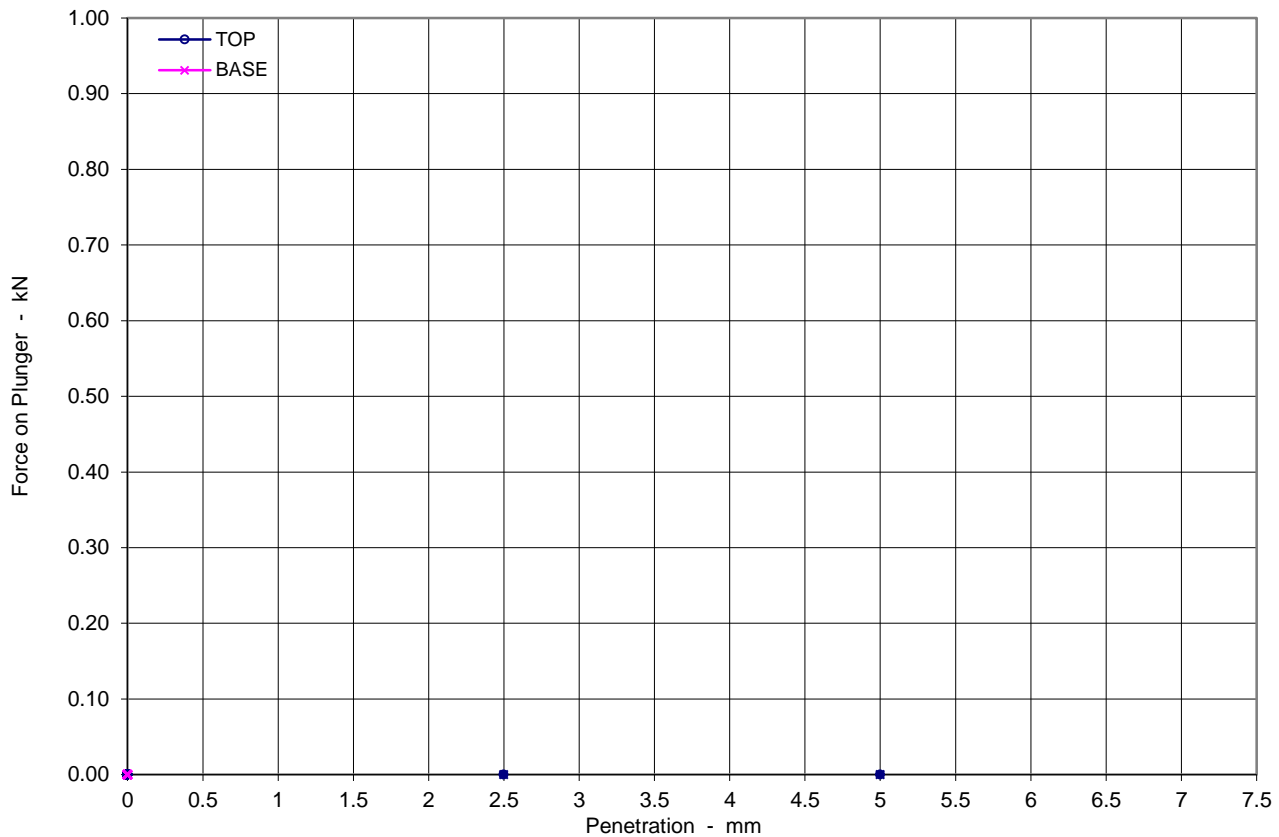
Notes :

Accepted CBR %	3.4	4.0
-----------------------	------------	------------

QA Ref SLR 2 Rev 2.7 Apr 15	 SOCOTEC	Project No A8015-18 Project Name VPI IMMINGHAM	Figure CBR
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California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Sample Details:	SAMPLE ID:	Hole No	TP8
	A8015-18-20180410074518	Sample Depth (m)	3.70 - 3.90
		Sample Type and No	B12
		Specimen Ref	1



Soil description	Brown SAND with occasional chalk fragments.
------------------	---

Test Conditions	
Sample Retained on 20 mm sieve	%

Sample Conditions	
Initial Moisture Content	%
Bulk Density	Mg/m ³
Dry Density	Mg/m ³
Moisture Content - TOP	%
Moisture Content - BASE	%

Preparation	Method of Compaction	
	Undisturbed	
	Soaked test	NO
	Soaking Period	days N/A
	Amount of Swell	mm N/A

Penetration mm	CBR Values %	
	TOP	BASE
2.5	-	-
5.0	-	-

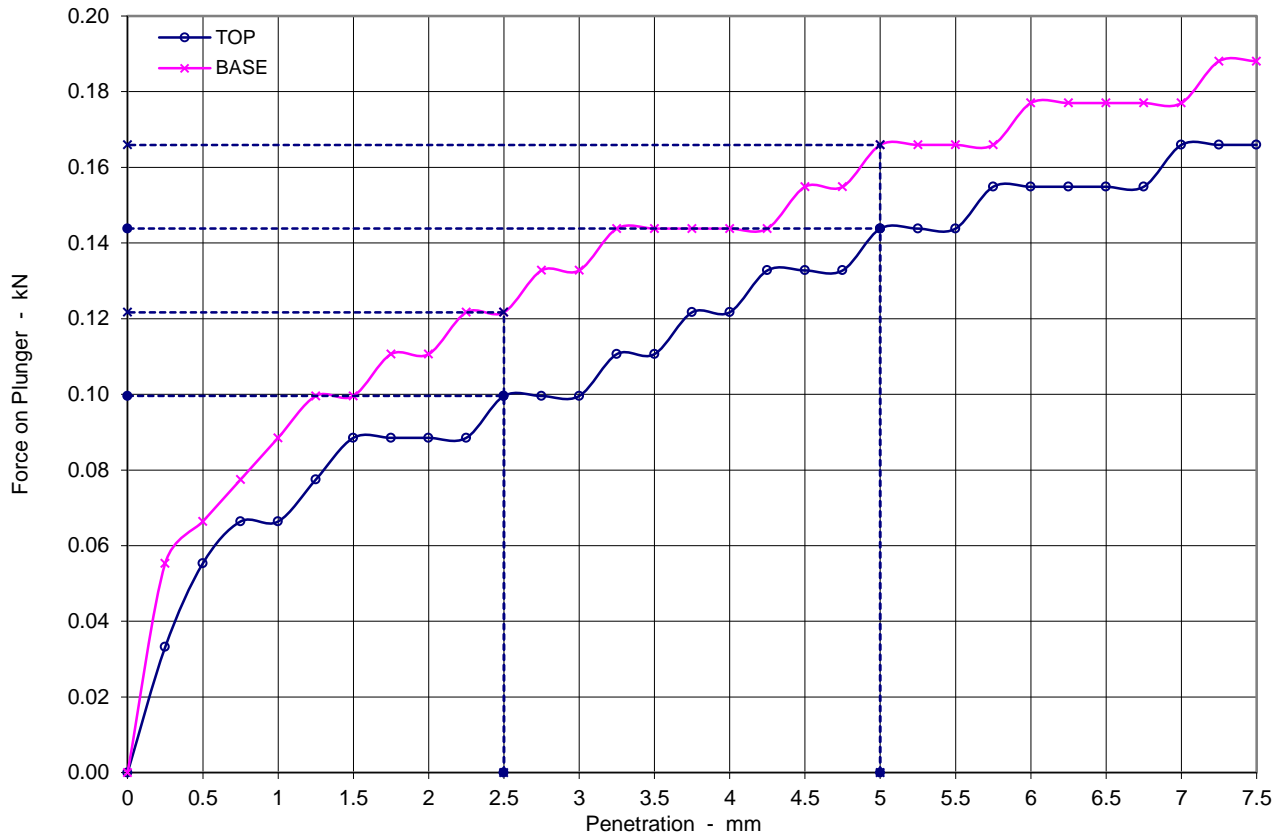
Surcharge applied	kg	
	kPa	0

Accepted CBR %	-	-
-----------------------	---	---

Notes :
 Test attempted @ NMC & various dryer MC's, sample protruded from mould at NMC & dryer MC's when CBR testing equipment came into contact with sample.

California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Sample Details:	SAMPLE ID:	Hole No	TT1
	A8015-18-20180413014738	Sample Depth (m)	0.50 - 0.70
		Sample Type and No	B4
		Specimen Ref	1



Soil description	Brown slightly gravelly CLAY with occasional chalk fragments.
------------------	---

Test Conditions		
Sample Retained on 20 mm sieve	%	2

Sample Conditions		
Initial Moisture Content	%	27.0
Bulk Density	Mg/m ³	2.40
Dry Density	Mg/m ³	1.90
Moisture Content - TOP	%	25.0
Moisture Content - BASE	%	26.0


Preparation	Method of Compaction	
	Recompacted - Rammer compaction with specified effort (4.5kg)	
	Soaked test	NO
	Soaking Period	days N/A
	Amount of Swell	mm N/A

Penetration mm	CBR Values %	
	TOP	BASE
2.5	0.8	0.9
5	0.7	0.8

Surcharge applied	kg	16
	kPa	10

Notes :

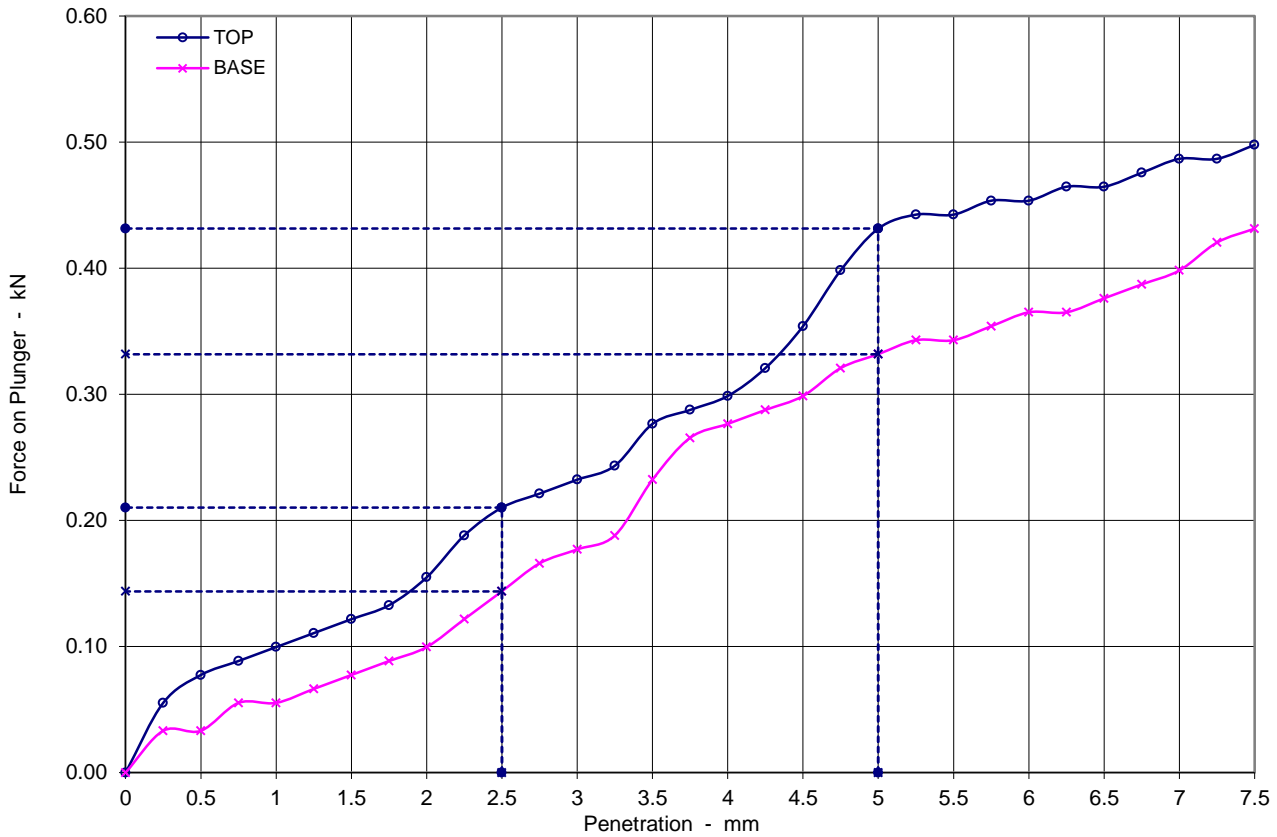
Accepted CBR %	0.8	0.9
-----------------------	------------	------------

QA Ref SLR 2 Rev 2.7 Apr 15	 SOCOTEC	Project No A8015-18 Project Name VPI IMMINGHAM	Figure CBR
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California Bearing Ratio (BS1377:1990:Part 4 , section 7)

Sample Details:	SAMPLE ID:
	A8015-18-20180408080446

Hole No	TT3
Sample Depth (m)	0.30 - 0.60
Sample Type and No	B2
Specimen Ref	1



Soil description	Brown slightly sandy CLAY.
------------------	----------------------------

Test Conditions		
Sample Retained on 20 mm sieve	%	0

Sample Conditions		
Initial Moisture Content	%	25.0
Bulk Density	Mg/m ³	1.94
Dry Density	Mg/m ³	1.56
Moisture Content - TOP	%	24.0
Moisture Content - BASE	%	27.0


Preparation	Method of Compaction	
	Recompacted - Rammer compaction with specified effort (2.5kg)	
	Soaked test	NO
	Soaking Period	days N/A
	Amount of Swell	mm N/A

Penetration mm	CBR Values %	
	TOP	BASE
2.5	1.6	1.1
5	2.2	1.7

Surcharge applied	kg	16
	kPa	10

Notes :

Accepted CBR %	2.2	1.7
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QA Ref SLR 2 Rev 2.7 Apr 15	 SOCOTEC	Project No A8015-18 Project Name VPI IMMINGHAM	Figure CBR
		Test carried out outside the scope of UKAS accreditation. © Copyright 2015 SOCOTEC UK Limited	Printed: 14/08/2018 11:15

TEST REPORT

Report No. EFS/187041 (Ver. 1)

SOCOTEC UK Doncaster
Askern Road
Carcroft
Doncaster
South Yorkshire
DN6 8DG

Site: A8015-18 VPI Immingham

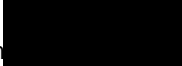
The 4 samples described in this report were registered for analysis by SOCOTEC UK Limited on 23-Jun-2018. This report supersedes any versions previously issued by the laboratory.

The analysis was completed by: 03-Jul-2018

The following tables are contained in this report:

Table 1 Main Analysis Results (Page 2)
Analytical and Deviating Sample Overview (Page 3)
Table of Method Descriptions (Page 4)
Table of Report Notes (Page 5)
Table of Sample Descriptions (Appendix A Page 1 of 1)

On behalf of
SOCOTEC UK Limited
Tim Barnes



Operations Director
Energy & Waste Services

Date of Issue: 03-Jul-2018

Tests marked 'N' have been subcontracted to another laboratory.

Where samples have been flagged as deviant on the Analytical and Deviating Sample Overview, for any reason, the data may not be representative of the sample at the point of sampling and the validity of the data may be affected.

SOCOTEC UK Limited accepts no responsibility for any sampling not carried out by our personnel.

Units :		%																	
Method Codes :		ORGMAT																	
Method Reporting Limits :		0.1																	
LAB ID Number CL/	Client Sample Description	Sample Date	Organic Matter %																
1910777	BH4 D 2 1.20		1.4																
1910778	TP02 D 3 0.30		7.1																
1910779	BH5 D 13 2.90		1.4																
1910780	BH2 D 3 0.60		16.7																
 Bretby Business Park, Ashby Road Burton-on-Trent, Staffordshire, DE15 0YZ Tel +44 (0) 1283 554400 Fax +44 (0) 1283 554422		Client Name	SOCOTEC UK Doncaster										Sample Analysis						
		Contact	Tim Clifford																
		A8015-18 VPI Immingham												Date Printed	03-Jul-2018				
														Report Number	EFS/187041				
Table Number	1																		

Customer SOCOTEC UK Doncaster
Site A8015-18 VPI Immingham
Report No S187041

Consignment No S75653
Date Logged 23-Jun-2018
In-House Report Due 29-Jun-2018

Please note the results for any subcontracted analysis (identified with a '^') is likely to take up to an additional five working days.

ID Number	Description	MethodID	ClustServ	ORGMAT
		Sampled	REPORT A	Organic Matter %
CL/1910777	BH4 1.20-1.65	D	D	D
CL/1910778	TP02 0.30	D	D	D
CL/1910779	BH5 2.90-3.35	D	D	D
CL/1910780	BH2 0.60	D	D	D

Note: We will endeavour to prioritise samples to complete analysis within holding time; however any delay could result in samples becoming deviant whilst being processed in the laboratory.

If sampling dates are missing or matrices unclassified then results will not be ISO 17025 accredited. Please contact us as soon as possible to provide missing information in order to reinstate accreditation.

Deviating Sample Key	
A	The sample was received in an inappropriate container for this analysis
B	The sample was received without the correct preservation for this analysis
C	Headspace present in the sample container
D	The sampling date was not supplied so holding time may be compromised - applicable to all analysis
E	Sample processing did not commence within the appropriate holding time
F	Sample processing did not commence within the appropriate handling time
Requested Analysis Key	
■	Analysis Required
■	Analysis dependant upon trigger result - Note: due date may be affected if triggered
□	No analysis scheduled
^	Analysis Subcontracted - Note: due date may vary

Where individual results are flagged see report notes for status.

Method Descriptions

Matrix	MethodID	Analysis Basis	Method Description
Soil	ORGMAT	Oven Dried @ < 35°C	Acid Dichromate oxidation of the sample followed by colorimetric analysis of the extract

Report Notes

Generic Notes

Soil/Solid Analysis

Unless stated otherwise,

- Results expressed as mg/kg have been calculated on the basis indicated in the Method Description table.
All results on MCERTS reports are reported on a 105°C dry weight basis with the exception of pH and conductivity.
- Sulphate analysis not conducted in accordance with BS1377
- Water Soluble Sulphate is on a 2:1 water:soil extract

Waters Analysis

Unless stated otherwise results are expressed as mg/l

Nil: Where "Nil" has been entered against Total Alkalinity or Total Acidity this indicates that a measurement was not required due to the inherent pH of the sample.

Oil analysis specific

Unless stated otherwise,

- Results are expressed as mg/kg
- SG is expressed as g/cm³@ 15°C

Gas (Tedlar bag) Analysis

Unless stated otherwise, results are expressed as ug/l

Asbestos Analysis

CH Denotes Chrysotile

TR Denotes Tremolite

CR Denotes Crocidolite

AC Denotes Actinolite

AM Denotes Amosite

AN Denotes Anthophyllite

NAIIS No Asbestos Identified in Sample

NADIS No Asbestos Detected In Sample

Symbol Reference

^ Sub-contracted analysis.

\$\$ Unable to analyse due to the nature of the sample

¶ Samples submitted for this analyte were not preserved on site in accordance with laboratory protocols.

This may have resulted in deterioration of the sample(s) during transit to the laboratory.

Consequently the reported data may not represent the concentration of the target analyte present in the sample at the time of sampling

¥ Results for guidance only due to possible interference

& Blank corrected result

I.S Insufficient sample to complete requested analysis

I.S(g) Insufficient sample to re-analyse, results for guidance only

Intf Unable to analyse due to interferences

N.D Not determined

N.Det Not detected

N.F No Flow

NS Information Not Supplied

Req Analysis requested, see attached sheets for results

P Raised detection limit due to nature of the sample

* All accreditation has been removed by the laboratory for this result

‡ MCERTS accreditation has been removed for this result

§ accreditation has been removed for this result as it is a non-accredited matrix

Note: The Laboratory may only claim that data is accredited when all of the requirements of our Quality System have been met. Where these requirements have not been met the laboratory may elect to include the data in its final report and remove the accreditation from individual data items if it believes that the validity of the data has not been affected. If further details are required of the circumstances which have led to the removal of accreditation then please do not hesitate to contact the laboratory.

TEST REPORT



Report No. EFS/187043 (Ver. 1)

SOCOTEC UK Doncaster
Askern Road
Carcroft
Doncaster
South Yorkshire
DN6 8DG

Site: A8015-18 VPI Immingham

The 12 samples described in this report were registered for analysis by SOCOTEC UK Limited on 23-Jun-2018. This report supersedes any versions previously issued by the laboratory.

The analysis was completed by: 04-Jul-2018

Tests where the accreditation is set to N or No, and any individual data items marked with a * are not UKAS accredited. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

The following tables are contained in this report:

Table 1 Main Analysis Results (Page 2)
Analytical and Deviating Sample Overview (Page 3)
Table of Method Descriptions (Page 4)
Table of Report Notes (Page 5)
Table of Sample Descriptions (Appendix A Page 1 of 1)


On behalf of
SOCOTEC UK Limited
Tim Barnes
Operations Director
Energy & Waste Services

Date of Issue: 04-Jul-2018

Tests marked '^' have been subcontracted to another laboratory.

Where samples have been flagged as deviant on the Analytical and Deviating Sample Overview, for any reason, the data may not be representative of the sample at the point of sampling and the validity of the data may be affected.

SOCOTEC UK Limited accepts no responsibility for any sampling not carried out by our personnel.

		Units :	mg/kg	mg/l	%	%	pH Units											
		Method Codes :	ICPACIDS	ICPWSS	ORGMAT	TSBRE1	WSLM50											
		Method Reporting Limits :	20	10	0.1	0.005												
		UKAS Accredited :	Yes	Yes	No	No	No											
LAB ID Number	CL/	Client Sample Description	Sample Date	SO4-- (acid sol)	SO4-- (H2O sol) mg/l	Organic Matter %	Total Sulphur.	pH (BS1377)										
1910790		BH2 D 14 2.80				1.6												
1910791		BH3 D 4 2.00				1.4												
1910792		BH3 D 6 3.00		433	116		0.041	8.4										
1910793		BH6 D 26 13.70		200	23		0.029	8.7										
1910794		TP1 D 1 0.10				3.6												
1910795		TP2 D 11 4.00		276	56		0.031	8.8										
1910796		TP3 D 9 3.40				1.5												
1910797		TP5 D 1 0.10				3.6												
1910798		TP6 D 3 0.40		1420	479		0.085	7.8										
1910799		TP8 D 7 2.00				1.9												
1910800		TP9 D 5 0.80				3.1												
1910801		TT2 B 6 2.00		643	118		0.039	7.5										
 Bretby Business Park, Ashby Road Burton-on-Trent, Staffordshire, DE15 0YZ Tel +44 (0) 1283 554400 Fax +44 (0) 1283 554422				Client Name SOCOTEC UK Doncaster Contact Tim Clifford				Sample Analysis				Date Printed 04-Jul-2018 Report Number EFS/187043 Table Number 1						
A8015-18 VPI Immingham																		

Customer SOCOTEC UK Doncaster
Site A8015-18 VPI Immingham
Report No S187043

Consignment No S75655
Date Logged 23-Jun-2018
In-House Report Due 29-Jun-2018

Please note the results for any subcontracted analysis (identified with a '^') is likely to take up to an additional five working days.

ID Number	Description	MethodID	ClstServ	Dep.Ord	DO Mg if SO4(W)>3000	DO NO3 if pH<5.5	DO Cl if pH>5.5	ICPACIDS	ICPBRE	ICPWSS	KONECL	KoneNO3	ORGMAT	TSBRE1	WSLMS0
		Sampled	REPORT A	DO Cl if pH<5.5				SO4-- (acid sol)	Magnesium (BRE)	SO4-- (H2O sol) mg/l	Chloride:(2:1)	Nitrate (BRE 2:1): mg/l	Organic Matter %	Total Sulphur.	pH (BS1377)
								✓		✓					
CL/1910790	BH2 2.80-3.25	D	D										D		
CL/1910791	BH3 2.00-2.45	D	D										D		
CL/1910792	BH3 3.00-3.45	D	D	D	D	D	D	D	D	D	D	D	D	D	D
CL/1910793	BH6 13.70	D	D				D	D	D	D	D	D	D	D	D
CL/1910794	TP1 0.10	D	D										D		
CL/1910795	TP2 4.00	D	D				D	D	D	D	D	D	D	D	D
CL/1910796	TP3 3.40	D	D										D		
CL/1910797	TP5 0.10	D	D										D		
CL/1910798	TP6 0.40	D	D				D	D	D	D	D	D	D	D	D
CL/1910799	TP8 2.00	D	D										D		
CL/1910800	TP9 0.80	D	D										D		
CL/1910801	TT2 2.00-2.15	D	D				D	D	D	D	D	D	D	D	D

Note: We will endeavour to prioritise samples to complete analysis within holding time; however any delay could result in samples becoming deviant whilst being processed in the laboratory.

If sampling dates are missing or matrices unclassified then results will not be ISO 17025 accredited. Please contact us as soon as possible to provide missing information in order to reinstate accreditation.

Deviating Sample Key	
A	The sample was received in an inappropriate container for this analysis
B	The sample was received without the correct preservation for this analysis
C	Headspace present in the sample container
D	The sampling date was not supplied so holding time may be compromised - applicable to all analysis
E	Sample processing did not commence within the appropriate holding time
F	Sample processing did not commence within the appropriate handling time
Requested Analysis Key	
■	Analysis Required
■	Analysis dependant upon trigger result - Note: due date may be affected if triggered
□	No analysis scheduled
^	Analysis Subcontracted - Note: due date may vary

Where individual results are flagged see report notes for status.

Method Descriptions

Matrix	MethodID	Analysis Basis	Method Description
Soil	ICPACIDS	Oven Dried @ < 35°C	Determination of Total Sulphate in soil samples by Hydrochloric Acid extraction followed by ICPOES detection
Soil	ICPWSS	Oven Dried @ < 35°C	Determination of Water Soluble Sulphate in soil samples by water extraction followed by ICPOES detection
Soil	ORGMAT	Oven Dried @ < 35°C	Acid Dichromate oxidation of the sample followed by colorimetric analysis of the extract
Soil	TSBRE1	Oven Dried @ < 35°C	Determination of Total Carbon and/or Total Sulphur in solid samples by high temperature combustion/infrared detection
Soil	WSLM50	Oven Dried @ < 35°C	Determination of pH of 2.5:1 deionised water to soil extracts using pH probe.

Where individual results are flagged see report notes for status.

Report Notes

Generic Notes

Soil/Solid Analysis

Unless stated otherwise,

- Results expressed as mg/kg have been calculated on the basis indicated in the Method Description table.
All results on MCERTS reports are reported on a 105°C dry weight basis with the exception of pH and conductivity.
- Sulphate analysis not conducted in accordance with BS1377
- Water Soluble Sulphate is on a 2:1 water:soil extract

Waters Analysis

Unless stated otherwise results are expressed as mg/l

Nil: Where "Nil" has been entered against Total Alkalinity or Total Acidity this indicates that a measurement was not required due to the inherent pH of the sample.

Oil analysis specific

Unless stated otherwise,

- Results are expressed as mg/kg
- SG is expressed as g/cm³@ 15°C

Gas (Tedlar bag) Analysis

Unless stated otherwise, results are expressed as ug/l

Asbestos Analysis

CH Denotes Chrysotile

TR Denotes Tremolite

CR Denotes Crocidolite

AC Denotes Actinolite

AM Denotes Amosite

AN Denotes Anthophyllite

NAIIS No Asbestos Identified in Sample

NADIS No Asbestos Detected In Sample

Symbol Reference

^ Sub-contracted analysis.

\$\$ Unable to analyse due to the nature of the sample

¶ Samples submitted for this analyte were not preserved on site in accordance with laboratory protocols.

This may have resulted in deterioration of the sample(s) during transit to the laboratory.

Consequently the reported data may not represent the concentration of the target analyte present in the sample at the time of sampling

¥ Results for guidance only due to possible interference

& Blank corrected result

I.S Insufficient sample to complete requested analysis

I.S(g) Insufficient sample to re-analyse, results for guidance only

Intf Unable to analyse due to interferences

N.D Not determined

N.Det Not detected

N.F No Flow

NS Information Not Supplied

Req Analysis requested, see attached sheets for results

P Raised detection limit due to nature of the sample

* All accreditation has been removed by the laboratory for this result

‡ MCERTS accreditation has been removed for this result

§ accreditation has been removed for this result as it is a non-accredited matrix

Note: The Laboratory may only claim that data is accredited when all of the requirements of our Quality System have been met. Where these requirements have not been met the laboratory may elect to include the data in its final report and remove the accreditation from individual data items if it believes that the validity of the data has not been affected. If further details are required of the circumstances which have led to the removal of accreditation then please do not hesitate to contact the laboratory.

TEST REPORT



1252

Report No. EFS/187204 (Ver. 1)

SOCOTEC UK Doncaster
Askern Road
Carcroft
Doncaster
South Yorkshire
DN6 8DG

Site: A8015-18 VPI Immingham

The 11 samples described in this report were registered for analysis by SOCOTEC UK Limited on 28-Jun-2018. This report supersedes any versions previously issued by the laboratory.

The analysis was completed by: 09-Jul-2018

Tests where the accreditation is set to N or No, and any individual data items marked with a * are not UKAS accredited. Opinions and interpretations expressed herein are outside the scope of UKAS accreditation.

The following tables are contained in this report:

Table 1 Main Analysis Results (Page 2)
Analytical and Deviating Sample Overview (Page 3)
Table of Method Descriptions (Page 4)
Table of Report Notes (Page 5)
Table of Sample Descriptions (Appendix A Page 1 of 1)

On behalf of
SOCOTEC UK Limited
Tim Barnes



Operations Director
Energy & Waste Services

Date of Issue: 09-Jul-2018


Tests marked '^' have been subcontracted to another laboratory.

Where samples have been flagged as deviant on the Analytical and Deviating Sample Overview, for any reason, the data may not be representative of the sample at the point of sampling and the validity of the data may be affected.

SOCOTEC UK Limited accepts no responsibility for any sampling not carried out by our personnel.

Units :	mg/kg	mg/l	%	%	pH Units														
Method Codes :	ICPACIDS	ICPWSS	ORGMAT	TSBRE1	WSLM50														
Method Reporting Limits :	20	10	0.1	0.005															
UKAS Accredited :	Yes	Yes	No	No	No														

LAB ID Number	Client Sample Description	Sample Date	SO4-- (acid sol)	SO4-- (H2O sol) mg/l	Organic Matter %	Total Sulphur.	pH (BS1377)													
1911581	TT02 B 6 2.00		498	79		0.033	7.8													
1911582	TT03 B 4 1.30				2.6															
1911583	BH5 B 18 4.00		737	205		0.153	8.0													
1911584	BH6 B 1 0.00				3.2															
1911585	TP02 B 10 3.40				1.6															
1911586	TP6 B 6 1.00				1.4															
1911587	TP09 B 6 0.80		626	121		0.053	7.6													
1911588	BH1 D 3 0.45				13.7															
1911589	BH1 B 5 1.00		1260	847		0.068	7.8													
1911590	BH2 B 13 2.20		1170	530		0.075	8.1													
1911591	BH2 B 31 5.70		604	178		0.319	8.5													

 <p>Bretby Business Park, Ashby Road Burton-on-Trent, Staffordshire, DE15 0YZ Tel +44 (0) 1283 554400 Fax +44 (0) 1283 554422</p>	Client Name	SOCOTEC UK Doncaster		Sample Analysis				
	Contact	Tim Clifford						
	<h1>A8015-18 VPI Immingham</h1>				Date Printed	09-Jul-2018		
					Report Number	EFS/187204		
				Table Number	1			

Customer SOCOTEC UK Doncaster
Site A8015-18 VPI Immingham
Report No S187204

Consignment No S75795
Date Logged 28-Jun-2018
In-House Report Due 04-Jul-2018

Please note the results for any subcontracted analysis (identified with a '^') is likely to take up to an additional five working days.

ID Number	Description	MethodID	ClientServ	Dep. Opt	DO Mg if SO4(W)>3000	DO NO3 if pH<5.5	SO4-- (acid sol)	ICPACIDS	ICPBRE	ICPWSS	KONCL	KONNO3	ORGMAT	TSBRE1	W/S/LM50
		Sampled	REPORT A	DO Cl if pH<5.5											
								✓		✓					
CL/1911581	TT02 2.00-2.15	D	D	D	D	D	D	D	D	D	D	D		D	D
CL/1911582	TT03 1.30-1.60	D	D										D		
CL/1911583	BH5 4.00-4.45	D	D				D	D	D	D	D	D		D	D
CL/1911584	BH6 0.00-0.30	D	D										D		
CL/1911585	TP02 3.40-3.50	D	D										D		
CL/1911586	TP6 1.00-1.20	D	D										D		
CL/1911587	TP09 0.80-1.00	D	D				D	D	D	D	D	D		D	D
CL/1911588	BH1 0.45	D	D										D		
CL/1911589	BH1 1.00-1.20	D	D				D	D	D	D	D	D		D	D
CL/1911590	BH2 2.20-2.70	D	D				D	D	D	D	D	D		D	D
CL/1911591	BH2 5.70-6.15	D	D				D	D	D	D	D	D		D	D

Note: We will endeavour to prioritise samples to complete analysis within holding time; however any delay could result in samples becoming deviant whilst being processed in the laboratory.

If sampling dates are missing or matrices unclassified then results will not be ISO 17025 accredited. Please contact us as soon as possible to provide missing information in order to reinstate accreditation.

Deviating Sample Key	
A	The sample was received in an inappropriate container for this analysis
B	The sample was received without the correct preservation for this analysis
C	Headspace present in the sample container
D	The sampling date was not supplied so holding time may be compromised - applicable to all analysis
E	Sample processing did not commence within the appropriate holding time
F	Sample processing did not commence within the appropriate handling time
Requested Analysis Key	
■	Analysis Required
■	Analysis dependant upon trigger result - Note: due date may be affected if triggered
□	No analysis scheduled
^	Analysis Subcontracted - Note: due date may vary

Where individual results are flagged see report notes for status.

Method Descriptions

Matrix	MethodID	Analysis Basis	Method Description
Soil	ICPACIDS	Oven Dried @ < 35°C	Determination of Total Sulphate in soil samples by Hydrochloric Acid extraction followed by ICPOES detection
Soil	ICPWSS	Oven Dried @ < 35°C	Determination of Water Soluble Sulphate in soil samples by water extraction followed by ICPOES detection
Soil	ORGMAT	Oven Dried @ < 35°C	Acid Dichromate oxidation of the sample followed by colorimetric analysis of the extract
Soil	TSBRE1	Oven Dried @ < 35°C	Determination of Total Carbon and/or Total Sulphur in solid samples by high temperature combustion/infrared detection
Soil	WSLM50	Oven Dried @ < 35°C	Determination of pH of 2.5:1 deionised water to soil extracts using pH probe.

Where individual results are flagged see report notes for status.

Report Notes

Generic Notes

Soil/Solid Analysis

Unless stated otherwise,

- Results expressed as mg/kg have been calculated on the basis indicated in the Method Description table.
All results on MCERTS reports are reported on a 105°C dry weight basis with the exception of pH and conductivity.
- Sulphate analysis not conducted in accordance with BS1377
- Water Soluble Sulphate is on a 2:1 water:soil extract

Waters Analysis

Unless stated otherwise results are expressed as mg/l

Nil: Where "Nil" has been entered against Total Alkalinity or Total Acidity this indicates that a measurement was not required due to the inherent pH of the sample.

Oil analysis specific

Unless stated otherwise,

- Results are expressed as mg/kg
- SG is expressed as g/cm³@ 15°C

Gas (Tedlar bag) Analysis

Unless stated otherwise, results are expressed as ug/l

Asbestos Analysis

CH Denotes Chrysotile

TR Denotes Tremolite

CR Denotes Crocidolite

AC Denotes Actinolite

AM Denotes Amosite

AN Denotes Anthophyllite

NAIIS No Asbestos Identified in Sample

NADIS No Asbestos Detected In Sample

Symbol Reference

^ Sub-contracted analysis.

\$\$ Unable to analyse due to the nature of the sample

¶ Samples submitted for this analyte were not preserved on site in accordance with laboratory protocols.

This may have resulted in deterioration of the sample(s) during transit to the laboratory.

Consequently the reported data may not represent the concentration of the target analyte present in the sample at the time of sampling

¥ Results for guidance only due to possible interference

& Blank corrected result

I.S Insufficient sample to complete requested analysis

I.S(g) Insufficient sample to re-analyse, results for guidance only

Intf Unable to analyse due to interferences

N.D Not determined

N.Det Not detected

N.F No Flow

NS Information Not Supplied

Req Analysis requested, see attached sheets for results

P Raised detection limit due to nature of the sample

* All accreditation has been removed by the laboratory for this result

‡ MCERTS accreditation has been removed for this result

§ accreditation has been removed for this result as it is a non-accredited matrix

Note: The Laboratory may only claim that data is accredited when all of the requirements of our Quality System have been met. Where these requirements have not been met the laboratory may elect to include the data in its final report and remove the accreditation from individual data items if it believes that the validity of the data has not been affected. If further details are required of the circumstances which have led to the removal of accreditation then please do not hesitate to contact the laboratory.

TEST REPORT

Report No. EFS/187902 (Ver. 1)

SOCOTEC UK Doncaster
Askern Road
Carcroft
Doncaster
South Yorkshire
DN6 8DG

Site: A8015-18 VPI Immingham

The 1 sample described in this report were registered for analysis by SOCOTEC UK Limited on 19-Jul-2018. This report supersedes any versions previously issued by the laboratory.

The analysis was completed by: 25-Jul-2018

The following tables are contained in this report:

Table 1 Main Analysis Results (Page 2)
Analytical and Deviating Sample Overview (Page 3)
Table of Method Descriptions (Page 4)
Table of Report Notes (Page 5)
Table of Sample Descriptions (Appendix A Page 1 of 1)

On behalf of
SOCOTEC UK Limited
Tim Barnes



Operations Director
Energy & Waste Services

Date of Issue: 25-Jul-2018


Tests marked 'N' have been subcontracted to another laboratory.

Where samples have been flagged as deviant on the Analytical and Deviating Sample Overview, for any reason, the data may not be representative of the sample at the point of sampling and the validity of the data may be affected.

SOCOTEC UK Limited accepts no responsibility for any sampling not carried out by our personnel.

Units :	%																		
Method Codes :	ORGMAT																		
Method Reporting Limits :	0.1																		

LAB ID Number CL/	Client Sample Description	Sample Date	Organic Matter %																
1914695	BH1 D 7 1.65		1.1																

 Bretby Business Park, Ashby Road Burton-on-Trent, Staffordshire, DE15 0YZ Tel +44 (0) 1283 554400 Fax +44 (0) 1283 554422	Client Name	SOCOTEC UK Doncaster								Sample Analysis				
	Contact	Tim Clifford												
	A8015-18 VPI Immingham										Date Printed	25-Jul-2018		
											Report Number	EFS/187902		
										Table Number	1			

Customer SOCOTEC UK Doncaster
Site A8015-18 VPI Immingham
Report No S187902

Consignment No S75653
Date Logged 19-Jul-2018
In-House Report Due 25-Jul-2018

Please note the results for any subcontracted analysis (identified with a '^') is likely to take up to an additional five working days.

ID Number	Description	MethodID	ClientServ	ORGMAT
		Sampled	REPORT A	Organic Matter %
CL/1914695	BH1 1.65-1.80	D	D	D

Note: We will endeavour to prioritise samples to complete analysis within holding time; however any delay could result in samples becoming deviant whilst being processed in the laboratory.

If sampling dates are missing or matrices unclassified then results will not be ISO 17025 accredited. Please contact us as soon as possible to provide missing information in order to reinstate accreditation.

Deviating Sample Key	
A	The sample was received in an inappropriate container for this analysis
B	The sample was received without the correct preservation for this analysis
C	Headspace present in the sample container
D	The sampling date was not supplied so holding time may be compromised - applicable to all analysis
E	Sample processing did not commence within the appropriate holding time
F	Sample processing did not commence within the appropriate handling time
Requested Analysis Key	
■	Analysis Required
■	Analysis dependant upon trigger result - Note: due date may be affected if triggered
□	No analysis scheduled
^	Analysis Subcontracted - Note: due date may vary

Where individual results are flagged see report notes for status.

Method Descriptions

Matrix	MethodID	Analysis Basis	Method Description
Soil	ORGMAT	Oven Dried @ < 35°C	Acid Dichromate oxidation of the sample followed by colorimetric analysis of the extract

Report Notes

Generic Notes

Soil/Solid Analysis

Unless stated otherwise,

- Results expressed as mg/kg have been calculated on the basis indicated in the Method Description table.
All results on MCERTS reports are reported on a 105°C dry weight basis with the exception of pH and conductivity.
- Sulphate analysis not conducted in accordance with BS1377
- Water Soluble Sulphate is on a 2:1 water:soil extract

Waters Analysis

Unless stated otherwise results are expressed as mg/l

Nil: Where "Nil" has been entered against Total Alkalinity or Total Acidity this indicates that a measurement was not required due to the inherent pH of the sample.

Oil analysis specific

Unless stated otherwise,

- Results are expressed as mg/kg
- SG is expressed as g/cm³@ 15°C

Gas (Tedlar bag) Analysis

Unless stated otherwise, results are expressed as ug/l

Asbestos Analysis

CH Denotes Chrysotile

TR Denotes Tremolite

CR Denotes Crocidolite

AC Denotes Actinolite

AM Denotes Amosite

AN Denotes Anthophyllite

NAIIS No Asbestos Identified in Sample

NADIS No Asbestos Detected In Sample

Symbol Reference

^ Sub-contracted analysis.

\$\$ Unable to analyse due to the nature of the sample

¶ Samples submitted for this analyte were not preserved on site in accordance with laboratory protocols.

This may have resulted in deterioration of the sample(s) during transit to the laboratory.

Consequently the reported data may not represent the concentration of the target analyte present in the sample at the time of sampling

¥ Results for guidance only due to possible interference

& Blank corrected result

I.S Insufficient sample to complete requested analysis

I.S(g) Insufficient sample to re-analyse, results for guidance only

Intf Unable to analyse due to interferences

N.D Not determined

N.Det Not detected

N.F No Flow

NS Information Not Supplied

Req Analysis requested, see attached sheets for results

P Raised detection limit due to nature of the sample

* All accreditation has been removed by the laboratory for this result

‡ MCERTS accreditation has been removed for this result

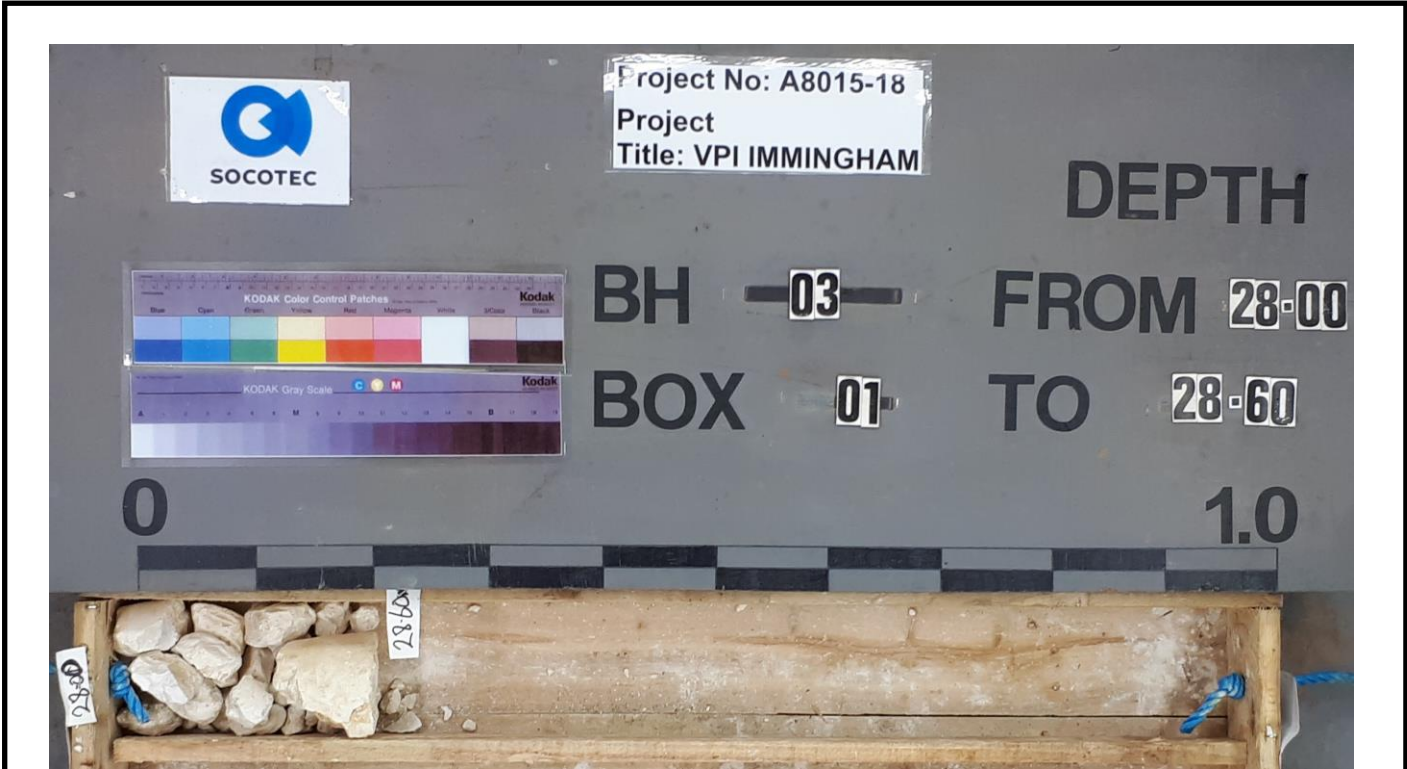
§ accreditation has been removed for this result as it is a non-accredited matrix

Note: The Laboratory may only claim that data is accredited when all of the requirements of our Quality System have been met. Where these requirements have not been met the laboratory may elect to include the data in its final report and remove the accreditation from individual data items if it believes that the validity of the data has not been affected. If further details are required of the circumstances which have led to the removal of accreditation then please do not hesitate to contact the laboratory.

APPENDIX E
PHOTOGRAPHS

Rotary Cores
Trial Pits

Plate 1 to 6
Plate 7 to 21



Notes:	Project VPI IMMINGHAM Project No. A8015-18 Carried out for AECOM	Plate 1
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Photographs



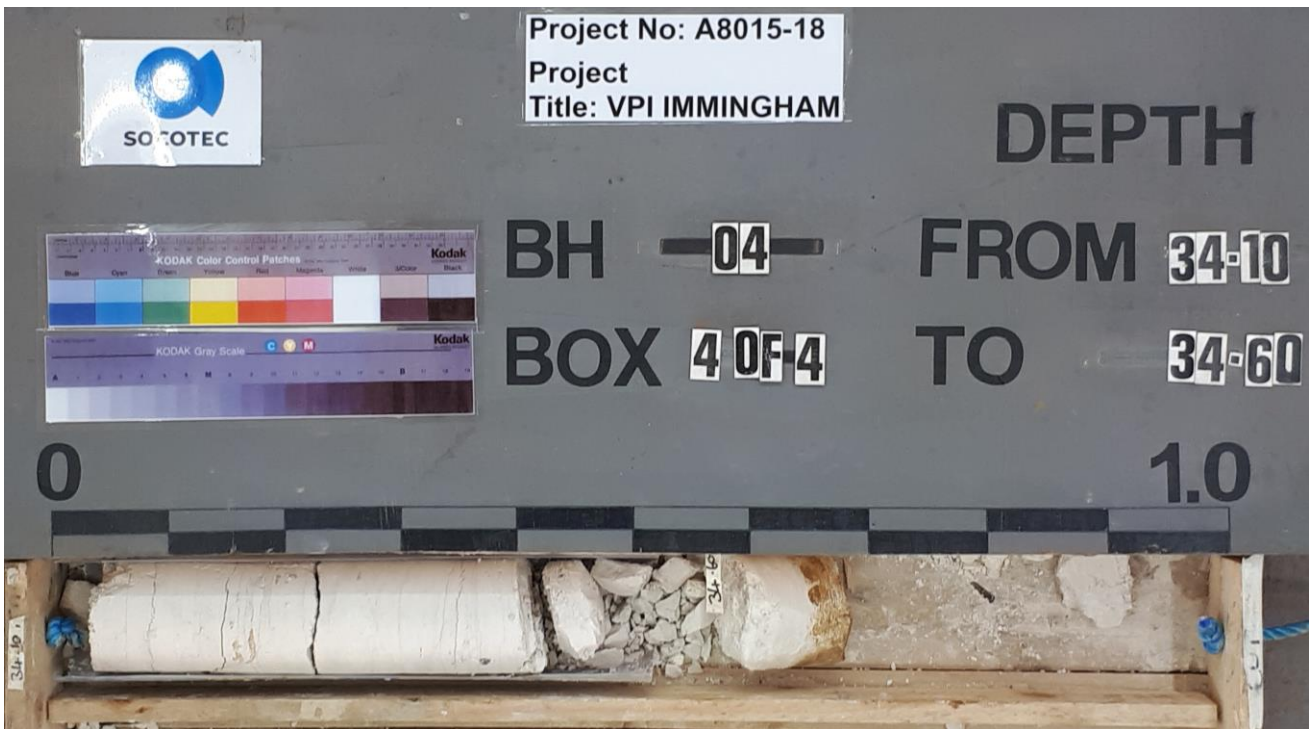
Notes:

Project VPI IMMINGHAM
Project No. A8015-18
Carried out for AECOM

Plate

2

Photographs



Notes:	Project VPI IMMINGHAM Project No. A8015-18 Carried out for AECOM	Plate <p style="text-align: center;">3</p>
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Photographs



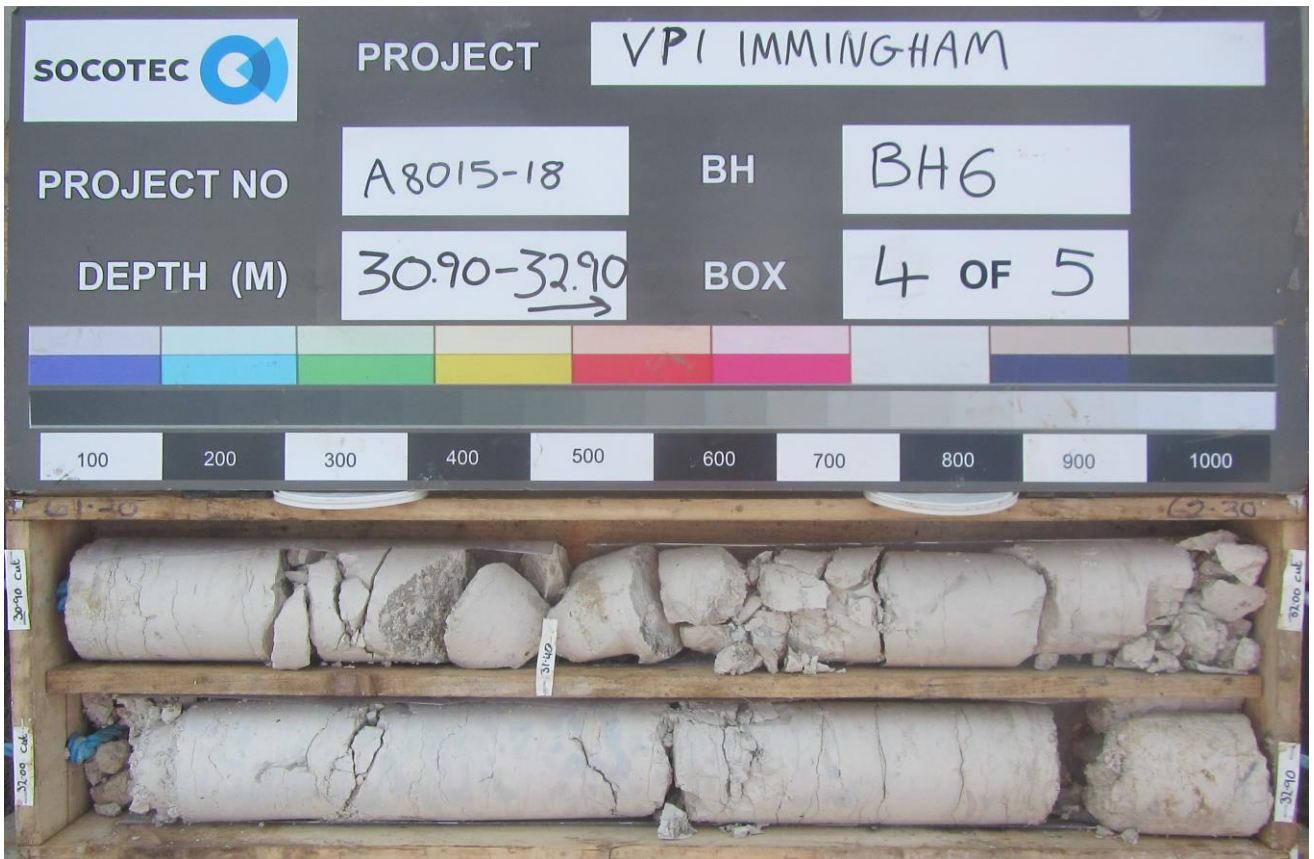
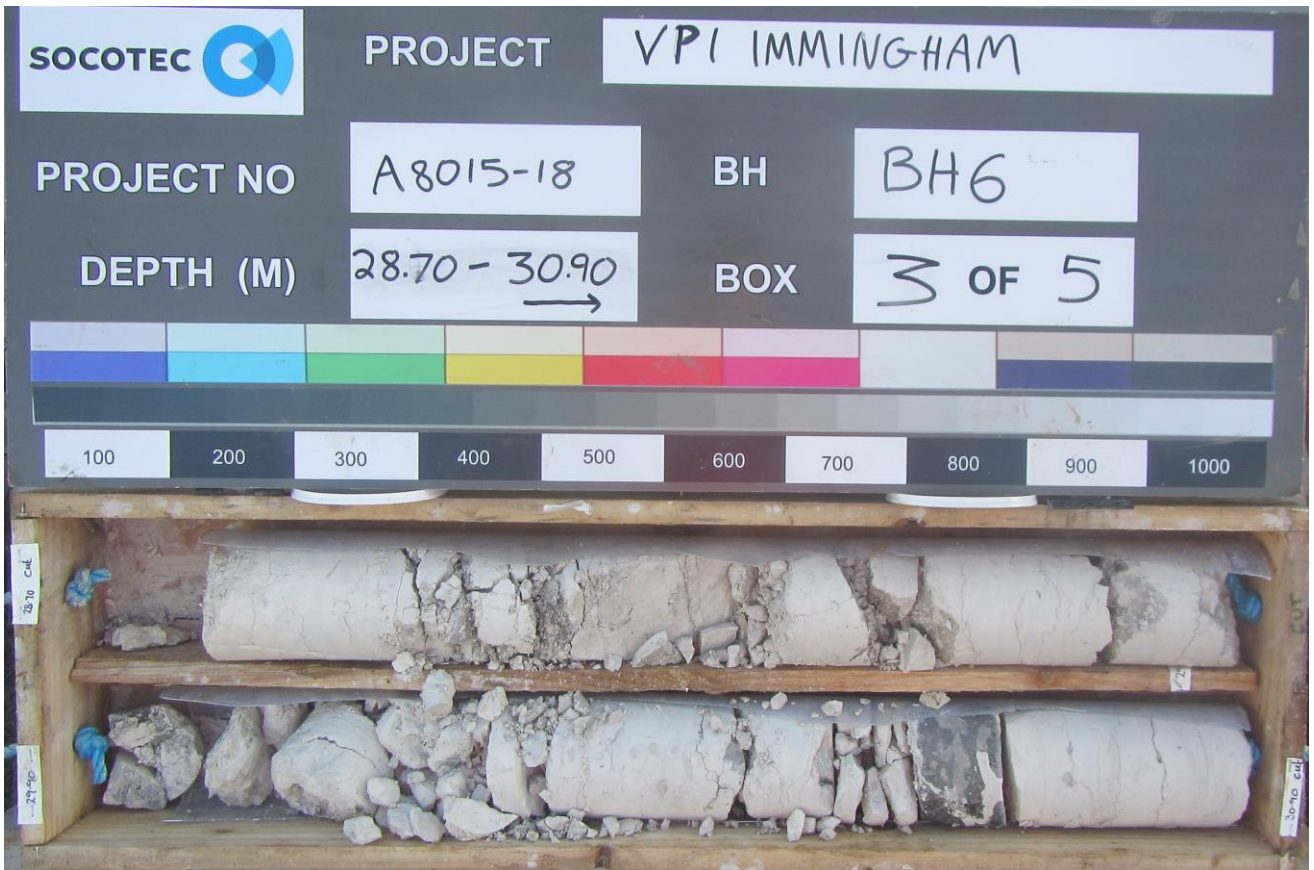
Notes:

Project VPI IMMINGHAM
Project No. A8015-18
Carried out for AECOM

Plate

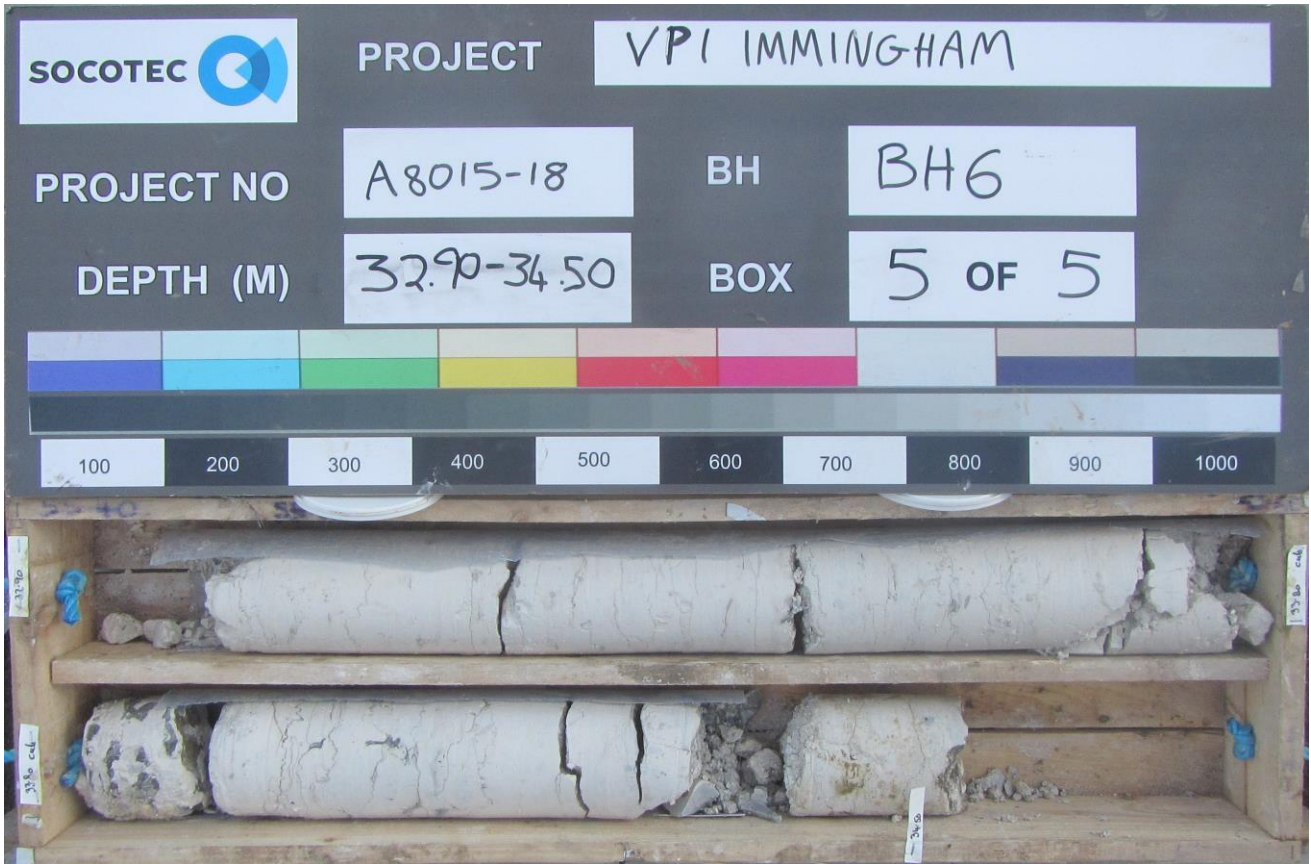
4

Photographs



Notes:	Project VPI IMMINGHAM Project No. A8015-18 Carried out for AECOM	Plate 5
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Photographs



Notes:	Project VPI IMMINGHAM Project No. A8015-18 Carried out for AECOM	Plate 6
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Photographs



TP1



Notes:

Project VPI IMMINGHAM
Project No. A8015-18
Carried out for AECOM

Plate

7



TP1 Spoil

Notes:	<p>Project VPI IMMINGHAM</p> <p>Project No. A8015-18</p> <p>Carried out for AECOM</p>	Plate 8
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Photographs



TP2



Notes:	Project VPI IMMINGHAM Project No. A8015-18 Carried out for AECOM	Plate 9
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TP2 Spoil

Notes:

Project VPI IMMINGHAM
Project No. A8015-18
Carried out for AECOM

Plate

10



TP3



Notes:	Project VPI IMMINGHAM Project No. A8015-18 Carried out for AECOM	Plate 11
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TP3 Spoil

Notes:

Project VPI IMMINGHAM
Project No. A8015-18
Carried out for AECOM

Plate

12



TP5



Notes:

Project VPI IMMINGHAM
 Project No. A8015-18
 Carried out for AECOM

Plate



TP6



Notes:

Project VPI IMMINGHAM
Project No. A8015-18
Carried out for AECOM

Plate

14



TP6 Spoil

Notes:

Project VPI IMMINGHAM
Project No. A8015-18
Carried out for AECOM

Plate

15



TP9 Spoil

Notes:

Project VPI IMMINGHAM
Project No. A8015-18
Carried out for AECOM

Plate

16



TP10



Notes:

Project VPI IMMINGHAM
Project No. A8015-18
Carried out for AECOM

Plate

17



TP10 Spoil

Notes:

Project VPI IMMINGHAM
Project No. A8015-18
Carried out for AECOM

Plate

18



TT02



Notes:	<p>Project VPI IMMINGHAM</p> <p>Project No. A8015-18</p> <p>Carried out for AECOM</p>	<p>Plate</p> <p style="text-align: center;">19</p>
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TT02 Spoil

Notes:

Project VPI IMMINGHAM
Project No. A8015-18
Carried out for AECOM

Plate

20



TT03



Notes:	<table border="0"> <tr> <td>Project</td> <td>VPI IMMINGHAM</td> </tr> <tr> <td>Project No.</td> <td>A8015-18</td> </tr> <tr> <td>Carried out for</td> <td>AECOM</td> </tr> </table>	Project	VPI IMMINGHAM	Project No.	A8015-18	Carried out for	AECOM	<table border="0"> <tr> <td>Plate</td> <td>21</td> </tr> </table>	Plate	21
Project	VPI IMMINGHAM									
Project No.	A8015-18									
Carried out for	AECOM									
Plate	21									