

10.2.6 Assessment of design sulphate class (DC) and aggressive chemical environment for concrete (ACEC)

10.2.6.1 Based on the design sulphate class, characteristic value of pH and assessment of groundwater mobility, and with reference to table C2 of SDI: 2005, the ACEC class for each soil type is presented in Table 10.2.3 below.

Summary of concrete classification				
Soil type	Disturbed ground?	Consider TPS?	DS class	ACEC class
Made Ground	N	N	DS-3	AC-2s
	Y	Y	DS-3	AC-2s
London Clay	N	N	DS-3	AC-2s
	Y	Y	DS-5	AC-4s

Table 10.2.6.1

10.2.6.2 Where concrete is in contact with more than one soil source, the more onerous of design sulphate class and ACEC class should be adopted.

10.3 Concrete - Chloride attack

10.3.1 Hazards

10.3.1.1 There are a number of ways in which chlorides can react with hydrated cement compounds in concrete. These are as follows:

- Chlorides react with calcium hydroxide in the cement binder to form soluble calcium chloride. This reaction increases the permeability of the concrete reducing its durability.
- Calcium and magnesium chlorides can react with calcium aluminate hydrates to form chloroaluminates which result in low to medium expansion of the concrete.
- If concrete is subject to wetting and drying cycles caused by groundwater fluctuations, salt crystallisation can form in concrete pores. If pressure produced by crystal growth is greater than the tensile strength of the concrete, the concrete will crack and eventually disintegrate.

10.3.2 Risk assessment

10.3.2.1 Chlorides of sodium, potassium, and calcium are generally regarded as being non-aggressive towards mass concrete; indeed, brine containers used in salt mines have been known to be serviceable after 20 years' service. Depending upon the type of concrete, and the cement used up to 0.4% chloride is allowed in BS8110: Part 1.

10.3.2.2 In view of the past use of the site we consider the likelihood of elevated concentrations of chlorides in the ground to be low and, on this basis, have not specifically measured concentrations of chlorides.

10.4 Concrete - Acid attack

10.4.1 Hazards

10.4.1.1 Concrete being an alkaline material is vulnerable to attack by acids. Prolonged exposure of concrete structures to acidic solutions can result in complete disintegration.

10.4.2 Risk assessment

10.4.2.1 The rate of acid attack on concrete depends upon the following:

- The type of acid
- The acid concentration (pH)
- The composition of the concrete (cement/aggregate)
- The soil permeability
- Groundwater movement

10.4.2.2 British Standard BS8110: Part 1 classifies extreme environment as one where concrete is exposed to flowing groundwater that has a pH<4.5. The standard also warns that Portland Cement is not suitable for acidic conditions with a pH of 5.5 or lower.

10.4.2.3 The pH of the soil was measured exceeding 5.5 and on this basis the risk of concrete being affected by acidic conditions is considered low.

10.5 Concrete - Magnesium attack

10.5.1 Hazards

10.5.1.1 Magnesium salts (excepting magnesium hydrogen carbonate) are destructive to concrete. Corrosion of concrete occurs from cation exchange reactions where calcium in the cement paste hydrates and is replaced with magnesium. The cement loses binding power and eventually the concrete disintegrates.

10.5.2 Risk assessment

10.5.2.1 In practise 'high' concentrations of magnesium will be found in the UK only in ground having industrial residues. Following BRE Special Digest 1:2005, measurement of the concentration of magnesium is recommended if sulphate concentrations in water extract or groundwater exceed 3000mg/l. Once measured the concentration of magnesium is considered further in BRE Special Digest in establishing the concrete mix to resist chemical attack.

10.5.2.2 We are not aware the site has been subject to any manufacturing processes which would have included magnesium containing compounds, and in addition sulphate concentrations did not exceed 3000mg/l. On this basis, we have not measured the concentration of magnesium in soils at the site and would consider the risk of soils at the site promoting attack on concrete is considered low.

10.5.2.3 BS EN 206-1:2000 '*Concrete - Part 1: Specification, performance, production and conformity*' does, however, provide exposure classes for concrete in contact with water, with varying concentrations of magnesium for the design/specification for concrete mixes. No groundwater was encountered during the investigation and we would consider the risk of magnesium requiring special consideration with respect to enhancement of exposure class for this contaminant in isolation to be low.

10.6 Concrete - Ammonium attack

10.6.1 Hazards

10.6.1.1 Ammonium salts, like magnesium salts act as weak acids and attack hardened concrete paste resulting in softening and gradual decrease in strength of the concrete.

10.6.2 Risk assessment

10.6.2.1 UK guidance is not available on the concentration of ammonium which may affect concrete. BS EN 206-1: 2000 '*Concrete - Part 1: Specification, performance, production and conformity*' does, however, provide exposure classes for concrete in contact with water with varying concentrations of ammonia for the design/specification for concrete mixes.

10.6.2.2 The site has no history which provides evidence of the uses of ammonia on site, and therefore, the risk of concrete being affected by ammonia is considered low.

10.7 Plastic Pipes

10.7.1 Hazards

10.7.1.1 Plastic pipes are predominantly manufactured from PVC and PE but other materials can be used. In general, they perform well but it is known that chemical attack and permeation of contaminants through the pipes can result from use in contaminated land. A published review on plastic pipes reports the following:

- Polyethylene (PE) - good resistance to solvents, acids and alkalis
- Poly vinyl chloride (PVC) - most common form of pipe. Good general resistance to chemical attack but can be attacked by solvents such as ketones, chlorinated hydrocarbons and aromatics.
- Polypropylene (PP) - chemically resistant to acids, alkalis and organic solvents but not recommended for use with storing oxidising acids, chlorinated hydrocarbons and aromatics.
- Poly vinylidene fluoride (PVDF) - inert to most solvents, acids and alkalis as well as chlorine, bromide and other halogens
- Polytetrafluoroethylene (PTFE) - one of the most inert thermoplastics available. PTFE has good chemical resistance to solvents, acids and alkalis

10.7.1.2 A survey carried out by the Water Research Centre (WRC) on reported incidents of permeation (more than 25), only two involved PVC with these incidents relating to spillages of fuel.

10.7.2 Assessment

10.7.2.1 A survey carried out by the Water Research Centre (WRC) on reported incidents of permeation (more than 25), only two involved PVC with these incidents relating to spillages of fuel.

10.7.2.2 The UK Water Industry research (UKWIR) have published a document entitled *'Guidance for the selection of Water supply pipes to be used in Brownfield sites'*. The publication defines brownfield sites as

'Land or premises that have been used or developed. They may also be vacant, or derelict. However, they are not necessarily contaminated'

10.7.2.3 The subject site has previously been developed and on this basis could potentially be considered brownfield in accordance with the UKWIR document. Following the preliminary risk assessment procedures described in the UKWIR document however, (paragraph 2.4.2) there is no evidence to indicate that chemicals have ever been used or stored on site.

- 10.7.2.4 Whilst we have not carried out a full investigation set out in guidance in the UKWIR document, the subject site does exhibit a degree of localised hydrocarbon (PAH) contamination. The UKWIR document advises a trigger concentration of 0.125mg/kg for their 'extended VOC (Volatile Organic Carbons) suite' which includes the PAH suite which we have results for. The measured concentration of individual contaminants forming part of the PAH suite exceeds the trigger value of 0.125mg/kg and on this basis, it is considered likely that barrier pipes will have to be installed at this site where they are located within Made Ground. We recommend Thames Water is consulted on this to gain their opinion and requirements.

11 Waste characterisation

11.1	The Landfill Directive
11.2	Characterisation of soil types
11.3	Waste characterisation procedure
11.4	Hazardous waste classification
11.5	Landfill waste acceptance criteria
11.6	Naturally deposited soils not affected by artificial contaminants
11.7	Basic characterisation
11.8	Treatment of waste
11.9	Reuse of Soils - Materials Management Plan

11.1 The Landfill Directive

11.1.1 The Landfill Directive represents an important change in the way we dispose of waste. It encourages waste minimisation by promoting increased levels of recycling and recovery. The Landfill Directive became law in 1999 and was transcribed into the Landfill (England and Wales) Regulations which came into force in 2002. These Regulations were amended in 2005 by introducing criteria to classify soils for disposal to landfill. It is the duty of the waste producer (the client) to classify the soils for this purpose.

11.2 Characterisation of soil types

11.2.1 Our investigations consider two soil types which may be generated as wastes as part of construction operations, potentially contaminated soil and uncontaminated soil. A full hazard assessment and subsequent testing for waste acceptance criteria is undertaken on soils which are not considered to be naturally deposited or are likely to be affected by artificial contamination. For soils that are unlikely to be affected by artificial contamination (such as natural soils), specific testing in relation to the classification process is not necessary.

11.3 Waste characterisation procedure

11.3.1 The Environment Agency publication, '*Waste Sampling and Testing for Disposal to Landfill*' (2013), provides an appropriate procedure for establishing if the soils are hazardous or non-hazardous and for determining the appropriate landfill class. This guidance applies to soils that are identified as potentially contaminated. Uncontaminated, natural soils are considered separately (see Section 11.6).

11.3.2 Hazardous waste classification

11.3.2.1 The first stage for characterising a potentially 'contaminated' soil for disposal to landfill is to establish its chemical status by first identifying potential sources/types of chemical contamination (desk study) followed by intrusive site investigations to obtain samples for undefined testing of soil samples to measure concentrations of chemical

contaminants. Such data provides information to partly complete a basic characterisation.

- 11.3.2.2 Laboratory test data is then compared with the Environment Agency publication '*Guidance on the classification and assessment of waste. Technical Guidance WM3 (2018, version 1.1)*'. With reference to this document a hazard assessment has been carried out to enable classification of the material as hazardous or non-hazardous and to subsequently establish the European Waste Catalogues (EWC) code (ref Section 11.3.4).

11.3.3 Landfill waste acceptance criteria

- 11.3.3.1 The second stage for characterising a potentially 'contaminated' soil for disposal to landfill is by determining the appropriate landfill class. If the soil is deemed hazardous then measurement of organic contaminants and leachable inorganic contaminants is necessary for comparison with values listed in the Environment Agency publication '*Waste Sampling and Testing for Disposal to Landfill (2013) Table 5.3*. Similarly should the soil be deemed as non-hazardous then such testing may also be undertaken to determine if it is potentially inert. This document also provides guidance on sampling materials and frequency as well as test procedures and quality assurance of testing.

- 11.3.3.2 The above procedures are described with respect to the subject site in the following Sections 11.4 (hazardous waste classification) and 11.5 (landfill waste acceptance criteria), leading to the basic characterisation of soils for disposal. Subject to the results of the characterisation and anticipated development methodology, consideration should be given by the developer to reduce volumes of disposal or treatment to allow reclassification.

11.3.4 European Waste Catalogues (EWC) coding

- 11.3.4.1 The EWC 2002 is a catalogue of all wastes, grouped according to generic industry, process or waste type. It is divided into twenty main chapters, each with a two digit code between 01 and 20. Following the EWC, in our opinion, soils considered as part of this investigation would be categorised within 'Group 17' of the EWC catalogue, which comprises 'Construction and Demolition Wastes (including excavated soils from contaminated sites)'.

- 11.3.4.2 The Catalogue further categorises the waste, such that soils considered as part of this investigation would be classified as either 17 05 04 defined as '*soil and stones (other than those mentioned in 17 05 03)*'; or 17 05 03* defined as soil or stones containing dangerous substances (where hazardous wastes are described by entries followed by an asterisk).

11.4 Hazardous waste classification

11.4.1 Soil types

- 11.4.1.1 Based on soils exposed in exploratory excavations, in combination with anticipated construction works, we assume soils requiring off-site disposal will comprise Made Ground and London Clay Formation deposits.

11.4.2 Classification as hazardous or non-hazardous waste

- 11.4.2.1 The Environment Agency publication '*Waste Sampling and Testing for Disposal to Landfill*' (March 2013) provides the following procedure for establishing if the soils are hazardous or non-hazardous. The first stage in classifying a potentially 'contaminated' soil for disposal is to establish its chemical status by first identifying potential sources/types of chemical contamination (desk study) followed by intrusive site investigations to obtain samples for laboratory testing of soil samples to measure concentrations of chemical contaminants.
- 11.4.2.2 An assessment of potential source of contamination is presented in Section 8 of this report. Laboratory testing has been set as deemed appropriate to our source assessment.
- 11.4.2.3 We have carried out an analysis of test data for each chemical contaminant considered in this investigation. A conservative approach has been adopted for the analysis whereby the maximum test value for each contaminant has been adopted as a preliminary screening process to determine if the soils are hazardous or non-hazardous. Should the analysis indicate potentially hazardous properties then a process of zoning by further analysing the site history, geological conditions and analytical data may be undertaken.
- 11.4.2.4 Laboratory test data measures the concentration of anions, which are unlikely to exist in the pure metallic form in the soil, but probably exist as a compound. Following guidance provided in the Environment Agency Technical Guidance WM3 '*Guidance on the classification and assessment of waste*' (2018), we have reviewed a variety of compounds for each of the metallic and semi metallic elements we have tested.
- 11.4.2.5 To determine the hazardous waste properties for each element, we have reviewed chemical compounds listed in Table 3.2 of Annex VI of the European Regulation (1272/2008) for Classification, Labelling and Packaging (CLP) of chemicals which has now superseded the Approved Supply List (Published by the Health and Safety Executive) for the classification of hazardous chemicals in the UK. In order to provide a 'worst case' scenario, initially we adopt the most severe hazardous properties (risk phrases) associated with the various compounds for each element under review. If measured concentrations produce a hazardous outcome then the element or elements are reassessed on a site specific basis. For review of organic contamination, we have directly adopted the threshold concentrations for the appropriate organic compounds listed in Table 3.2.
- 11.4.2.6 The compound or compounds adopted for each element is used to convert the measured metallic concentration to the substance concentration using their respective molecular weights. This derived conversion factor is then used in the threshold concentration spreadsheet (refer paragraph 11.4.2.8).
- 11.4.2.7 Our assessment of each of the chemical substances is maintained on our files and is available for confidential review/audit by the Environment Agency.

11.4.2.8 A spreadsheet detailing the hazard assessment is presented in Appendix K1.

11.4.2.9 The spreadsheet indicates the soils are **non-hazardous**.

11.5 Landfill waste acceptance criteria

11.5.1 We have scheduled testing of **two** samples to measure the parameters listed in Table 5.3 (landfill waste acceptance criteria) included in '*Waste Sampling and Testing for Disposal to Landfill*' (2013). A copy of the test result certificate is presented in Appendix G. The samples were tested from.

Composition of soil samples for classification testing		
Strata	Source	Soil Type
Made Ground	BH01 at 0.6m	Brown sandy gravelly clay. Gravel of concrete, brick and flint.
	BH06 at 1.0m	Brown gravelly clayey sand. Gravels of bituminous bound material, brick and igneous rock.

Table 11.5.1

11.5.2 Laboratory test data has been compared with the landfill waste acceptable criteria to allow the assessment to be completed. A tabulated copy this comparison is presented in Appendix K2.

11.5.3 Comparison of test data with landfill waste acceptance criteria indicates that Made Ground soils are suitable for disposal at **a non-hazardous** landfill site. These soils cannot be disposed of as inert waste due to elevated concentrations of fluoride, sulphate and total dissolved solids.

11.6 Naturally deposited soils not affected by artificial contaminants

11.6.1 With reference to the Environment Agency's publications *Waste Sampling and Testing for Disposal to Landfill* (2013) and *Waste acceptance at landfills* (2010), naturally occurring soils not likely to be affected by contamination can be classified as inert waste, with a EWC code of 17 05 04. Should any of the naturally deposited soils be suspected to contain contamination (by virtue of visual or olfactory evidence) upon excavation, then such soils should be stockpiled appropriately and additional testing carried out as considered necessary. Based on evidence obtained during our investigations, we are of the opinion that the London Clay Formation at the site are not likely to be affected by chemical contamination and thus can be classified as **inert waste**.

11.7 Basic characterisation

11.7.1 Based on the preceding assessment, we have produced **two** basic characterisation schedules relating to the Made Ground and London Clay deposits, which are presented in Appendix K3. These schedules should be provided together with a copy of this report to an appropriately licensed landfill facility to demonstrate the material can be deposited at this facility.

- 11.7.2 We understand that some landfill sites have licences which have restrictions on concentrations of chemical contaminants and thus we recommend this report is provided to the selected landfill facility to confirm (or otherwise) it can accept the waste. Please be aware that landfill sites are obligated to undertake in house quality assurance tests and thus may require further WAC testing for any soils encountered as part of this investigation. There is no obligation on any landfill operator to accept waste if they choose not to and waste operators may require additional testing of untested waste soils prior to acceptance at landfill in accordance with the landfill regulations.

11.8 Treatment of waste

- 11.8.1 Treatment of wastes prior to disposal is now a requirement of the landfill directive applied by the Landfill (England and Wales) Regulations 2002. Landfill cannot accept untreated waste (be it hazardous or non-hazardous), thus waste producers have the choice of treating it themselves on site or treating it elsewhere prior to disposal to landfill. The regulations require:

‘10 – (1) The operator of a landfill shall ensure that the landfill is only used for landfilling waste which is subject to prior treatment unless:

- a) It is inert waste for which treatment is not technically feasible; or*
- b) It is waste other than inert waste and treatment would not reduce its quantity or the hazards which it poses to human health or the environment.’*

- 11.8.2 Regulation 2 defines treatment as: *‘physical, thermal, chemical or biological processes (including sorting) that change the characteristics of waste in order to reduce its volume or hazardous nature, facilitate its handling or enhance recovery.’*

- 11.8.3 A treatment option must comply with the definition of treatment. This involves a ‘three point test’ against which treatment is assessed i.e.

1. It must be a physical, thermal, chemical or biological process including sorting
2. It must change the characteristics of the waste: and
3. It must do so in order to:
 - a) Reduce its volume: or
 - b) Reduce its hazardous nature: or
 - c) Facilitate its handling: or
 - d) Enhance its recovery.

11.8.4 Treatment of inert wastes

- 11.8.4.1 Inert waste does not need to be treated if it is not technically feasible however treatment should reduce the amount of waste which goes to landfill and enhance its recovery (by re-use or recycling). Inert wastes are often suitable for recycling, for example as an aggregate or an engineering fill material. A fact sheet on treatment of inert wastes is available on the following website www.environment-agency.gov.uk
- 11.8.4.2 Clearly, excavations in the London Clay Formation will generate inert wastes which could be reused on site or off site for bulk filling, subject of course to maintenance of an acceptable water content and provided that it is fit for its intended purpose.

11.8.5 Treatment of non-hazardous waste

- 11.8.5.1 Guidance and indeed examples of treatment is provided in the Environment Agency publication '*Treatment of non-hazardous wastes for landfill – your waste – your responsibility*,' again available on the EA website.

11.8.6 Landfill operators

- 11.8.6.1 It is a requirement of the landfill operator to check if the waste soils taken to the facility have been treated.

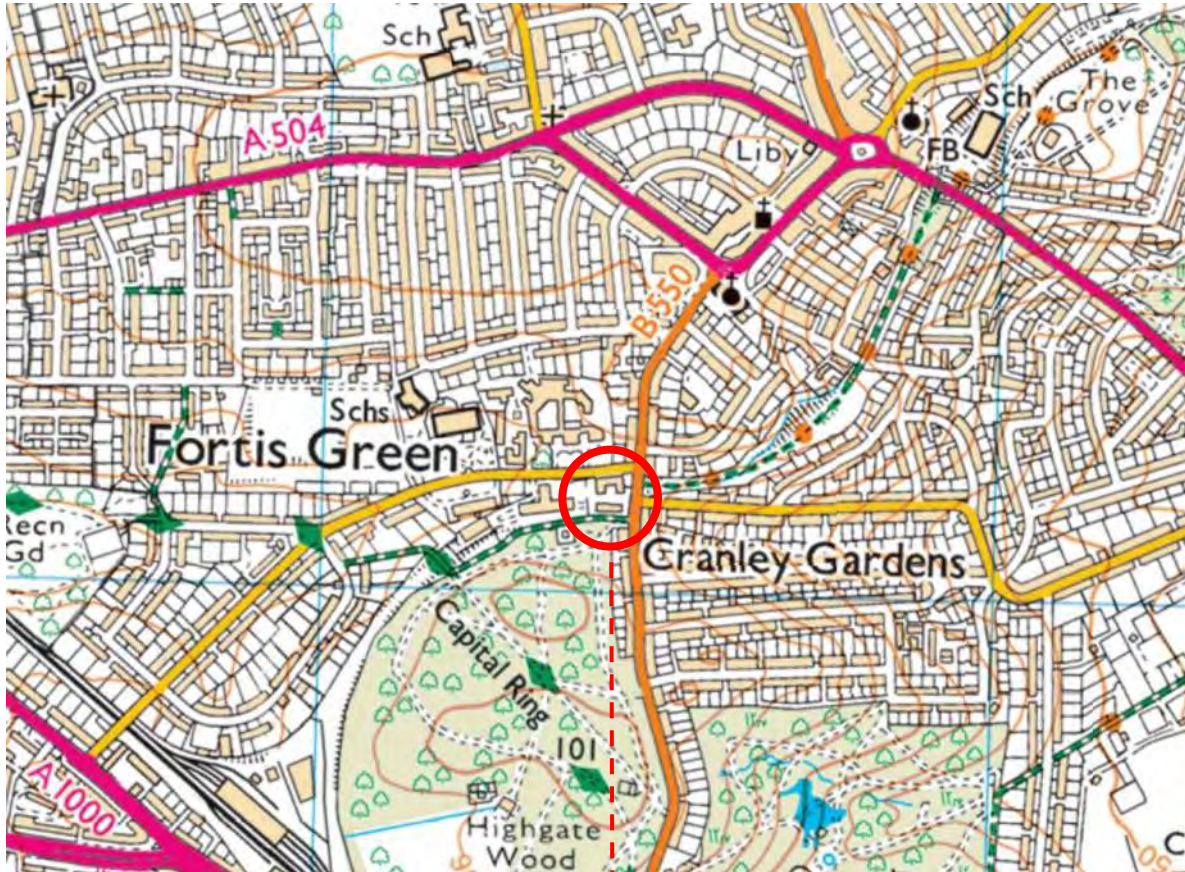
11.9 Reuse of Soils - Materials Management Plans

- 11.9.1 Where soils are to be moved and reused onsite, or are to be imported to the site, a Waste Exemption or an Environmental Permit is required.
- 11.9.2 An alternative is the use of a Materials Management Plan (MMP) to determine where soils are and are not considered to be a waste. By following '*The Definition of Waste: Development Industry Code of Practice*' published by CL:AIRE (produced in 2008 and revised in March 2011), soils that are suitable for reuse without the need for remediation (either chemical or geotechnical) and have a certainty of use, are not considered to be waste and therefore do not fall under waste regulations. In addition, following this guidance may present an opportunity to transfer suitable material between sites, without the need for Waste Exemptions or Environmental Permits.
- 11.9.3 MMPs offering numerous benefits, including maximising the use of soils onsite, minimising soils going to landfill and reducing costs and time involved in liaising with waste regulators.
- 11.9.4 We can provide further advice on this and provide fees for producing a Materials Management Plan on further instructions.

12 Further investigations

12.1 Further investigations

- 12.1 We recommend further samples of Made Ground are collected and tested to allow refinement of the statistical analysis and determine whether these are isolated concentrations or more widespread. This should include additional sampling around the vicinity of BH01 and BH06 as well as more generally.
- 12.2 In addition, some areas of soft landscaping are already present on site and if it proposed to reuse any of the existing Topsoil-type soils, further testing will be needed to confirm it is suitable for reuse due to the limited testing undertaken to date in this soil type.
- 12.3 A shaft was recorded on site when it was occupied by the station and remained recorded after redevelopment for the current care home. There is no further information regarding the shaft but it is possible it is still on site and there may be some voids in this area. We would recommend further investigation of this area to determine if any such structure is still present.
- 12.4 The client has however requested that an additional two foundation trial pits are completed adjacent to the existing residential properties once access can be agreed.



Site location

Title	Scale	Drawing number
Site location plan	Not to scale	01

Treehouse School

St James
Primary School

Highgate Wood

Muswell
Hill Guest
House

Residential
properties

Cranley Gardens

Residential
properties



Key



BH

Approximate location of borehole
formed by Cable and Tool percussive
techniques



TP

Approximate location of trial pit
excavation



Approximate Thames Water Easement



Approximate site boundary



P

Approximate location and orientation
of photographic record

Notes

Base drawing provided by Plowman Craven

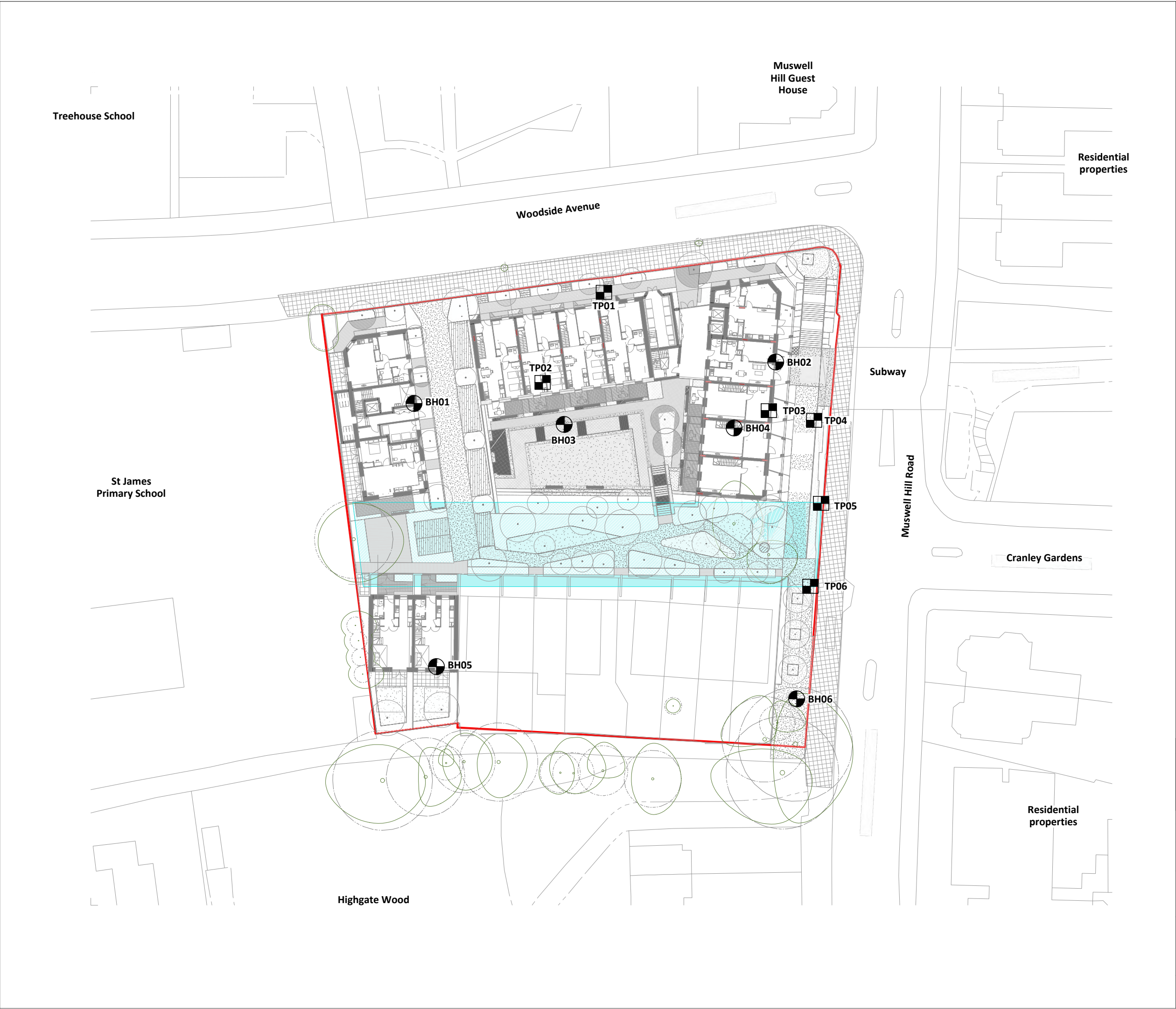
A	First issue	KD	GL	KB	05.03.2021
REV	DESCRIPTION	PRODUCED BY	CHECKED BY	REVIEWED BY	DATE

soiltechnics
environmental ■ geotechnical ■ building fabric

PROJECT
Cranwood, 100 Woodside Avenue, London

TITLE
Plan showing existing site features and location of
exploratory points

PROJECT NO. STS5215	SCALE AT A3 1:500	DRAWING NO. 02
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Key

-  BH Approximate location of borehole formed by Cable and Tool percussive techniques
-  TP Approximate location of trial pit excavation
-  Approximate Thames Water Easement
-  Approximate site boundary

Notes

Base drawing provided by Levitt Bernstein

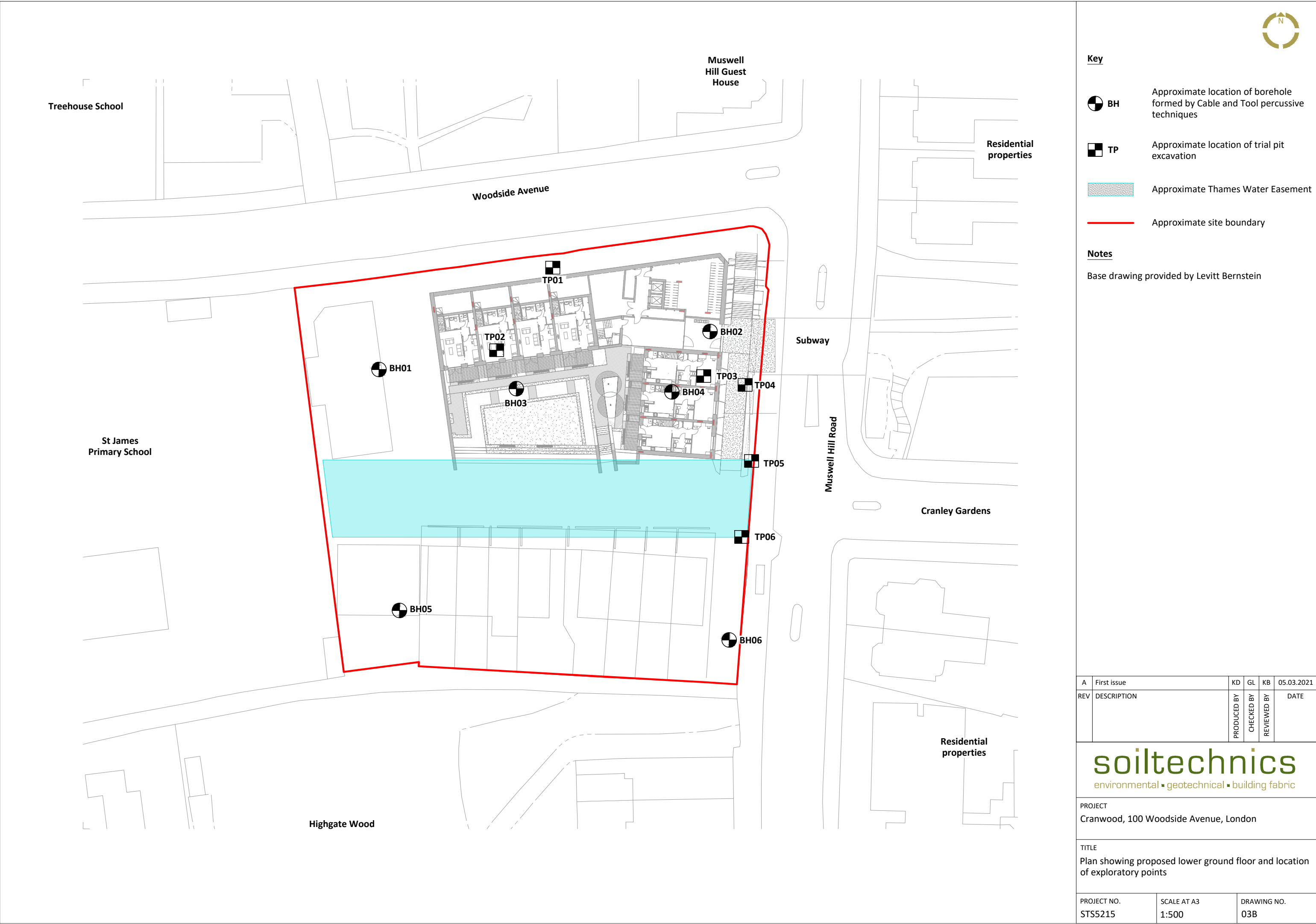
A	First issue	KD	GL	KB	05.03.2021
REV	DESCRIPTION	PRODUCED BY	CHECKED BY	REVIEWED BY	DATE

soiltechnics
environmental ■ geotechnical ■ building fabric

PROJECT
Cranwood, 100 Woodside Avenue, London

TITLE
Plan showing proposed ground floor and location of exploratory points

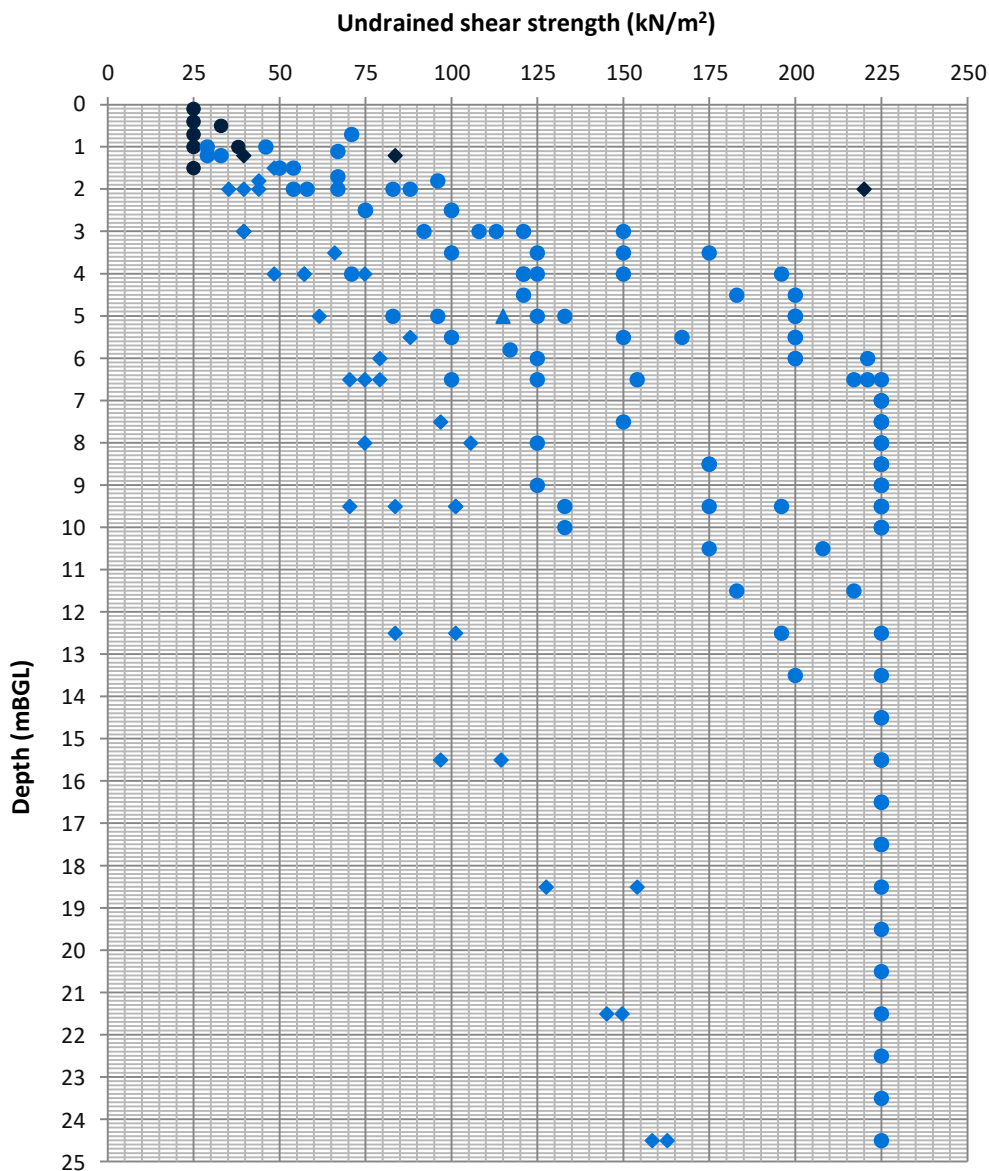
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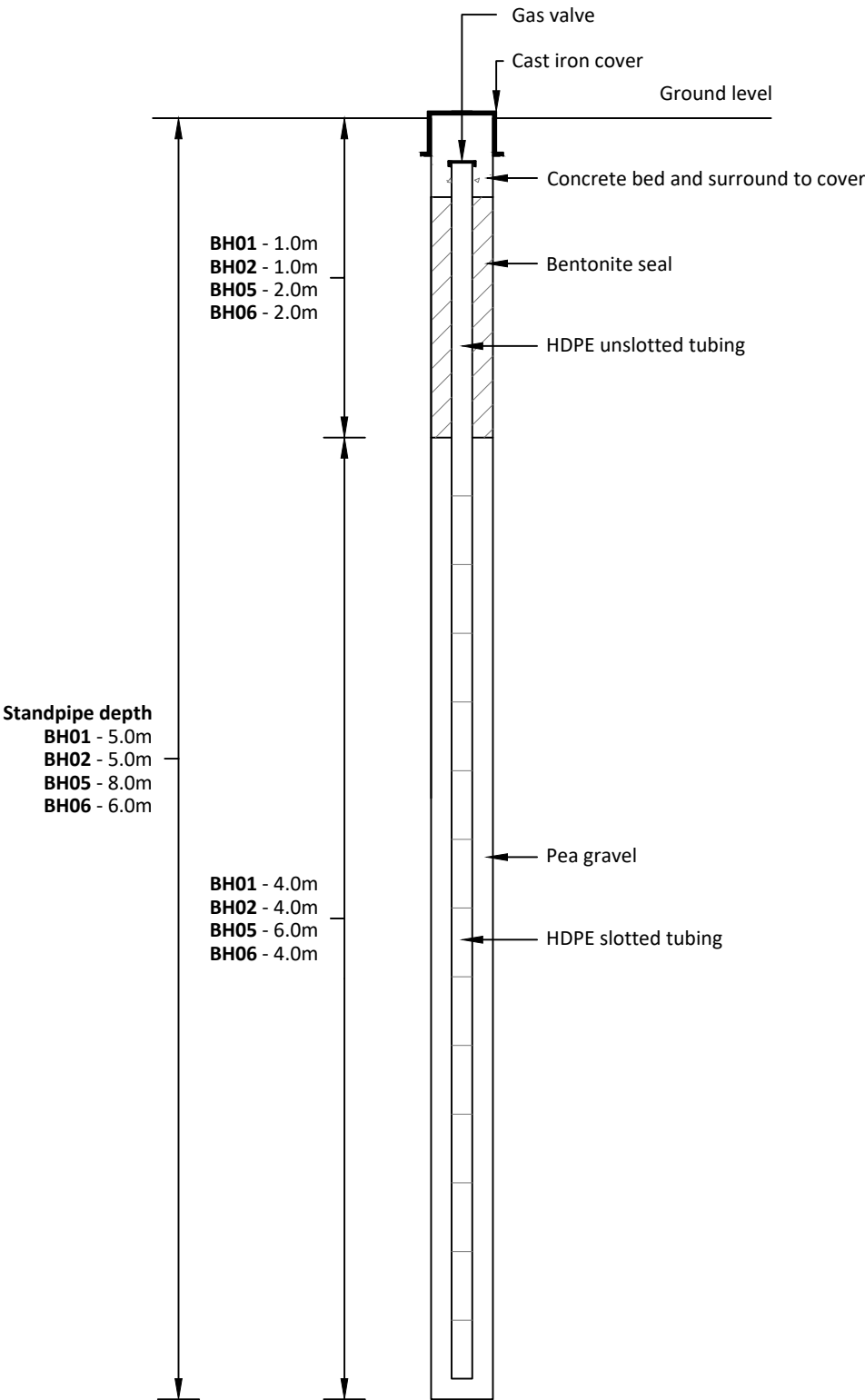
Plot summarising results of combined insitu testing data by geology (mBGL)

Drawing number

04



- MADE GROUND (PP)
- ◆ MADE GROUND (SPT)
- ▲ LONDON CLAY FORMATION (TX)
- LONDON CLAY FORMATION (PP)
- ◆ LONDON CLAY FORMATION (SPT)



Title

Section showing construction of gas monitoring standpipes
installed in boreholes BH01, BH02, BH05 and BH06

Scale

Not to scale

Drawing number

05

Definition of geotechnical terms used in this report - foundations

Strip foundations.

A foundation providing a continuous longitudinal ground bearing.

Trench fill concrete foundation.

A trench filled with mass concrete providing continuous longitudinal ground bearing.

Pad foundation.

An isolated foundation to spread a concentrated load.

Raft foundation.

A foundation continuous in two directions, usually covering an area equal to or greater than the base area of the structure.

Substructure.

That part of any structure (including building, road, runway or earthwork) which is below natural or artificial ground level. In a bridge this includes piers and abutments (and wing walls), whether below ground level or not, which support the superstructure.

Piled foundations and end bearing piles. A pile driven or formed in the ground for transmitting the weight of a structure to the soil by the resistance developed at the pile point or base and the friction along its surface. If the pile supports the load mainly by the resistance developed at its point or base, it is referred to as an end-bearing pile; if mainly by friction along its surface, as a friction pile.

Bored cast in place pile.

A pile formed with or without a casing by excavating or boring a hole in the ground and subsequently filling it with plain or reinforced concrete.

Driven pile.

A pile driven into the ground by the blows of a hammer or a vibrator.

Precast pile.

A reinforced or pre-stressed concrete pile cast before driving.

Driven cast in place pile.

A pile installed by driving a permanent or temporary casing, and filling the hole so formed with plain or reinforced concrete.

Displacement piles.

Piled formed by displacement of the soil or ground through which they are driven.

Skin friction.

The frictional resistance of the surrounding soil on the surface of cofferdam or caisson walls, and pile shafts.

Downdrag or negative skin friction. A downwards frictional force applied to the shaft of a pile caused by the consolidation of compressible strata, e.g. under recently placed fill. Downdrag has the effect of adding load to the pile and reducing the factor of safety.

Definition of geotechnical terms used in this report – bearing values

To Eurocode 7

Formal definitions of Eurocode terms are provided in BS EN 1990:2002 '*Eurocode – Basis of Structural Design*'. The following are considered informal definitions relating to the context of the geotechnical design report.

Bearing resistance

Calculated ability of a foundation to resist applied actions considered for ultimate and serviceability limit states.

Ultimate limit state (ULS) considerations

Partial factors applied to soil parameters, and actions (applied loads) in bearing resistance calculations to avoid risk of failure of the foundation in bearing.

Serviceability limit state (SLS) considerations

Calculations to determine bearing resistance of a foundation which will generate acceptable levels of settlement under applied actions

Characteristic geotechnical parameters

These are based on results and derived values from laboratory field tests, complemented by well-established experience.

Pre-Eurocode 7 methods.

Ultimate bearing capacity.

The value of the gross loading intensity for a particular foundation at which the resistance of the soil to displacement of the foundation is fully mobilised.

Presumed bearing value.

The net loading intensity considered appropriate to the particular type of ground for preliminary design purposes. The particular value is based on calculation from shear strength tests or other field tests incorporating a factor of safety against shear failure.

Allowable bearing pressure.

The maximum allowable net loading intensity at the base of the foundation, taking into account the ultimate bearing capacity, the amount and kind of settlement expected and our estimate of ability of the structure to accommodate this settlement.

Factor of safety.

The ratio of the ultimate bearing capacity to the intensity of the applied bearing pressure or the ratio of the ultimate load to the applied load.

Definition of geotechnical terms used in this report – road pavements

The following definitions are based on Transport and Road Research Laboratory (TRRL) Report LR1132.

Equilibrium CBR values.

A prediction of the CBR value, which will be attained at formation level under the completed pavement.

Thin pavement.

A thin pavement (which includes both bound and unbound pavement construction materials) is 300mm thick (very lightly trafficked road) and a thick pavement is 1200mm thick (typical of motorway construction).

Definition of geo-environmental terms used in this report

Conceptual model

Textual and/or schematic hypothesis of the nature and sources of contamination, potential migration pathways (including description of the ground and groundwater) and potential receptors, developed on the basis of the information obtained from the investigatory process.

Contamination

Presence of a substance which is in, on or under land, and which has the potential to cause harm or to cause pollution of controlled water.

Controlled water

Inland freshwater (any lake, pond or watercourse above the freshwater limit), water contained in underground strata and any coastal water between the limit of highest tide or the freshwater line to the three mile limit of territorial waters.

Harm

Adverse effect on the health of living organisms, or other interference with ecological systems of which they form part, and, in the case of humans, including property.

Pathway

Mechanism or route by which a contaminant comes into contact with, or otherwise affects, a receptor.

Receptor

Persons, living organisms, ecological systems, controlled waters, atmosphere, structures and utilities that could be adversely affected by the contaminant(s).

Risk

Probability of the occurrence of, and magnitude of the consequences of, an unwanted adverse effect on a receptor.

Risk assessment

Process of establishing, to the extent possible, the existence, nature and significance of risk.

Definition of environmental risk/hazard terms used in this report

Based on CIRIA report C552 '*Contaminated land risk assessment – A guide to good practice*'.

Potential hazard severity definition

Category	Definition
Severe	Acute risks to human health, catastrophic damage to buildings/property, major pollution of controlled waters
Medium	Chronic risk to human health, pollution of sensitive controlled waters, significant effects on sensitive ecosystems or species, significant damage to buildings or structures
Mild	Pollution of non-sensitive waters, minor damage to buildings or structures
Minor	Requirement for protective equipment during site works to mitigate health effects, damage to non-sensitive ecosystems or species

Probability of risk definition

Category	Definition
High likelihood	Pollutant linkage may be present, and risk is almost certain to occur in long term, or there is evidence of harm to the receptor
Likely	Pollutant linkage may be present, and it is probable that the risk will occur over the long term
Low likelihood	Pollutant linkage may be present, and there is a possibility of the risk occurring, although there is no certainty that it will do so
Unlikely	Pollutant linkage may be present, but the circumstances under which harm would occur are improbable

Level of risk for potential hazard definition

Probability of risk	Potential severity			
	Severe	Medium	Mild	Minor
High likelihood	Very high	High	Moderate	Low/Moderate
Likely	High	Moderate	Low/Moderate	Low
Low likelihood	Moderate	Low/Moderate	Low	Very low
Unlikely	Low/Moderate	Low	Very low	Very low

See below for definitions of 'very high' to 'very low'

Definition of environmental risk/hazard terms used in this report

Based on CIRIA report C552 '*Contaminated land risk assessment – A guide to good practice*'.

Risk classifications and likely action required:

Very high risk

High probability that severe harm could arise to a designated receptor from an identified hazard OR there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised is likely to result in substantial liability. Urgent investigation and remediation are likely to be required.

High risk

Harm is likely to arise to a designated receptor from an identified hazard. This risk, if realised, is likely to result in substantial liability. Urgent investigation is required and remedial works may be necessary in the short term and are likely over the long term.

Moderate risk

It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is likely that the harm would be relatively mild. Investigation is normally required to clarify risks and to determine potential liability. Some remedial works may be required in the long term.

Low risk

It is possible that harm could arise to a designated receptor from an identified hazard but it is likely that this harm, if realised, would at worst normally be mild.

Very low risk

It is a low possibility that harm could arise to a designated receptor. On the event of such harm being realised it is not likely to be severe.

List of documents used in assessment of chemical contamination

No.	Title	Publication reference / publisher
1	Human health toxicological assessment of contaminants in soil	EA Science Report – SC050021/SR2
2	Updated technical background to the CLEA model	EA Science Report – SC050021/SR3
3	CLEA Software (Version 1.03 beta) Handbook	EA Science Report - SC050021/SR4
4	Guidance on comparing Soil Contamination Data with a Critical Concentration	CIEH
5	The LQM/CIEH S4ULs for Human Health Risk Assessment (2015)	LQM/CIEH
6	Assessment of Risks to Human Health from Land Contamination: An overview of the development of soil guideline values and related research	R&D Publication, Contaminated Land Report CLR 7
7	Contaminants of Soil: Collation of Toxicological Data and Intake Values for Humans	R&D Publication, Contaminated Land Report CLR 9
8	The Contaminated Land Exposure Assessment Model (CLEA): Technical Basis and Algorithms	R&D Publication, Contaminated Land Report CLR 10
9	Model Procedures for the Management of Land Contamination	R&D Publication, Contaminated Land Report CLR 11
10	Contaminants in Soil: Collection of Toxicological Data and Intake Values for Human Values	R&D Publications, Tox. 6
11	Soil Guideline Values for Contamination (2002)	R&D Publications, SGV 10
12	Soil Guideline Values (2009)	EA Science Reports – SC050021
13	Atkins ATRISK ^{SOIL} (2011)	http://www.atrisksoil.co.uk
14	Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination (September 2014)	CL:AIRE

CIEH	Chartered institute of Environmental Health
LQM	Land Quality Management
EA	Environment Agency
CL:AIRE	Contaminated Land: Applications in Real Environments

Testing suite summary

Table summarising testing suites		
Suite	Parameters	Medium
Suite 1	Arsenic, beryllium, boron, cadmium, chromium (total and VI), copper, lead, mercury, nickel, selenium, vanadium zinc, cyanide (free, total and complex), organic matter content, PAH (16 speciated), pH, phenol (total), TOC	Soil
Suite 2	Arsenic, boron (water soluble), beryllium, cadmium, chromium (total), copper, lead, mercury, nickel, selenium, vanadium, zinc, cyanide (free, total and complex, PAH (16 speciated), pH, phenol (total), sulfate (water soluble), sulfide, nitrate	Leachate
Suite 3	Arsenic, boron (water soluble), beryllium, cadmium, chromium (total), copper, lead, mercury, nickel, selenium, vanadium, zinc, cyanide (free, total and complex, PAH (16 speciated), pH, phenol (total), sulfate (water soluble), sulfide, nitrate	Water
Suite 4	TPH Texas Banding Aliphatic/Aromatic Split, BTEX, MTBE, PAH (16 speciated), organic matter	Soil
Suite 5	TPH Texas Banding Aliphatic/Aromatic Split, BTEX, MTBE, PAH (16 speciated)	Leachate
Suite 6	TPH Texas Banding Aliphatic/Aromatic Split, BTEX, MTBE, PAH (16 speciated)	Water
Suite 7	TPH Texas Banding Aliphatic/Aromatic Split, BTEX, TOC, organic matter	Soil
Suite 8	Sulphur (total), sulphate (water and acid soluble), pH	Soil
Suite 9	Sulphate, ammoniacal nitrogen, dissolved magnesium, pH	Water
Suite 10	VOC, SVOC, TOC, organic matter	Soil
Suite 11	VOC, SVOC	Leachate
Suite 12	VOC, SVOC	Water
Suite 13	Organotins dibutyltin/ tributyl-tin/tetrabutyltin/triphenyl-tin, tetraethyl-lead/tetramethyl-lead	Soil
Suite 14	Organotin	Leachate
Suite 15	Organotin	Water
Suite 16	TPH Texas Banding Aliphatic/Aromatic Split, BTEX, VOC, SVOC	Soil, water, leachate
Suite 17	TPH Texas Banding Aliphatic/Aromatic Split, BTEX, SVOC, VOC, arsenic, boron (water soluble), beryllium, cadmium, chromium (total), copper, lead, mercury, nickel, selenium, vanadium, zinc, cyanide (free, total and complex, pH, phenol (total), sulfate (water soluble), sulfide, nitrate	Soil, water, leachate
Concrete BRE suite	pH, sulphate (water and acid soluble), magnesium (water soluble), ammonia (water soluble), chloride, nitrate	Soil

Table summarising Standard Penetration Test (SPT) results

Location	Start Depth (m)	Penetration (mm)					
		Seating 1-2	Main 1-4	Total Seating	Total Main	Total Seating	Total Main
BH01	1.20	1/2	3/2/2/2	3	9	150	300
BH01	2.00	10/19	50	29	50	150	20
BH01	3.00	1/1	2/2/3/2	2	9	150	300
BH01	4.00	1/1	2/3/3/3	2	11	150	300
BH01	6.50	1/3	4/4/5/5	4	18	150	300
BH01	9.50	1/1	2/2/6/6	2	16	150	300
BH01	12.50	1/3	4/6/6/7	4	23	150	300
BH01	15.50	2/3	4/4/7/7	5	22	150	300
BH01	18.50	2/3	6/6/8/9	5	29	150	300
BH01	21.50	3/5	6/8/9/10	8	33	150	300
BH01	24.50	4/6	7/9/10/11	10	37	150	300
BH02	1.50	1/1	2/3/3/3	2	11	150	300
BH02	5.50	2/3	4/5/5/6	5	20	150	300
BH02	9.50	2/4	5/5/6/7	6	23	150	300
BH03	1.80	1/1	2/2/3/3	2	10	150	300
BH03	3.50	2/2	3/3/4/5	4	15	150	300
BH03	7.50	2/3	4/5/6/7	5	22	150	300
BH03	9.50	3/3	4/5/7/7	6	23	150	300
BH04	2.00	1/1	2/2/3/3	2	10	150	300
BH04	4.00	2/3	4/4/4/5	5	17	150	300
BH04	6.00	2/3	4/4/5/5	5	18	150	300
BH04	8.00	3/4	5/5/6/8	7	24	150	300
BH05	2.00	1/1	2/2/2/3	2	9	150	300
BH05	3.00	1/1	1/2/3/3	2	9	150	300
BH05	4.00	1/1	2/3/3/5	2	13	150	300
BH05	5.00	1/1	3/3/4/4	2	14	150	300
BH05	6.50	1/2	3/4/5/5	3	17	150	300
BH05	8.00	2/3	3/4/4/6	5	17	150	300
BH06	1.20	1/2	4/5/5/5	3	19	150	300
BH06	2.00	1/1	2/2/2/2	2	8	150	300
BH06	4.00	1/1	2/3/3/5	2	13	150	300
BH06	6.50	1/3	3/4/4/5	4	16	150	300
BH06	9.50	1/3	3/4/6/6	4	19	150	300
BH06	12.50	1/2	3/4/6/6	3	19	150	300
BH06	15.50	2/4	5/6/7/8	6	26	150	300
BH06	18.50	3/5	7/8/10/10	8	35	150	300
BH06	21.50	3/6	7/8/8/11	9	34	150	300
BH06	24.50	4/5	7/8/10/11	9	36	150	300

Table summarising Pocket Penetrometer results

* Signifies that instrument limit reached.

Location	Start Depth (m)	Results 1-3	Average	Undrained Shear Strength (kN/m ²)
BH01	4.00	1.5/1.5/1.25	1.42	71
BH01	5.00	2/2/1.75	1.92	96
BH01	5.50	2/2/2	2.00	100
BH01	6.50	2/2/2	2.00	100
BH01	7.50	3/3/3	3.00	150
BH01	8.50	3.5/3.5/3.5	3.50	175
BH01	9.50	3.75/4/4	3.92	196
BH01	10.50	4/4.25/4.25	4.17	208
BH01	11.50	4.25/4.25/4.5	4.33	217
BH01	12.50	4.5/4.5/4.5	4.50	225
BH01	13.50	4.5/4.5/4.5	4.50	225
BH01	14.50	4.5/4.5/4.5	4.50	225
BH01	15.50	4.5/4.5/4.5	4.50	225
BH01	16.50	4.5/4.5/4.5	4.50	225
BH01	17.50	4.5/4.5/4.5	4.50	225
BH02	0.10	0.5/0.5/0.5	0.50	25
BH02	0.40	0.5/0.5/0.5	0.50	25
BH02	0.70	0.5/0.5/0.5	0.50	25
BH02	1.00	0.5/0.5/0.75	0.58	29
BH02	1.20	0.75/0.5/0.75	0.67	33
BH02	2.00	1/1.5/1.5	1.33	67
BH02	2.50	2/2/2	2.00	100
BH02	3.00	3/3/3	3.00	150
BH02	3.50	3/3.75/3.75	3.50	175
BH02	4.00	3.75/4/4	3.92	196
BH02	4.50	4/4/4	4.00	200
BH02	5.00	4/4/4	4.00	200
BH02	5.50	4/3.75/4.25	4.00	200
BH02	6.00	4.25/4.5/4.5	4.42	221
BH02	6.50	4.5/4.5/4.5	4.50	225
BH02	7.00	4.5/4.5/4.5	4.50	225
BH02	7.50	4.5/4.5/4.5	4.50	225
BH02	8.00	4.5/4.5/4.5	4.50	225
BH02	8.50	4.5/4.5/4.5	4.50	225
BH02	9.00	4.5/4.5/4.5	4.50	225
BH02	9.50	4.5/4.5/4.5	4.50	225
BH02	10.00	4.5/4.5/4.5	4.50	225
BH03	0.50	0.5/1/0.5	0.67	33

Table summarising Pocket Penetrometer results

* Signifies that instrument limit reached.

Location	Start Depth (m)	Results 1-3	Average	Undrained Shear Strength (kN/m ²)
BH03	1.00	0.75/0.75/0.75	0.75	38
BH03	1.50	1/1/1.25	1.08	54
BH03	2.00	1/1.2/1.25	1.15	58
BH03	2.50	1.25/1.75/1.5	1.50	75
BH03	3.00	2/1.75/1.75	1.83	92
BH03	3.50	2/2/2	2.00	100
BH03	4.00	2.5/2.5/2.25	2.42	121
BH03	4.50	2.25/2.5/2.5	2.42	121
BH03	5.00	2.5/2.5/2.5	2.50	125
BH03	5.50	3.5/3.5/3	3.33	167
BH03	6.00	3.75/4/4.25	4.00	200
BH03	6.50	4.25/4.5/4.5	4.42	221
BH03	7.00	4.5/4.5/4.5	4.50	225
BH03	7.50	4.5/4.5/4.5	4.50	225
BH03	8.00	4.5/4.5/4.5	4.50	225
BH03	8.50	4.5/4.5/4.5	4.50	225
BH03	9.00	4.5/4.5/4.5	4.50	225
BH03	9.50	4.5/4.5/4.5	4.50	225
BH03	10.00	4.5/4.5/4.5	4.50	225
BH04	1.00	0.75/1/1	0.92	46
BH04	1.50	1/1/1	1.00	50
BH04	2.00	1/1.25/1	1.08	54
BH04	2.50	1.25/1.75/1.5	1.50	75
BH04	3.00	2/2.5/2.25	2.25	113
BH04	3.50	3/3/3	3.00	150
BH04	4.00	3/3/3	3.00	150
BH04	4.50	3.5/3.75/3.75	3.67	183
BH04	5.00	4/4/4	4.00	200
BH04	5.50	4/3.75/4.25	4.00	200
BH04	6.00	4/4/4	4.00	200
BH04	6.50	4.5/4.5/4	4.33	217
BH04	7.00	4.5/4.5/4.5	4.50	225
BH04	7.50	4.5/4.5/4.5	4.50	225
BH04	8.00	4.5/4.5/4.5	4.50	225
BH04	8.50	4.5/4.5/4.5	4.50	225
BH04	9.00	4.5/4.5/4.5	4.50	225
BH04	9.50	4.5/4.5/4.5	4.50	225
BH04	10.00	4.5/4.5/4.5	4.50	225

Table summarising Pocket Penetrometer results

* Signifies that instrument limit reached.

Location	Start Depth (m)	Results 1-3	Average	Undrained Shear Strength (kN/m ²)
BH05	0.70	1.5/1.25/1.5	1.42	71
BH05	1.10	1.25/1.5/1.25	1.33	67
BH05	1.20	0.5/0.5/0.75	0.58	29
BH05	1.70	1.25/1.25/1.5	1.33	67
BH05	2.00	1.75/1.75/1.75	1.75	88
BH05	2.50	1.75/2/2.25	2.00	100
BH05	3.00	2.25/2.5/2.5	2.42	121
BH05	4.00	2.25/2.5/2.5	2.42	121
BH05	5.00	1.5/1.75/1.75	1.67	83
BH05	5.80	2.25/2.25/2.5	2.33	117
BH05	6.00	2.5/2.5/2.5	2.50	125
BH05	6.50	2.5/2.5/2.5	2.50	125
BH05	8.00	2.5/2.5/2.5	2.50	125
BH05	9.00	2.5/2.5/2.5	2.50	125
BH05	9.50	2.5/2.75/2.75	2.67	133
BH05	10.00	2.75/2.5/2.75	2.67	133
BH06	1.00	0.5/0.5/0.5	0.50	25
BH06	1.50	0.5/0.5/0.5	0.50	25
BH06	1.80	2/1.75/2	1.92	96
BH06	2.00	1.5/2.5/1	1.67	83
BH06	3.00	2/2.25/2.25	2.17	108
BH06	3.50	2.5/2.5/2.5	2.50	125
BH06	4.00	2.5/2.5/2.5	2.50	125
BH06	5.00	2.75/2.5/2.75	2.67	133
BH06	5.50	3/3/3	3.00	150
BH06	6.50	3/3.25/3	3.08	154
BH06	8.50	3.5/3.5/3.5	3.50	175
BH06	9.50	3.5/3.5/3.5	3.50	175
BH06	10.50	3.5/3.5/3.5	3.50	175
BH06	11.50	3.5/3.75/3.75	3.67	183
BH06	12.50	3.75/4/4	3.92	196
BH06	13.50	4/4/4	4.00	200
BH06	14.50	4.5/4.5/4.5	4.50	225
BH06	15.50	4.5/4.5/4.5	4.50	225
BH06	16.50	4.5/4.5/4.5	4.50	225
BH06	17.50	4.5/4.5/4.5	4.50	225
BH06	18.50	4.5/4.5/4.5	4.50	225
BH06	19.50	4.5/4.5/4.5	4.50	225

Table summarising Pocket Penetrometer results

* Signifies that instrument limit reached.

Location	Start Depth (m)	Results 1-3	Average	Undrained Shear Strength (kN/m ²)
BH06	20.50	4.5/4.5/4.5	4.50	225
BH06	21.50	4.5/4.5/4.5	4.50	225
BH06	22.50	4.5/4.5/4.5	4.50	225
BH06	23.50	4.5/4.5/4.5	4.50	225
BH06	24.50	4.5/4.5/4.5	4.50	225

Key to legends

Composite materials, soils and lithology					
	Topsoil		Made Ground		Boulders
	Clay		Coal		Cobbles
	Gravel		Limestone		Mudstone
	Sand		Sandstone		Silt
					Siltstone

Note: Composite soil types are signified by combined symbols.

Key to 'test results' and 'sampling' columns

Test result		Sampling	
Depth	Records depth that the test was carried out (i.e.: at 2.10m or between 2.10m and 2.55m)	From (m) To (m)	Records depth of sampling
	PP – Pocket penetrometer result reported as an equivalent undrained shear strength (kN/m ²) by applying a factor of 50.		D Disturbed sample
			B Bulk disturbed sample
			ES Environmental sample
Result	SV – Hand held shear vane result reported as an undrained shear strength (kN/m ²). Where multiple readings are taken at the same level the average value is shown on the log. * Signifies that instrument limit reached.	Type	W Water sample
			U Undisturbed thick-walled sample 100mm diameter sampler
			UT Undisturbed thin walled sample 100mm diameter sampler
			UTF Failed undisturbed sample

Water observations

Described at foot of log and shown in the 'water strike' column.

▼ Water level observed after specified delay in drilling

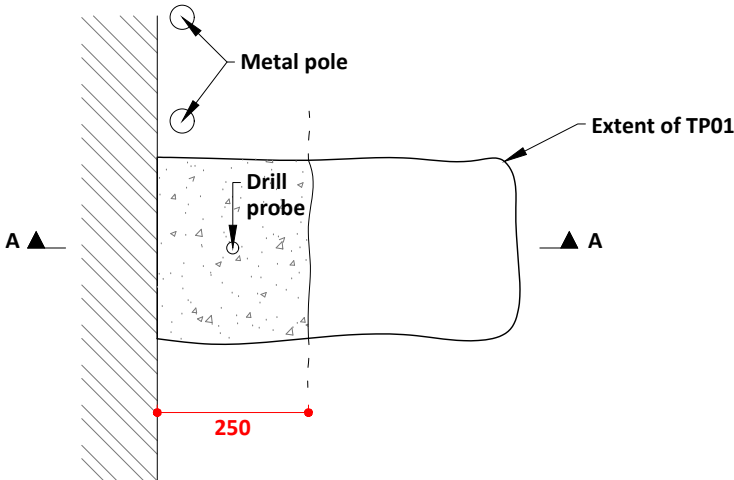
∇ Water strike

Density

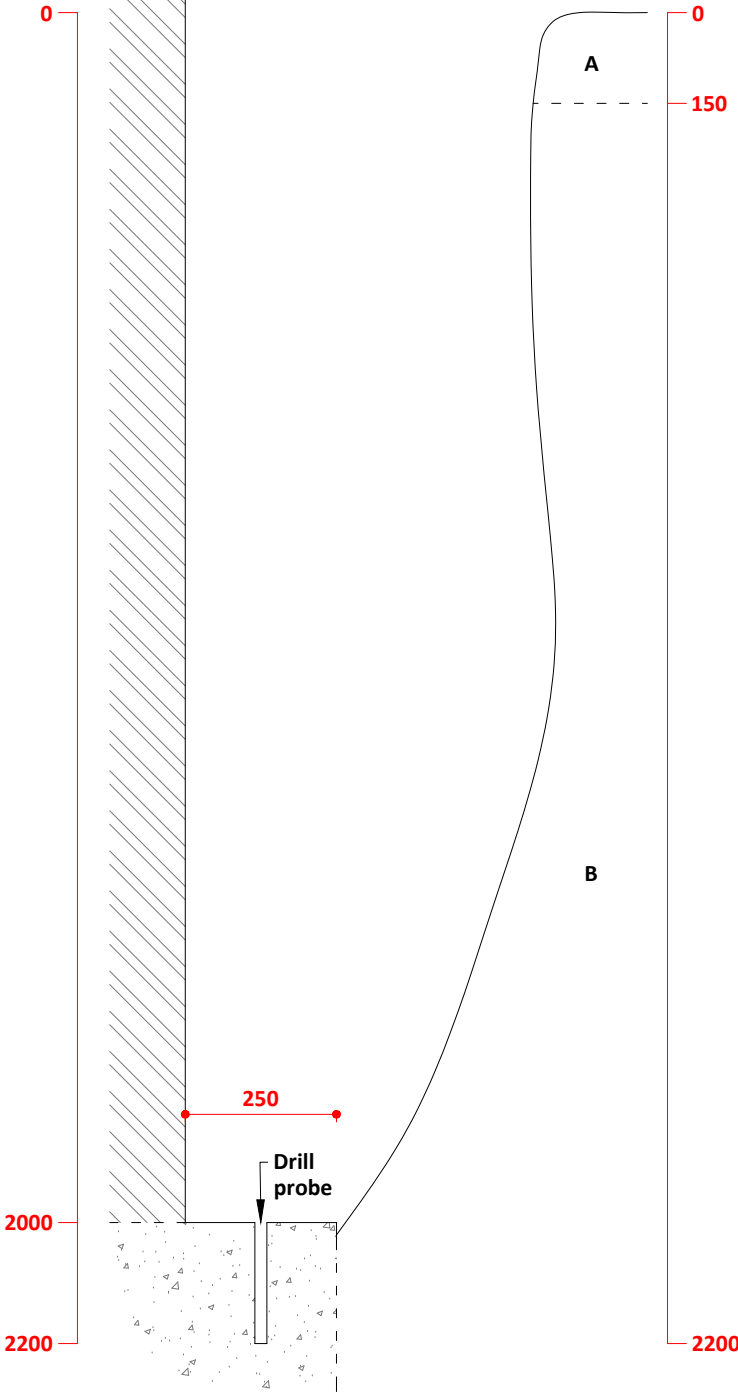
Density recorded in brackets determined by qualitative field assessment or inferred from density testing and soil descriptions from across the site (i.e.: [Medium dense]).



Plan



Section A-A



Photographic record



Key

- A. Grass onto dark brown slightly sandy slightly gravelly CLAY. Gravel is rounded to subangular flint and brick (MADE GROUND)
- B. Soft greyish brown gravelly CLAY with frequent cobbles of concrete and brick and fragments of timber and plastic. Gravel is brick, concrete, ash and flint. (MADE GROUND)

— Observed features
- - - - Assumed features

 Denotes brickwork
 Denotes concrete

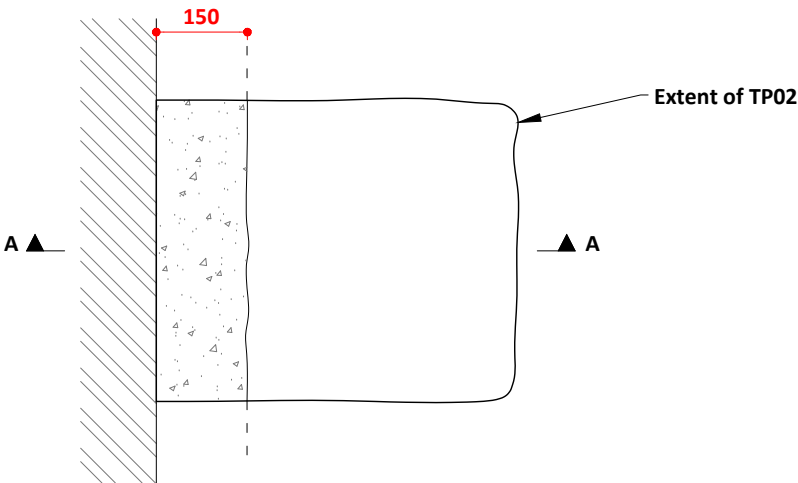
Notes

1. All dimensions shown in millimetres
2. Environmental samples taken from 0.5m and 1.2m depths
3. Trial pit sides remained upright and stable

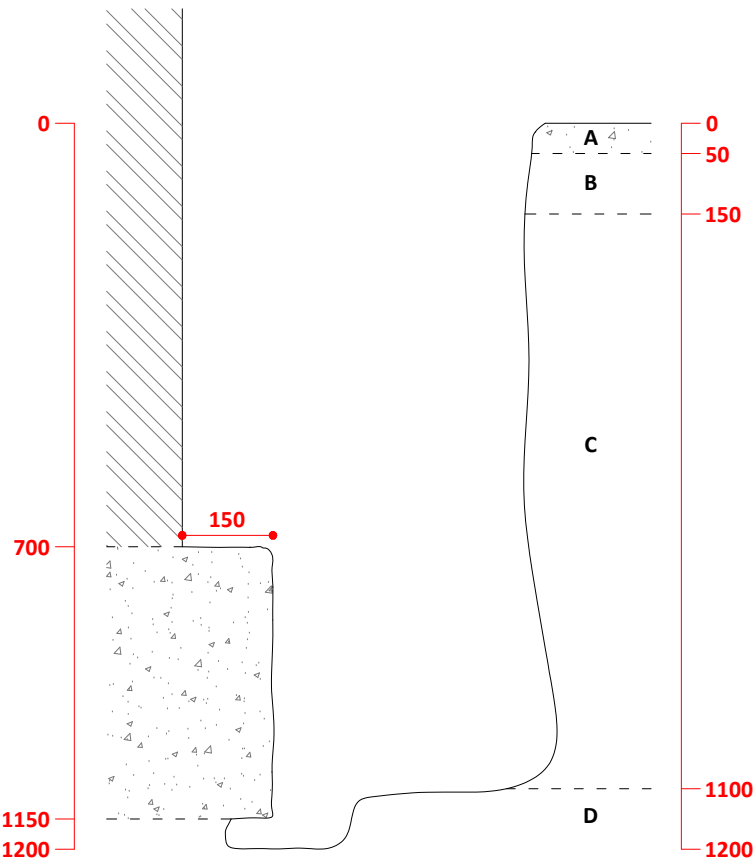
Method of excavation	Title	Location reference
Hand tools	Trial pit record	TP01
Dimensions	Date of works	Location plan on drawing number
As shown	14.12.2020	02
Groundwater observations	Scale	Appendix
No groundwater observed	1:12.5 at A3	D



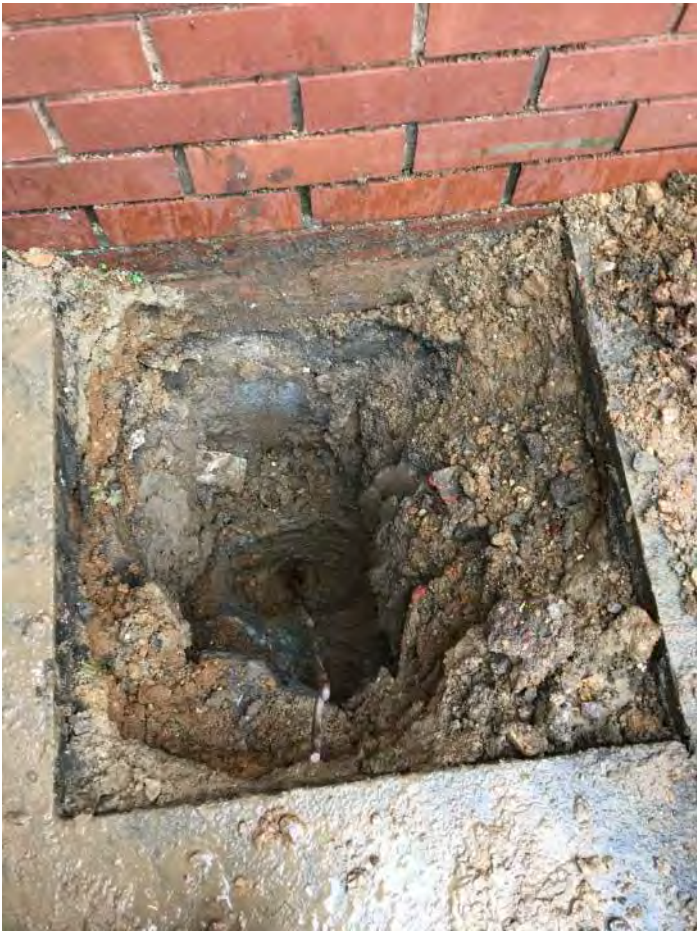
Plan



Section A-A



Photographic record



Key

- A. Paving Slabs (MADE GROUND)
- B. Yellow brown gravelly fine to coarse SAND. Gravel is rounded to subangular flint (MADE GROUND)
- C. Grey brown slightly sandy slightly gravelly CLAY with frequent cobbles of concrete and brick. Gravel is concrete, flint, brick, granite and ash. (MADE GROUND)
- D. Soft brown and grey CLAY (LONDON CLAY FORMATION)

——— Observed features
- - - - - Assumed features

 Denotes brickwork
 Denotes concrete

Notes

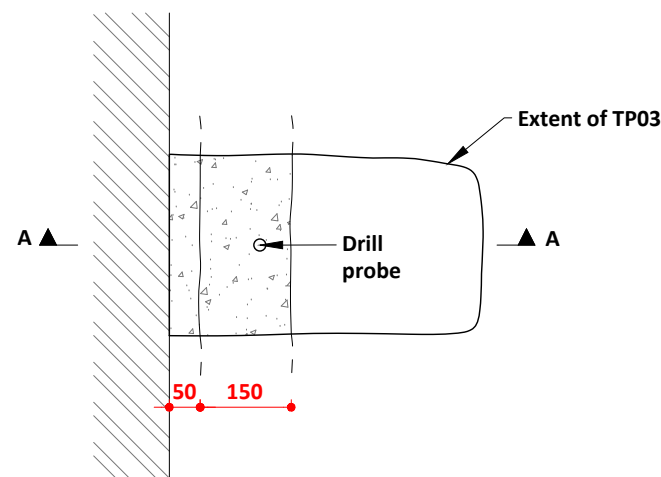
1. All dimensions shown in millimetres
2. Environmental samples taken from 0.5m - 1.0m depths
3. Trial pit sides remained upright and stable

Method of excavation
Hand tools
Dimensions
As shown
Groundwater observations
No groundwater observed

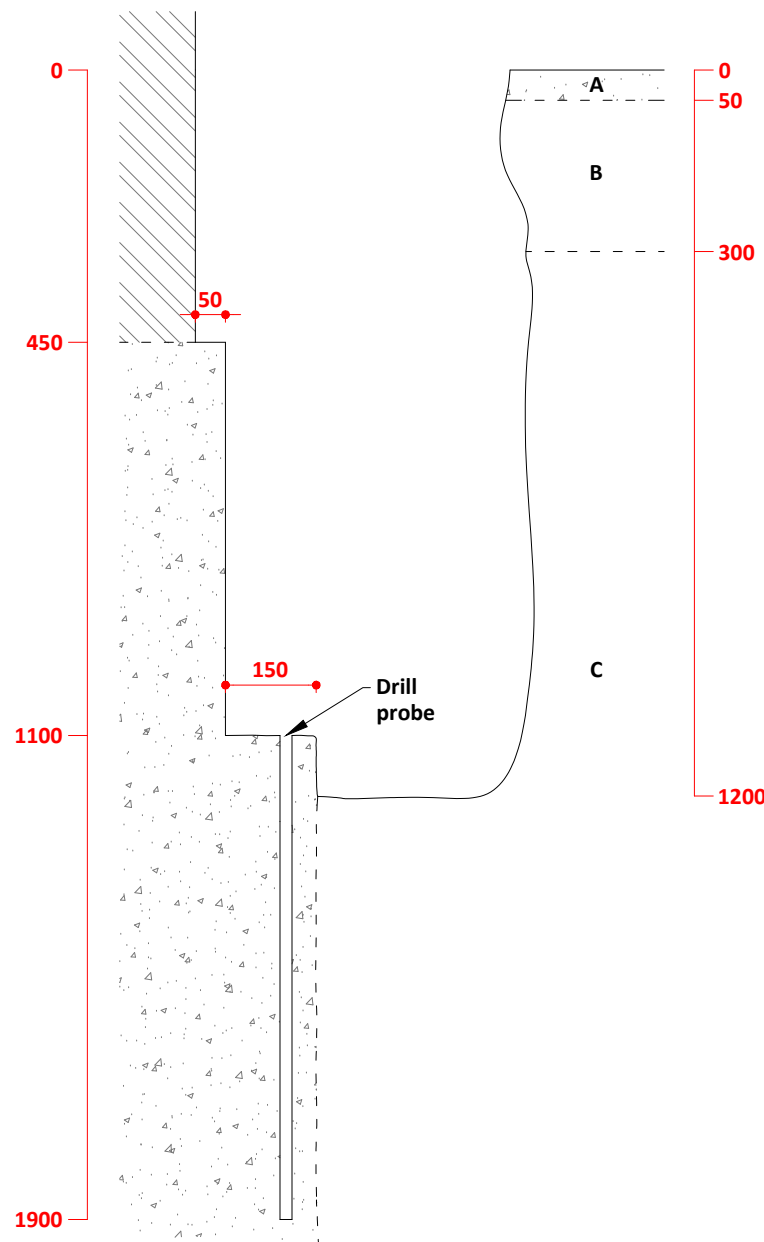
Title	Location reference
Trial pit record	TP02
Date of works	Location plan on drawing number
14.12.2020	02
Scale	Appendix
1:12.5 at A3	D



Plan



Section A-A



Photographic record



Key

- A. CONCRETE SLAB.
(MADE GROUND)
- B. Dark brown gravelly clayey SAND with fine rootlets throughout. Gravel is flint.
(TOPSOIL)
- C. Firm brown sandy gravelly CLAY with frequent cobbles of brick and fine rootlets
throughout. Gravel is concrete, brick and flint.
(MADE GROUND)

Observed features
Assumed features

Denotes
brickwork

Denotes
concrete

Notes

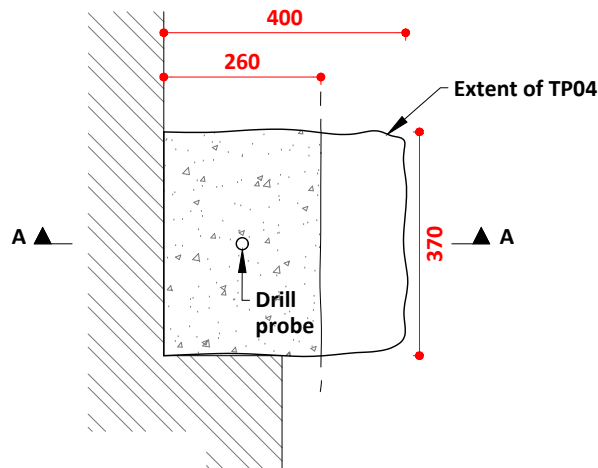
- All dimensions shown in millimetres
- Environmental samples taken from 0.2m, 0.4m, 0.6m, 0.8m and 1.0m depths
- Disturbed sample taken from 1.2m depth
- Pocket penetrometer testing:
 - 0.6m - 29kPa
 - 0.8m - 46kPa
 - 1.0m - 25kPa
 - 1.2m - 33kPa
- Drill probe from 1.1m depth to 1.9m below ground level, did not penetrate foundation
- Trial pit sides remained upright and stable

Method of excavation
Hand tools
Dimensions
As shown
Groundwater observations
No groundwater observed

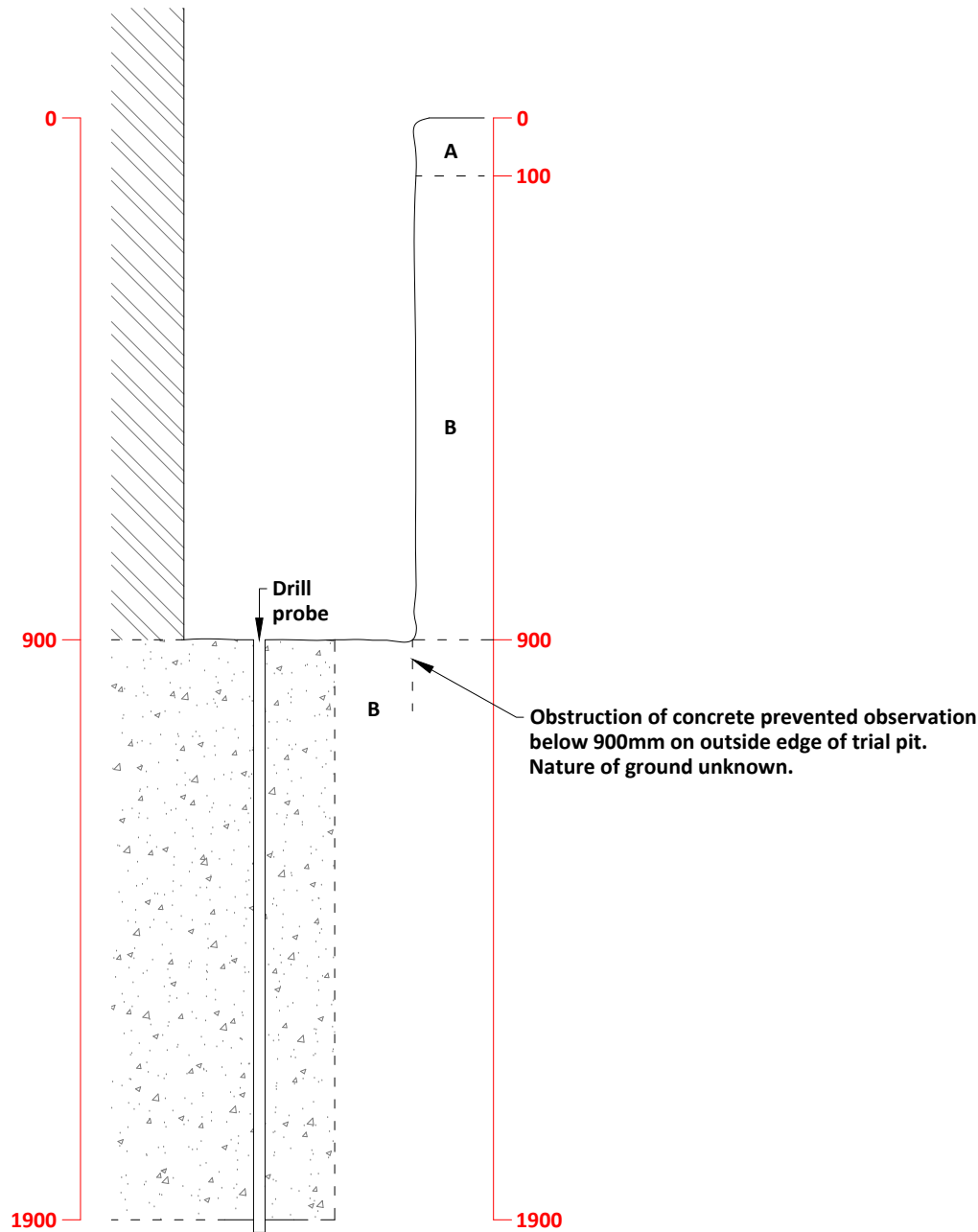
Title
Trial pit record
Date of works
16.12.2020
Scale
1:12.5 at A3
Location reference
TP03
Location plan on drawing number
02
Appendix
D



Plan



Section A-A



Photographic record



Key

- A. ASPHALT.
(MADE GROUND)
- B. Light brown sandy gravelly CLAY with occasional cobbles of brick throughout. Gravel is brick and igneous rock.
(MADE GROUND)

- Observed features
- - - Assumed features

- Denotes brickwork
- Denotes concrete

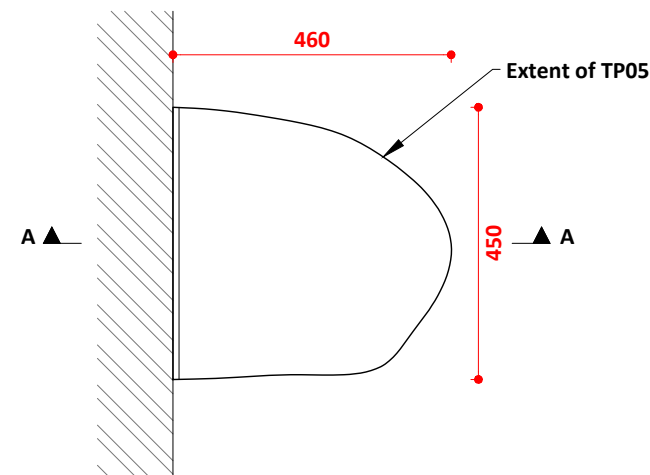
Notes

- All dimensions shown in millimetres
- Environmental samples taken from 0.2m, 0.5m, 0.7m and 0.9m depths
- Pocket penetrometer testing:
 - 0.7m - 38kPa
 - 0.8m - 38kPa
 - 0.9m - 25kPa
- Base of foundation encountered at 1.9m depth
- Trial pit sides remained upright and stable

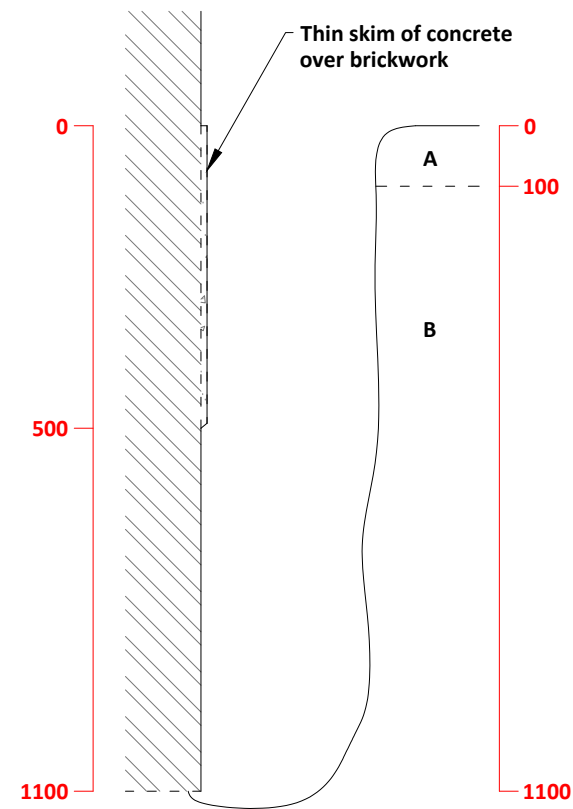
Method of excavation	Title	Location reference
Hand tools	Trial pit record	TP04
Dimensions	Date of works	Location plan on drawing number
As shown	16.12.2020	02
Groundwater observations	Scale	Appendix
No groundwater observed	1:12.5 at A3	D



Plan



Section A-A



Photographic record



Key

- A. ASPHALT.
(MADE GROUND)
- B. Firm light brown sandy gravelly CLAY. Gravel is brick and igneous rock.
(MADE GROUND)

— — — — — Observed features
- - - - - Assumed features

 Denotes brickwork
 Denotes concrete

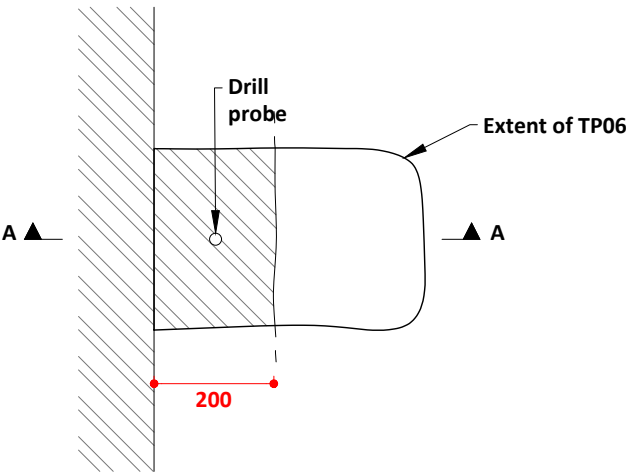
Notes

- All dimensions shown in millimetres
- Environmental samples taken from 0.2m, 0.4m, 0.6m, 0.8m and 0.9m depths
- Pocket penetrometer testing:
 - 0.6m - 21kPa
 - 0.7m - 25kPa
 - 0.8m - 25kPa
 - 0.9m - 29kPa
 - 1.0m - 33kPa
 - 1.1m - 33kPa
- Trial pit sides remained upright and stable

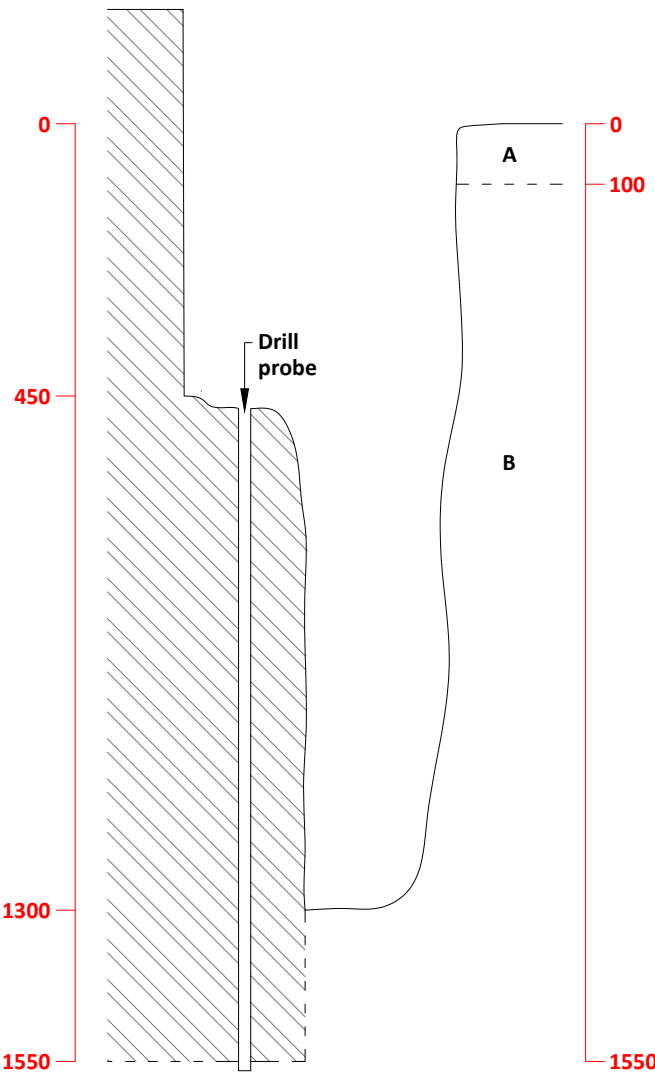
Method of excavation	Title	Location reference
Hand tools	Trial pit record	TP05
Dimensions	Date of works	Location plan on drawing number
As shown	16.12.2020	02
Groundwater observations	Scale	Appendix
Groundwater seepage at 1.1m depth	1:12.5 at A3	D



Plan



Section A-A



Photographic record



Key

- A. ASPHALT.
(MADE GROUND)
- B. Firm brown sandy gravelly CLAY. Gravel is brick, flint and bituminous coated material.
(MADE GROUND)

——— Observed features
- - - - Assumed features

 Denotes brickwork
 Denotes concrete

Notes

1. All dimensions shown in millimetres
2. Environmental samples taken from 0.2m, 0.4m, 0.6m, 0.8m, 1.0m and 1.2m depths
3. Pocket penetrometer testing:
 - 0.5m - 25kPa
 - 0.7m - 29kPa
 - 0.9m - 38kPa
 - 1.0m - 38kPa
 - 1.2m - 42kPa
4. Base of foundation encountered at 1.55m depth
5. Trial pit sides remained upright and stable

Method of excavation	Title	Location reference
Hand tools	Trial pit record	TP06
Dimensions	Date of works	Location plan on drawing number
As shown	16.12.2020	02
Groundwater observations	Scale	Appendix
No groundwater observed	1:12.5 at A3	D

Key to legends

Composite materials, soils and lithology							
	Topsoil		Made Ground		Boulders		Chalk
	Clay		Coal		Cobbles		Concrete
	Gravel		Limestone		Mudstone		Peat
	Sand		Sandstone		Silt		Siltstone

Note: Composite soil types are signified by combined symbols.

Key to 'test results' and 'sampling' columns

Test result		Sampling	
Depth	Records depth that the test was carried out (i.e.: at 2.10m or between 2.10m and 2.55m)	From (m) To (m)	Records depth of sampling
Result	PP – Pocket penetrometer result reported as an equivalent undrained shear strength (kN/m ²) by applying a factor of 50.		D Disturbed sample
	SV – Hand held shear vane result reported as an undrained shear strength (kN/m ²). Where multiple readings are taken at the same level the average value is shown on the log. * Signifies that instrument limit reached.		B Bulk disturbed sample
			ES Environmental sample
		Type	W Water sample
	SPT – Standard Penetration Test result (N value) (uncorrected) ^{1,2,3} SPT(c) – Standard Penetration Test result (solid cone) (N value) (uncorrected) ^{1,2,3}		U Undisturbed thick-walled sample 100mm diameter sampler
	UT – Undisturbed sample 100mm diameter sampler with number of blows of driving equipment required to obtain sample		UT Undisturbed thin walled sample 100mm diameter sampler
			UTF Failed undisturbed sample

Note 1: Seating blows recorded in brackets.

Note 2: Casing depth records depth of casing when SPT or SPT(c) was carried out.

Note 3: Water depth records depth of water when SPT or SPT(c) was carried out.

Water observations

Described at foot of log and shown in the 'water strike' column.

- Water level observed after specified delay in drilling
- Water strike

Installation details

	Gravel filter		Bentonite
	Slotted pipe		Unslotted pipe
	Arisings		Grout
	Extensometer magnet		Vibrating wire piezometer

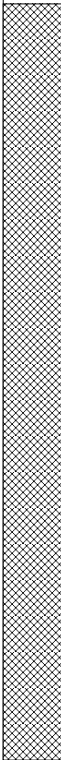
Density

Density recorded in brackets determined by qualitative field assessment or inferred from density testing and soil descriptions from across the site (i.e.: [Medium dense]).

INSTALL	STRATA				WATER STRIKES	SPT TESTING				OTHER IN SITU TESTING		SAMPLING					
	DESCRIPTION	DEPTH (m)	REDUCED LVL (m OD)	LEGEND		TYPE / DEPTH (m)	RESULT	CASING DEPTH (m)	WATER LEVEL (m)	TYPE / DEPTH (m)	RESULT	FROM (m)	TO (m)	TYPE			
	Light grey reinforced CONCRETE with aggregates of flint. 6mm plain reinforcement located at 100mm depth. (MADE GROUND)	0.15	94.15									0.25		ES			
	Medium dense brown gravelly SAND with some cobbles of brick and concrete. Gravel of brick, concrete and igneous rock. (MADE GROUND)	0.50	93.80									0.40		ES			
	Firm brown sandy gravelly CLAY. Gravel of concrete, brick and flint. (MADE GROUND)					C 1.20 - 1.65	(3) 9	1.20	DRY			0.50	0.70	D			
						C 2.00 - 2.17	(29) 50/20mm	1.70	DRY			0.60		B			
												0.80		ES			
												1.00		ES			
	Firm brown mottled grey CLAY. (LONDON CLAY FORMATION)	3.30	91.00			C 3.00 - 3.45	(2) 9	1.70	DRY			1.00	0.00	D			
												1.20		ES			
						S 4.00 - 4.45	(2) 11	1.70	DRY	PP 4.00	PP=71	1.20		ES			
												1.70		B			
	Firm to stiff bluish dark grey CLAY. (LONDON CLAY FORMATION)	5.50	88.80			S 6.50 - 6.95	(4) 18	1.70	DRY	PP 6.50	PP=100	2.00	2.50	D			
												2.00		D			
												3.00		D			
												3.30		D			
						S 9.50 - 9.95	(2) 16	1.70	DRY	PP 9.50	PP=196	3.50	4.00	B			
												4.00		D			
												5.00		D			
												5.00		UT			
						S 12.50 - 12.95	(4) 23	1.70	DRY	PP 12.50	PP=225	5.50	12.50	D			
						S 9.50 - 9.95	(2) 16	1.70	DRY	PP 9.50	PP=196	5.00	9.50	D			
												5.00		D			
												5.00		UT			
												5.50		D			
S 12.50 - 12.95	(4) 23	1.70	DRY	PP 12.50	PP=225	5.50	12.50	D									

CONTINUED ON NEXT SHEET

Notes Inspection pit excavated to 1.2m depth.	Chiselling details		Drilling details		Title		Date(s)
	Depth (m)	Duration (hh:mm)	Diameter	Base depth (m)	Borehole record		17/12/2020 - 18/12/2020
			150	25.00	Method	Logged by	Sheet number
Groundwater observations No groundwater encountered.	Water added details		Casing details		Cable tool percussion		RT
	Depth (m)	Water Added (l)	Diameter	Base depth (m)	Level (m OD)		Compiled by
			170	1.70	94.30		JC
					Co-ordinates	Checked by	Revision
					528402mE, 189157mN	KB	BH01

INSTALL	STRATA				WATER STRIKES	SPT TESTING				OTHER IN SITU TESTING		SAMPLING						
	DESCRIPTION	DEPTH (m)	REDUCED LVL (m OD)	LEGEND		TYPE / DEPTH (m)	RESULT	CASING DEPTH (m)	WATER LEVEL (m)	TYPE / DEPTH (m)	RESULT	FROM (m)	TO (m)	TYPE				
						S 15.50 - 15.95	(5) 22	1.70	DRY	PP 13.50	PP=225 UT=100	13.50	0.00	D				
										PP 14.50	PP=225	14.50		D				
						S 15.50 - 15.95	(5) 22	1.70	DRY	PP 15.50	PP=225	15.50	D					
										PP 16.50	PP=225 UT=100	16.50 17.00	D UT					
										PP 17.50	PP=225	17.50	D					
										S 18.50 - 18.95	(5) 29	1.70	DRY		18.50	D		
						19.50	D											
						UT=100	20.00	0.00	UT									
						20.50 20.50	21.00	D B										
						S 21.50 - 21.95	(8) 33	1.70	DRY		21.50	D						
											22.50	D						
											UT=100	23.00	UT					
											23.50	D						
						S 24.50 - 24.95	(10) 37	1.70	DRY			24.50	25.00	D				
						BOREHOLE TERMINATED AT 25.00m		25.00	69.30									

Notes Inspection pit excavated to 1.2m depth.	Chiselling details		Drilling details		Title		Date(s)
	Depth (m)	Duration (hh:mm)	Diameter	Base depth (m)	Borehole record		17/12/2020 - 18/12/2020
			150	25.00	Method Cable tool percussion	Logged by RT	Sheet number Sheet 2 of 2
Groundwater observations No groundwater encountered.	Water added details		Casing details		Level (m OD)	Compiled by	Revision
	Depth (m)	Water Added (l)	Diameter	Base depth (m)	94.30	JC	
			170	1.70	Co-ordinates 528402mE, 189157mN	Checked by KB	BH01

INSTALL	STRATA				WATER STRIKES	SPT TESTING				OTHER IN SITU TESTING		SAMPLING		
	DESCRIPTION	DEPTH (m)	REDUCED LVL (m OD)	LEGEND		TYPE / DEPTH (m)	RESULT	CASING DEPTH (m)	WATER LEVEL (m)	TYPE / DEPTH (m)	RESULT	FROM (m)	TO (m)	TYPE
	Soft to firm brown slightly sandy slightly gravelly CLAY. Gravel of brick and flint. (MADE GROUND)	0.60	94.39			C 1.50 - 1.95	(2) 11	1.50	DRY	PP 0.10	PP=25	0.30		B
	Soft dark brown slightly gravelly sandy CLAY with many fine rootlets throughout. Gravel of brick and flint with fragments of plastic. (MADE GROUND)	0.85	94.14							PP 0.40	PP=25	0.30		ES
	Firm brown mottled grey CLAY. (LONDON CLAY FORMATION)									PP 0.70	PP=25	0.70		B
										PP 1.00	PP=29	0.70		ES
										PP 1.20	PP=33	0.90	1.20	B
										PP 2.00	PP=67	1.20		ES
										PP 2.50	PP=100	1.50		B
										PP 3.00	PP=150	2.50		B
										PP 3.50	PP=175	3.50	3.95	UT
										PP 4.00	PP=196			
										PP 4.50	PP=200	4.50		B
										PP 5.00	PP=200			
										PP 5.50	PP=200	5.50		B
										PP 6.00	PP=221			
										PP 6.50	PP=225	6.50		B
										PP 7.00	PP=225			
										PP 7.50	PP=225	7.50	7.95	B
										PP 8.00	PP=225	7.95		B
										PP 8.50	PP=225	8.50		B
										PP 9.00	PP=225			
										PP 9.50	PP=225	9.50		B
										PP 10.00	PP=225			
	BOREHOLE TERMINATED AT 10.00m	10.00	84.99			C 5.50 - 5.95	(5) 20	1.50	DRY					
						C 9.50 - 9.95	(6) 23	1.50	DRY					

Notes Inspection pit excavated to 1.2m depth.	Chiselling details		Drilling details		Title		Date(s)	
	Depth (m)	Duration (hh:mm)	Diameter	Base depth (m)	Borehole record		06/01/2021	
			150	10.00	Method Cable tool percussion	Logged by RT	Sheet number Sheet 1 of 1	
Groundwater observations Slight groundwater seepage at 4m depth.	Water added details		Casing details		Level (m OD)		Compiled by	
	Depth (m)	Water Added (l)	Diameter	Base depth (m)	94.99		KD	
			170	1.50	Co-ordinates 528454mE, 189163mN	Checked by KB	BH02	

INSTALL	STRATA				WATER STRIKES	SPT TESTING				OTHER IN SITU TESTING		SAMPLING							
	DESCRIPTION	DEPTH (m)	REDUCED LVL (m OD)	LEGEND		TYPE / DEPTH (m)	RESULT	CASING DEPTH (m)	WATER LEVEL (m)	TYPE / DEPTH (m)	RESULT	FROM (m)	TO (m)	TYPE					
	PAVING SLAB. (MADE GROUND)	0.05	88.62			C 1.80 - 2.25	(2) 10	1.50	DRY	PP 0.50	PP=33	0.30	5.95	ES					
	Medium dense cream SAND. (MADE GROUND)	0.10	88.57									0.40		B					
	Medium dense brown sandy GRAVEL. Gravel of sandstone. (MADE GROUND)	0.15	88.52									0.70		B					
	Soft to firm brown sandy gravelly CLAY. Gravel of brick, concrete and flint. (MADE GROUND)	0.60	88.07									0.70		ES					
	Soft to firm dark brown sandy gravelly CLAY. Gravel of brick and flint. (MADE GROUND)	1.10	87.57									1.00		ES					
	Firm to stiff brown mottled grey CLAY. (LONDON CLAY FORMATION)	3.40	85.27			C 3.50 - 3.95	(4) 15	1.50	DRY	PP 2.00	PP=58	1.50	B						
	...at 3m depth, selenite crystals present.											1.80	B						
	Firm to stiff bluish dark grey CLAY. (LONDON CLAY FORMATION)											PP 2.50	PP=75	PP 3.00	3.00	B			
	...											PP=92	3.00		ES				
	...											PP=100	3.50		B				
	...											PP 4.00	PP=121		PP 4.50	4.50	B		
	...					PP=121	PP 5.00	PP=125	PP 5.50	PP=167	5.50	5.95	UT						
	...					PP=125													
	...					PP 6.00								PP=200					
	...					PP 6.50								PP=221					
	...					PP 7.00	PP=225	C 7.50 - 7.95	(5) 22	1.50	DRY	PP 7.50	PP=225	7.50	B				
	...					PP 8.00	PP=225							PP 8.50	PP=225	PP 9.00	PP=225	8.50	B
	...					PP 8.50	PP=225												
	...					PP 9.00	PP=225												
	...	PP 9.50	PP=225																
BOREHOLE TERMINATED AT 10.00m	10.00	78.67		C 9.50 - 9.95	(6) 23	1.50	DRY	PP 10.00	PP=225	9.50	B								
...	PP=225																		

Notes Inspection pit excavated to 1.2m depth.	Chiselling details		Drilling details		Title		Date(s)
	Depth (m)	Duration (hh:mm)	Diameter	Base depth (m)	Borehole record		08/01/2021
			150	10.00	Method Cable tool percussion	Logged by RT	Sheet number Sheet 1 of 1
Groundwater observations No groundwater encountered.	Water added details		Casing details		Level (m OD)		Revision
	Depth (m)	Water Added (l)	Diameter	Base depth (m)	88.67		
			170	1.50	Co-ordinates 528424mE, 189154mN	Checked by KB	BH03

INSTALL	STRATA				WATER STRIKES	SPT TESTING				OTHER IN SITU TESTING		SAMPLING			
	DESCRIPTION	DEPTH (m)	REDUCED LVL (m OD)	LEGEND		TYPE / DEPTH (m)	RESULT	CASING DEPTH (m)	WATER LEVEL (m)	TYPE / DEPTH (m)	RESULT	FROM (m)	TO (m)	TYPE	
	Dark brown slightly sandy slightly gravelly organic CLAY with fine rootlets. Gravel of fine flint. (TOPSOIL)	0.10	88.03			C 2.00 - 2.45	(2) 10	2.50	DRY	PP 1.00	PP=46	0.05	9.95	ES	
	Soft to firm brown slightly sandy slightly gravelly CLAY. Gravel of brick and flint. (MADE GROUND)	0.30	87.83									0.20		B	
		Firm brown mottled grey CLAY. (LONDON CLAY FORMATION)												0.20	ES
														0.50	ES
														0.60	B
														1.00	B
														1.00	ES
														2.00	B
															B
															
															
															
	Firm to stiff bluish dark grey CLAY. (LONDON CLAY FORMATION)	4.20	83.93			C 4.00 - 4.45	(5) 17	3.50	DRY	PP 4.00	PP=150	4.00		B	
										PP 4.50	PP=183				
										PP 5.00	PP=200	5.00		B	
										PP 5.50	PP=200				
						C 6.00 - 6.45	(5) 18	4.50	DRY	PP 6.00	PP=200	6.00		B	
										PP 6.50	PP=217				
										PP 7.00	PP=225	7.00		B	
										PP 7.50	PP=225				
						C 8.00 - 8.45	(7) 24	5.50	DRY	PP 8.00	PP=225	8.00		B	
										PP 8.50	PP=225				
								PP 9.00	PP=225	9.00	B				
							PP 9.50	PP=225	9.45	B					
							PP 10.00	PP=225	9.50	UT					
BOREHOLE TERMINATED AT 10.00m		10.00	78.13												

Notes Inspection pit excavated to 1.2m depth.	Chiselling details		Drilling details		Title		Date(s)	
	Depth (m)	Duration (hh:mm)	Diameter	Base depth (m)	Borehole record		07/01/2021	
			150	10.00	Method Cable tool percussion	Logged by RT	Sheet number Sheet 1 of 1	
Groundwater observations No groundwater encountered.	Water added details		Casing details		Level (m OD)		Compiled by	
	Depth (m)	Water Added (l)	Diameter	Base depth (m)	88.13		TO	
			170	1.50	Co-ordinates 528448mE, 189154mN	Checked by KB	BH04	

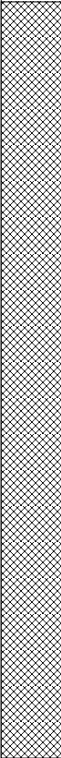
INSTALL	STRATA				WATER STRIKES	SPT TESTING				OTHER IN SITU TESTING		SAMPLING							
	DESCRIPTION	DEPTH (m)	REDUCED LVL (m OD)	LEGEND		TYPE / DEPTH (m)	RESULT	CASING DEPTH (m)	WATER LEVEL (m)	TYPE / DEPTH (m)	RESULT	FROM (m)	TO (m)	TYPE					
	ASPHALT. (MADE GROUND)	0.07	91.27			S 2.00 - 2.45	(2) 9	1.70	DRY	PP 0.70	PP=71	0.20	3.00	D					
	Medium dense yellowish brown gravelly fine to coarse SAND. Gravel of rounded to sub-angular flint. (MADE GROUND - SUBBASE)	0.11	91.23							PP 1.10	PP=67	0.50		D					
	Medium dense greyish brown very gravelly clayey fine to coarse SAND. Gravel of rounded to angular flint, quartz, slag, bituminous coated material and concrete. (MADE GROUND)	0.50	90.84							PP 1.20	PP=29	1.20		D					
	Firm brown mottled grey CLAY. (LONDON CLAY FORMATION)									PP 1.70	UT=60	1.20		UT					
										PP 2.00	PP=67	1.70		D					
										PP 2.50	PP=88	2.00		D					
										PP 3.00	PP=100	2.50		B					
	Firm to stiff bluish dark grey CLAY. (LONDON CLAY FORMATION)									PP 3.00	PP=121	3.00		D					
										PP 4.00	PP=121	4.00		D					
										PP 5.00	PP=83	5.00		D					
										PP 5.80	PP=117	5.80		D					
	Firm to stiff bluish dark grey CLAY. (LONDON CLAY FORMATION)									PP 6.00	PP=125	6.00		B					
										PP 6.50	PP=125	6.50		D					
										PP 8.00	PP=125	8.00		D					
										PP 9.00	PP=125	9.00		D					
	BOREHOLE TERMINATED AT 10.00m									PP 9.50	PP=133	9.50		UT					
										PP 10.00	UT=100	10.00		D					

Notes Inspection pit excavated to 1.2m depth.	Chiselling details		Drilling details		Title		Date(s)	
	Depth (m)	Duration (hh:mm)	Diameter	Base depth (m)	Borehole record		14/12/2020	
			150	10.00	Method Cable tool percussion	Logged by RT	Sheet number Sheet 1 of 1	
Groundwater observations No groundwater encountered.	Water added details		Casing details		Level (m OD)		Compiled by	
	Depth (m)	Water Added (l)	Diameter	Base depth (m)	91.34		JC	
			170	1.70	Co-ordinates 528405mE, 189120mN	Checked by KB	Revision BH05	

INSTALL	STRATA				WATER STRIKES	SPT TESTING				OTHER IN SITU TESTING		SAMPLING							
	DESCRIPTION	DEPTH (m)	REDUCED LVL (m OD)	LEGEND		TYPE / DEPTH (m)	RESULT	CASING DEPTH (m)	WATER LEVEL (m)	TYPE / DEPTH (m)	RESULT	FROM (m)	TO (m)	TYPE					
	ASPHALT.	0.10	91.41		C 1.20 - 1.65	(3) 19	1.20	DRY	PP 1.00	PP=25	0.20	1.50	ES						
	(MADE GROUND)	0.40	91.11								0.30		ES						
	Medium dense brown gravelly SAND. Gravel of brick and bituminous coated material.	1.10	90.41								S 2.00 - 2.45		(2) 8	1.70	DRY	PP 1.50 PP 1.80 PP 2.00	PP=25 PP=96 PP=83	0.40	ES
	(MADE GROUND)																	0.50	D
	Medium dense brown gravelly clayey SAND with occasional cobble of bituminous bound material. Gravel of brick and igneous rock.	1.80	89.71			S 4.00 - 4.45	(2) 13	1.70	DRY	PP 3.00 PP 3.50 PP 4.00	PP=108 UT=39 PP=125 PP=125		0.70	ES					
	(MADE GROUND)												0.90	ES					
	Firm brown slightly sandy slightly gravelly CLAY. Gravel of brick.	7.30	84.21			S 6.50 - 6.95	(4) 16	1.70	DRY	PP 5.00 PP 5.50	PP=133 UT=64 PP=150		1.00	3.00	D				
	(MADE GROUND)												1.10		B				
	Firm brown mottled grey CLAY.												1.50		D				
	(LONDON CLAY FORMATION)												1.80		D				
													2.00		D				
													2.50		B				
					3.00							UT							
					3.50							D							
					4.00							D							
					5.00							D							
		5.00	UT																
		5.50	D																
		6.50	D																
		7.50	D																
		8.00	UT																
	8.50	D																	
	9.50	D																	
	10.50	D																	
	11.00	UT																	
	11.50	D																	
	12.00	B																	
	12.50	D																	

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Notes Inspection pit excavated to 1.2m depth.	Chiselling details		Drilling details		Title		Date(s)
	Depth (m)	Duration (hh:mm)	Diameter	Base depth (m)	Borehole record		16/12/2020
			150	25.00	Method	Logged by	Sheet number
Groundwater observations No groundwater encountered.	Water added details		Casing details		Cable tool percussion		RT
	Depth (m)	Water Added (l)	Diameter	Base depth (m)	Level (m OD)		Compiled by
					91.51		JC
			170	1.70	Co-ordinates	Checked by	Revision
					528457mE, 189115mN		KB
					BH06		

INSTALL	STRATA				WATER STRIKES	SPT TESTING				OTHER IN SITU TESTING		SAMPLING		
	DESCRIPTION	DEPTH (m)	REDUCED LVL (m OD)	LEGEND		TYPE / DEPTH (m)	RESULT	CASING DEPTH (m)	WATER LEVEL (m)	TYPE / DEPTH (m)	RESULT	FROM (m)	TO (m)	TYPE
						S 15.50 - 15.95	(6) 26	1.70	DRY	PP 13.50	PP=200 UT=90	13.50		D
										PP 14.50	PP=225	14.00		UT
										PP 15.50	PP=225	14.50		D
										PP 16.50	PP=225	15.50		D
						S 18.50 - 18.95	(8) 35	1.70	DRY	PP 17.50	PP=225	16.50		D
										PP 18.50	PP=225	17.00		UT
										PP 19.50	PP=225	17.50		D
										PP 20.50	PP=225	18.50		D
						S 21.50 - 21.95	(9) 34	1.70	DRY	PP 18.50	PP=225	19.50		D
										PP 19.50	PP=225	20.00		UT
										PP 20.50	PP=225	21.50		D
										PP 21.50	PP=225	22.50		D
						S 24.50 - 24.95	(9) 36	1.70	DRY	PP 22.50	PP=225	23.00		UT
										PP 23.50	PP=225	23.40		D
										PP 24.50	PP=225	24.50		D
												25.00		
	BOREHOLE TERMINATED AT 25.00m	25.00	66.51											

Notes Inspection pit excavated to 1.2m depth.	Chiselling details		Drilling details		Title		Date(s)
	Depth (m)	Duration (hh:mm)	Diameter	Base depth (m)	Borehole record		16/12/2020
			150	25.00	Method Cable tool percussion	Logged by RT	Sheet number Sheet 2 of 2
Groundwater observations No groundwater encountered.	Water added details		Casing details		Level (m OD)		Revision
	Depth (m)	Water Added (l)	Diameter	Base depth (m)	91.51		
			170	1.70	Co-ordinates 528457mE, 189115mN	Checked by KB	BH06

Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY
Contact: Lauren Wenham
Site Address: Cranwood, 100 Woodside Avenue, London

Client Reference: STS5215
Job Number: 20-48817
Date Sampled: 14/12/2020
Date Received: 18/12/2020
Date Tested: 08/01/2021
Sampled By: Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

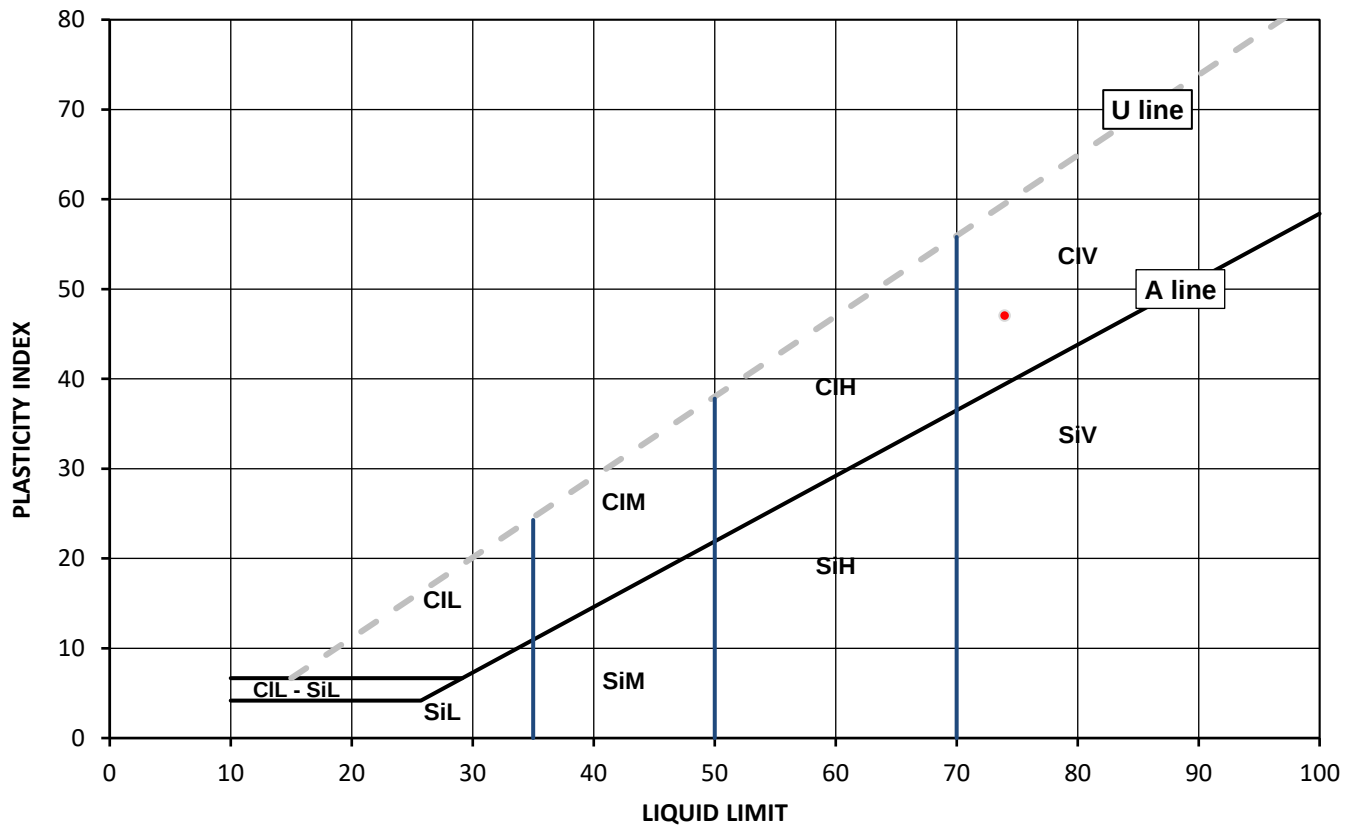
Test Results:

Laboratory Reference: 1726350
Hole No.: BH05
Sample Reference: 16
Soil Description: Brownish grey CLAY

Depth Top [m]: 9.50
Depth Base [m]: Not Given
Sample Type: U

Sample Preparation: Tested in natural condition

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
29	74	27	47	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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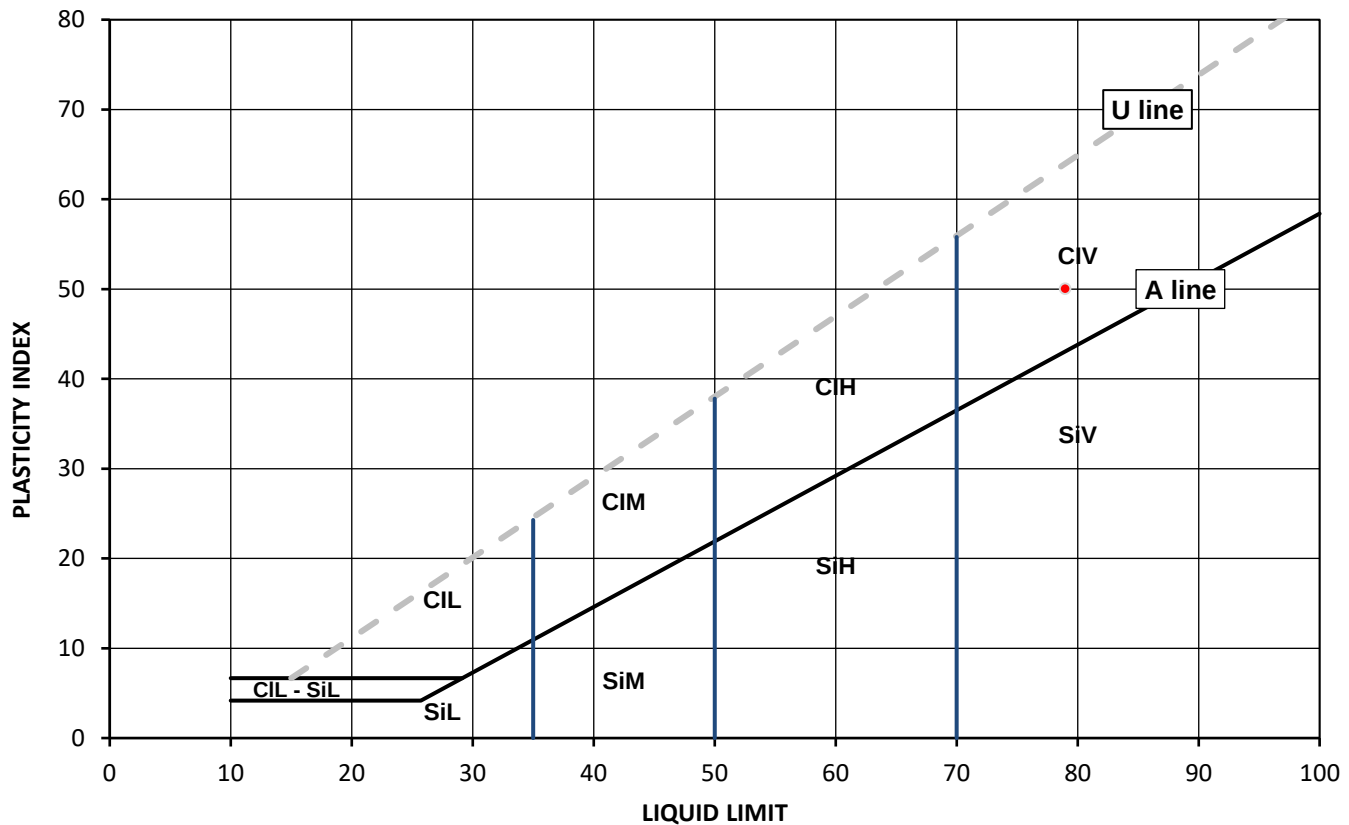
Test Results:

Laboratory Reference: 1726351
Hole No.: BH06
Sample Reference: 8
Soil Description: Brown CLAY

Depth Top [m]: 3.00
Depth Base [m]: Not Given
Sample Type: U

Sample Preparation: Tested in natural condition

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
31	79	29	50	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

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Date Received: 18/12/2020
Date Tested: 08/01/2021
Sampled By: Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Śląska, Poland

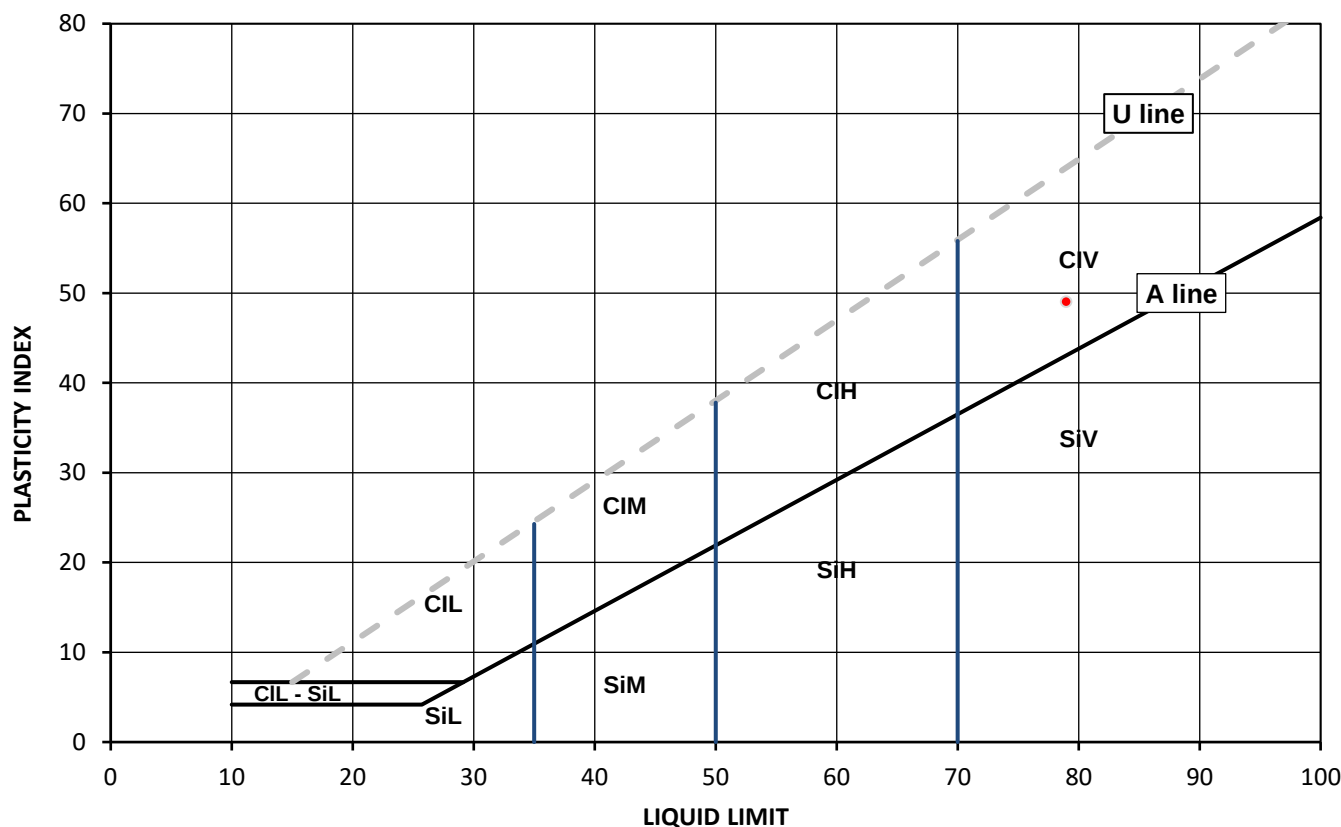
Test Results:

Laboratory Reference: 1726354
Hole No.: BH06
Sample Reference: 29
Soil Description: Greyish brown CLAY

Depth Top [m]: 17.00
Depth Base [m]: Not Given
Sample Type: U

Sample Preparation: Tested in natural condition

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
27	79	30	49	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	L Low below 35
Si	Silt	M Medium 35 to 50
		H High 50 to 70
		V Very high exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

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SUMMARY REPORT

Summary of Classification Test Results

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Tested in Accordance with:

Moisture Content by BS 1377-2: 1990: Clause 3.2; Water Content by BS EN 17892-1: 2014; Atterberg by BS 1377-2: 1990: Clause 4.3 (4 Point Test), Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2: 1990: Clause 8.2

Client Reference: STS5215

Job Number: 20-48817

Date Sampled: 14/12 - 16/12/2020

Date Received: 18/12/2020

Date Tested: 08/01/2021

Sampled By: Client

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Walgrave, Northampton,
NN6 9PY

Contact: Lauren Wenham
Site Address: Cranwood, 100 Woodside Avenue, London

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Moisture Content [W]	Water Content [W]	Atterberg				Density			Total Porosity#		
		Reference	Depth Top	Depth Base	Type					% Passing 425um	WL	Wp	Ip	bulk	dry	PD			
			m	m															
1726350	BH05	16	9.50	Not Given	U	Brownish grey CLAY	Atterberg 1 Point	29		100	74	27	47						
1726351	BH06	8	3.00	Not Given	U	Brown CLAY	Atterberg 1 Point	31		100	79	29	50						
1726354	BH06	29	17.00	Not Given	U	Greyish brown CLAY	Atterberg 1 Point	27		100	79	30	49						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

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TEST CERTIFICATE

Unconsolidated Undrained

Triaxial Compression
Tested in Accordance with:
BS 1377-7: 1990: Clause 8

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Soiltechnics Limited
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Client Reference: STS5215
Job Number: 20-48817
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Date Received: 18/12/2020
Date Tested: 08/01/2021
Sampled By: Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

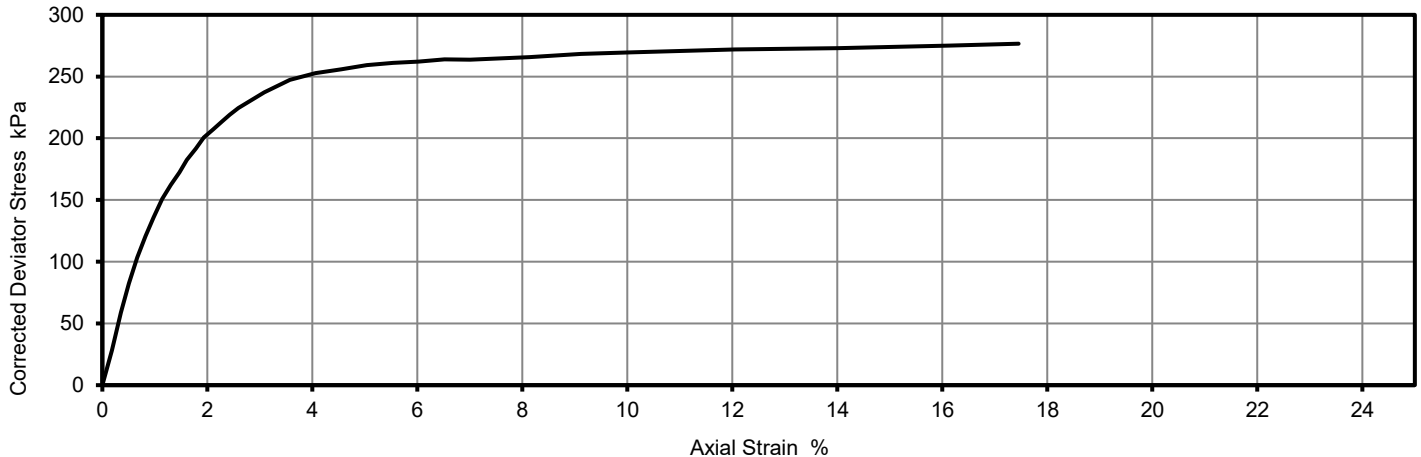
Laboratory Reference: 1726350
Hole No.: BH05
Sample Reference: 16
Sample Description: Brownish grey CLAY

Depth Top [m]: 9.50
Depth Base [m]: Not Given
Sample Type: U

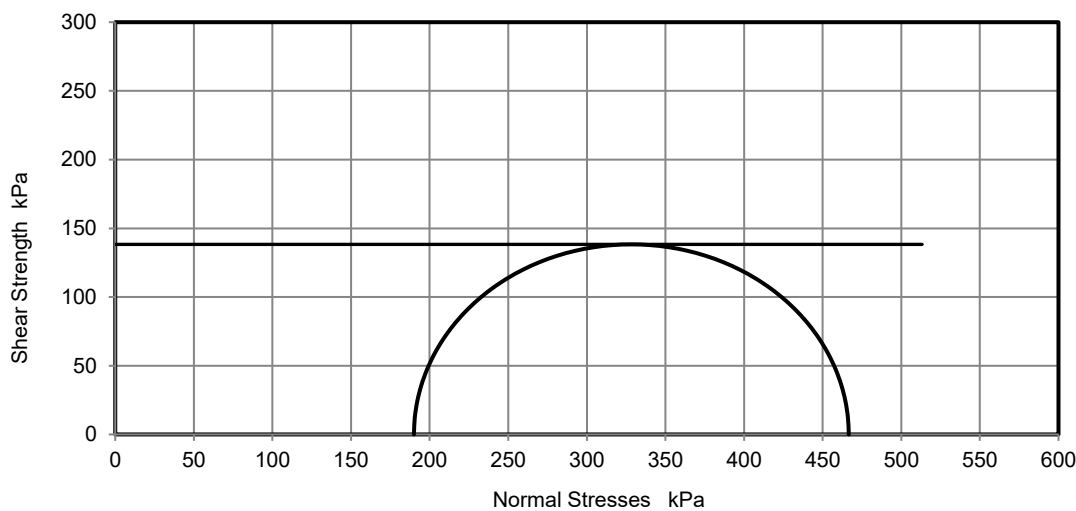
Test Number	1
Length	200.54 mm
Diameter	103.76 mm
Bulk Density	1.99 Mg/m ³
Moisture Content	29 %
Dry Density	1.55 Mg/m ³
Membrane Correction	0.63 kPa

Rate of Strain	1.99 %/min
Cell Pressure	190 kPa
Axial Strain at failure	17.5 %
Deviator Stress, ($\sigma_1 - \sigma_3$) _f	277 kPa
Undrained Shear Strength, c_u	138 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Mode of Failure	Compound
Membrane thickness	0.19 mm

Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377.
This is provided for information only.

Remarks:

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Test Results:

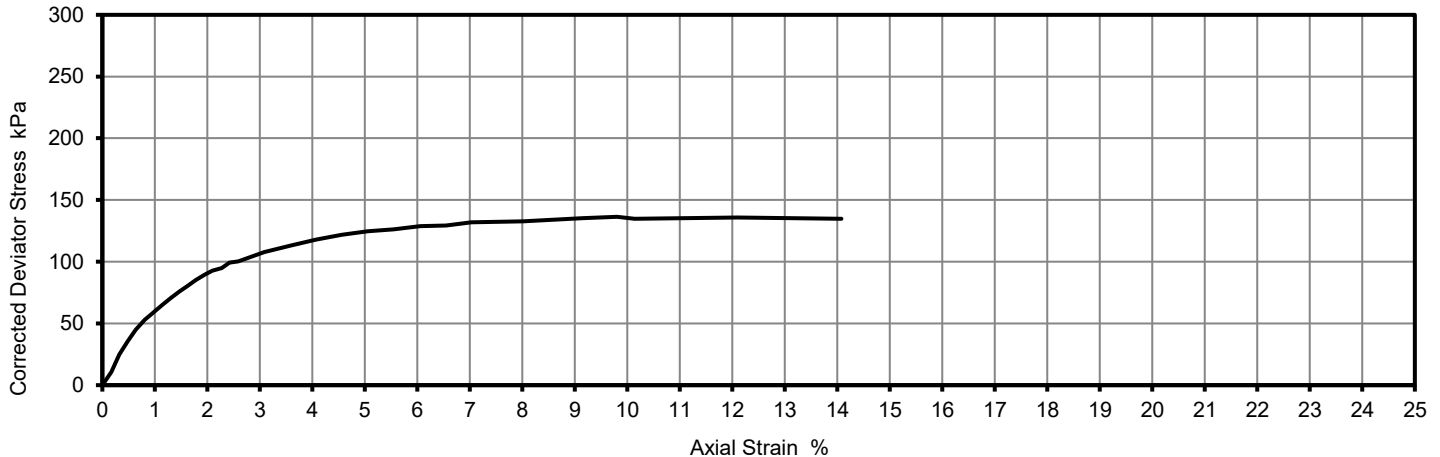
Laboratory Reference: 1726351
Hole No.: BH06
Sample Reference: 8
Sample Description: Brown CLAY

Depth Top [m]: 3.00
Depth Base [m]: Not Given
Sample Type: U

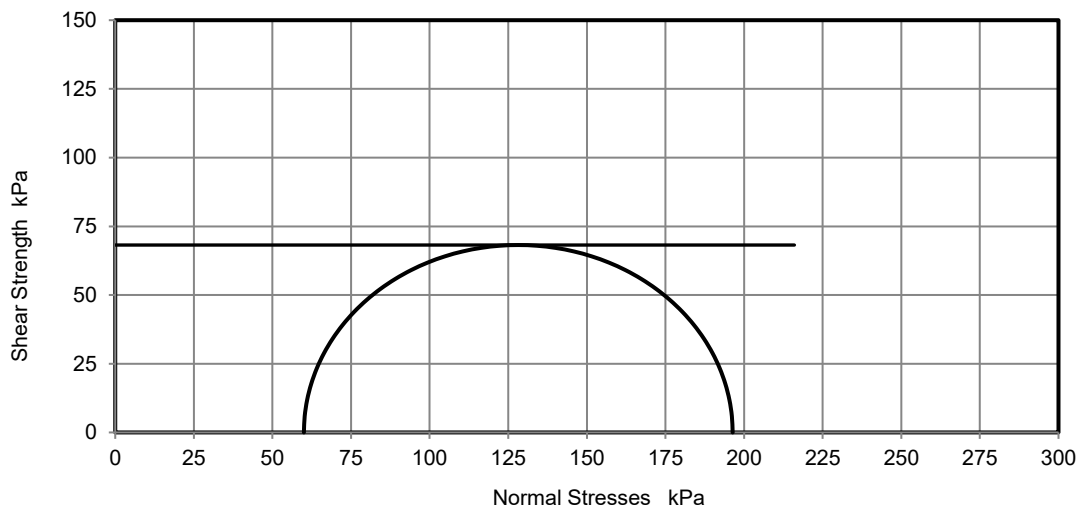
Test Number	1
Length	198.11 mm
Diameter	103.64 mm
Bulk Density	1.94 Mg/m ³
Moisture Content	31 %
Dry Density	1.49 Mg/m ³
Membrane Correction	0.49 kPa

Rate of Strain	2.00 %/min
Cell Pressure	60 kPa
Axial Strain at failure	9.8 %
Deviator Stress, ($\sigma_1 - \sigma_3$) _f	136 kPa
Undrained Shear Strength, c_u	68 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Mode of Failure	Compound
Membrane thickness	0.23 mm

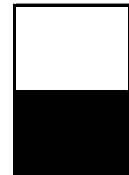
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377.
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TEST CERTIFICATE

Unconsolidated Undrained

Triaxial Compression
Tested in Accordance with:
BS 1377-7: 1990: Clause 8

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Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: STS5215
Job Number: 20-48817
Date Sampled: 16/12/2020
Date Received: 18/12/2020
Date Tested: 08/01/2021
Sampled By: Client

Test Results:

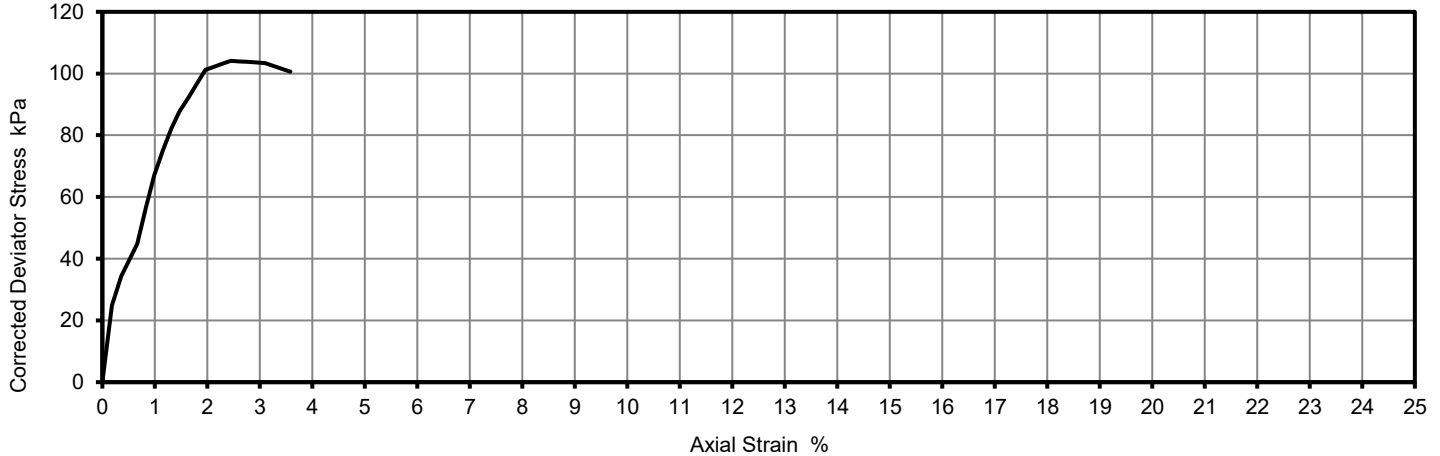
Laboratory Reference: 1726352
Hole No.: BH06
Sample Reference: 12
Sample Description: Brown CLAY

Depth Top [m]: 5.00
Depth Base [m]: Not Given
Sample Type: U

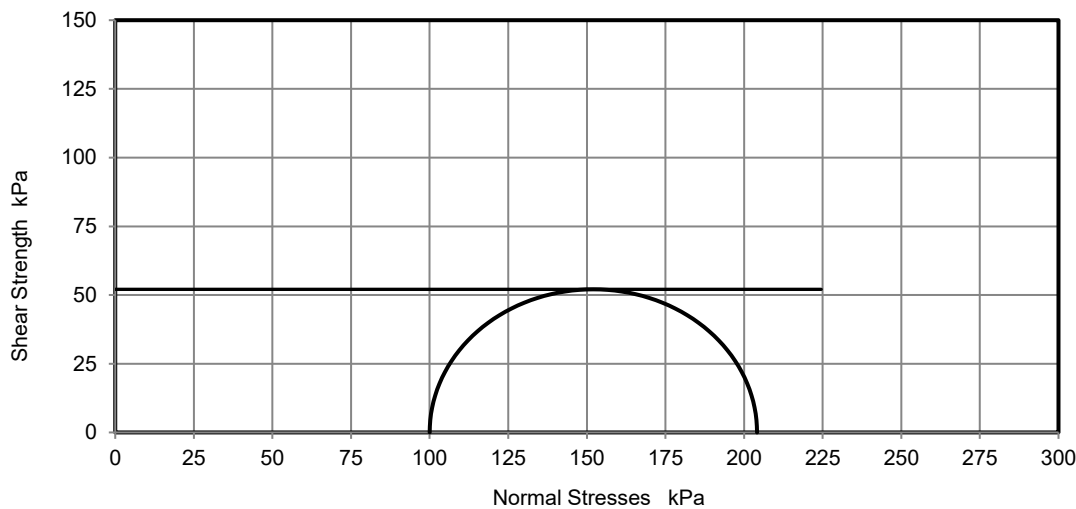
Test Number	1
Length	201.00 mm
Diameter	103.54 mm
Bulk Density	1.90 Mg/m ³
Moisture Content	34 %
Dry Density	1.42 Mg/m ³
Membrane Correction	0.16 kPa

Rate of Strain	1.99 %/min
Cell Pressure	100 kPa
Axial Strain at failure	2.4 %
Deviator Stress, ($\sigma_1 - \sigma_3$) _f	104 kPa
Undrained Shear Strength, c_u	52 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Mode of Failure	Brittle
Membrane thickness	0.24 mm

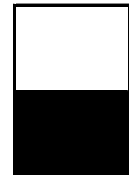
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377.
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TEST CERTIFICATE

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Test Results:

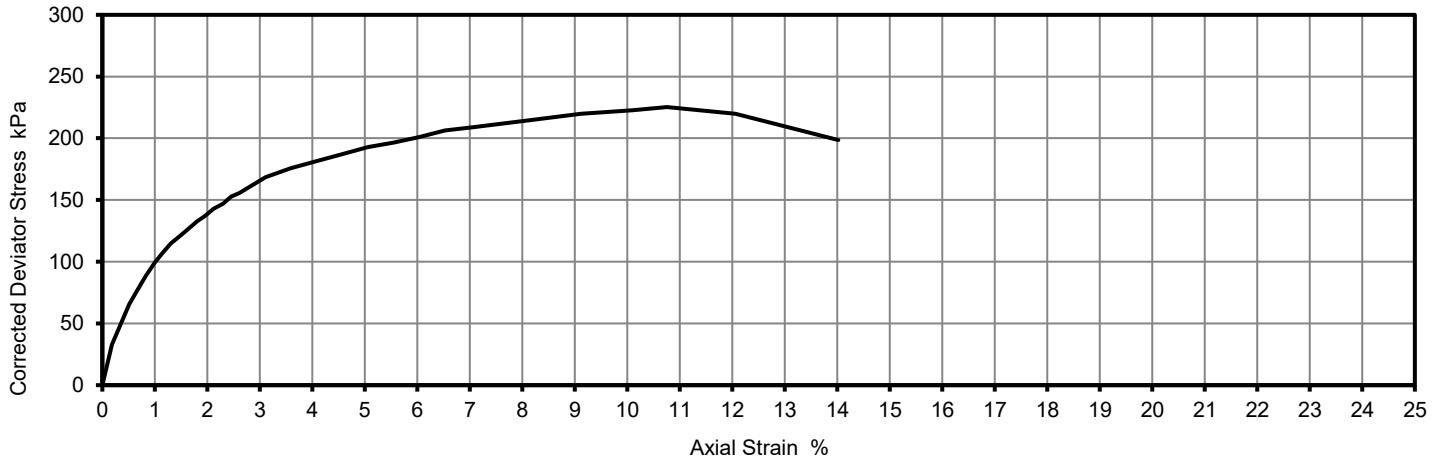
Laboratory Reference: 1726353
Hole No.: BH06
Sample Reference: 20
Sample Description: Greyish brown CLAY

Depth Top [m]: 11.00
Depth Base [m]: Not Given
Sample Type: U

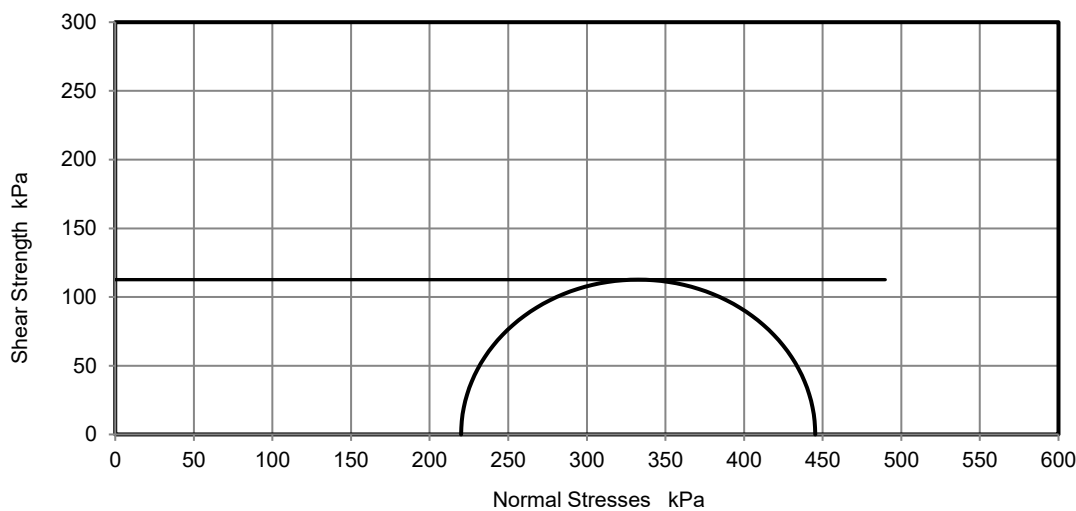
Test Number	1
Length	200.67 mm
Diameter	104.01 mm
Bulk Density	1.97 Mg/m ³
Moisture Content	25 %
Dry Density	1.57 Mg/m ³
Membrane Correction	0.56 kPa

Rate of Strain	1.99 %/min
Cell Pressure	220 kPa
Axial Strain at failure	10.8 %
Deviator Stress, ($\sigma_1 - \sigma_3$) _f	225 kPa
Undrained Shear Strength, c_u	113 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Mode of Failure	Compound
Membrane thickness	0.25 mm

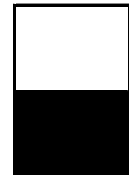
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377.
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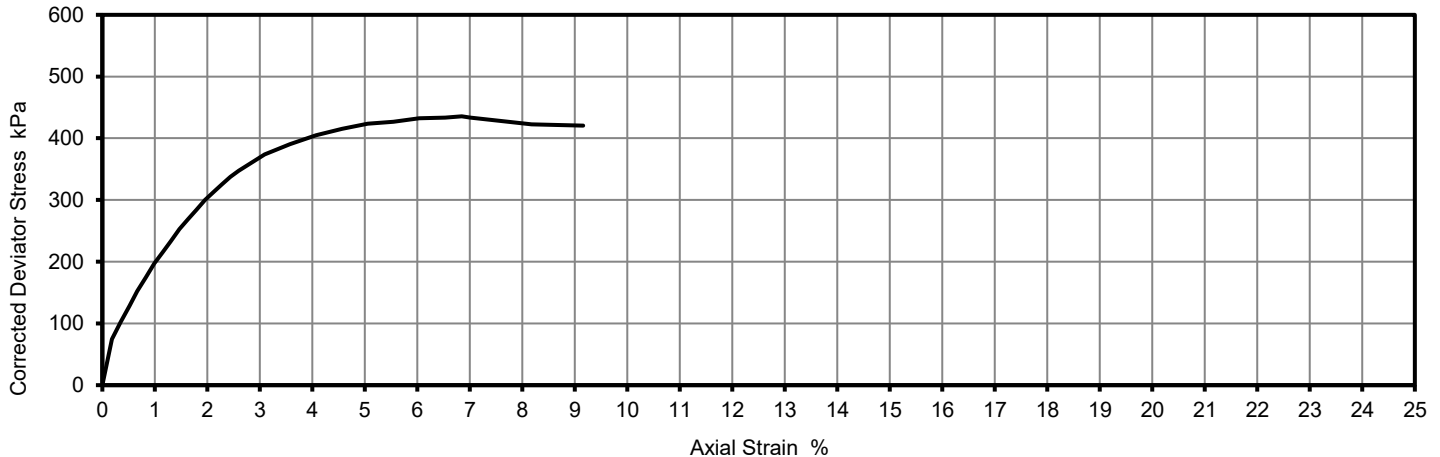
Laboratory Reference: 1726354
Hole No.: BH06
Sample Reference: 29
Sample Description: Greyish brown CLAY

Depth Top [m]: 17.00
Depth Base [m]: Not Given
Sample Type: U

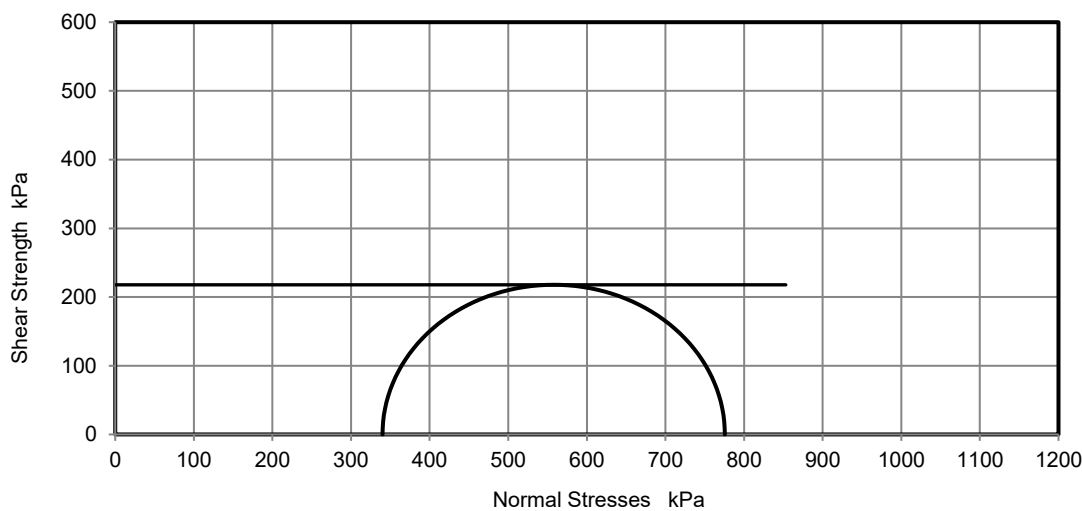
Test Number	1
Length	200.03 mm
Diameter	102.75 mm
Bulk Density	1.98 Mg/m ³
Moisture Content	27 %
Dry Density	1.56 Mg/m ³
Membrane Correction	0.35 kPa

Rate of Strain	2.00 %/min
Cell Pressure	340 kPa
Axial Strain at failure	6.8 %
Deviator Stress, ($\sigma_1 - \sigma_3$) _f	436 kPa
Undrained Shear Strength, c_u	218 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Mode of Failure	Brittle
Membrane thickness	0.21 mm

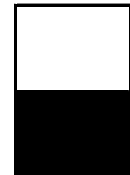
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377.
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Date Tested: 08/01/2021
Sampled By: Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

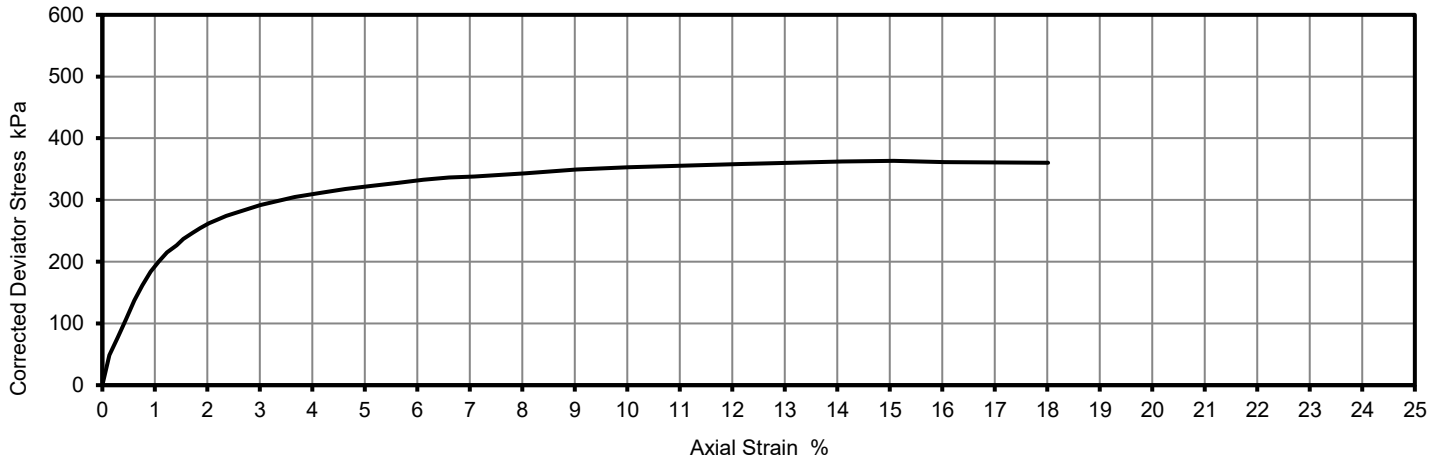
Laboratory Reference: 1726355
Hole No.: BH06
Sample Reference: 37
Sample Description: Greyish brown CLAY

Depth Top [m]: 23.00
Depth Base [m]: Not Given
Sample Type: U

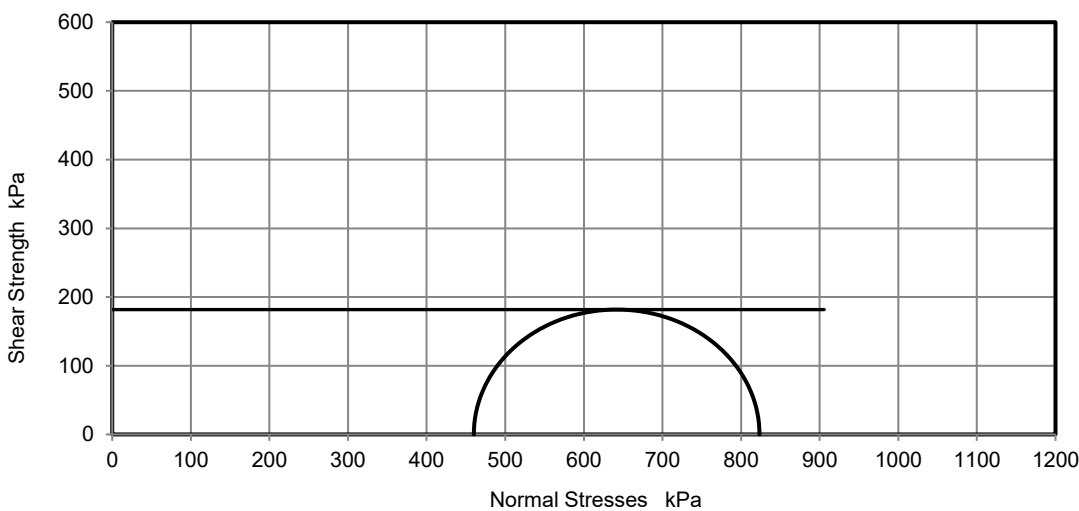
Test Number	1
Length	200.89 mm
Diameter	103.40 mm
Bulk Density	1.98 Mg/m ³
Moisture Content	29 %
Dry Density	1.54 Mg/m ³
Membrane Correction	0.62 kPa

Rate of Strain	1.99 %/min
Cell Pressure	460 kPa
Axial Strain at failure	15.1 %
Deviator Stress, ($\sigma_1 - \sigma_3$) _f	363 kPa
Undrained Shear Strength, c_u	182 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Mode of Failure	Compound
Membrane thickness	0.21 mm

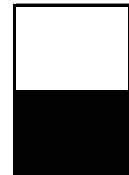
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377.
This is provided for information only.

Remarks:

Signed:

Szczepan Bielatowicz

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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One Dimensional Consolidation Test

Tested in Accordance with: BS 1377-5: 1990: Clause 3

Client: Soiltechnics Limited

Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY

Contact: Lauren Wenham

Site Address: Cranwood, 100 Woodside Avenue, London

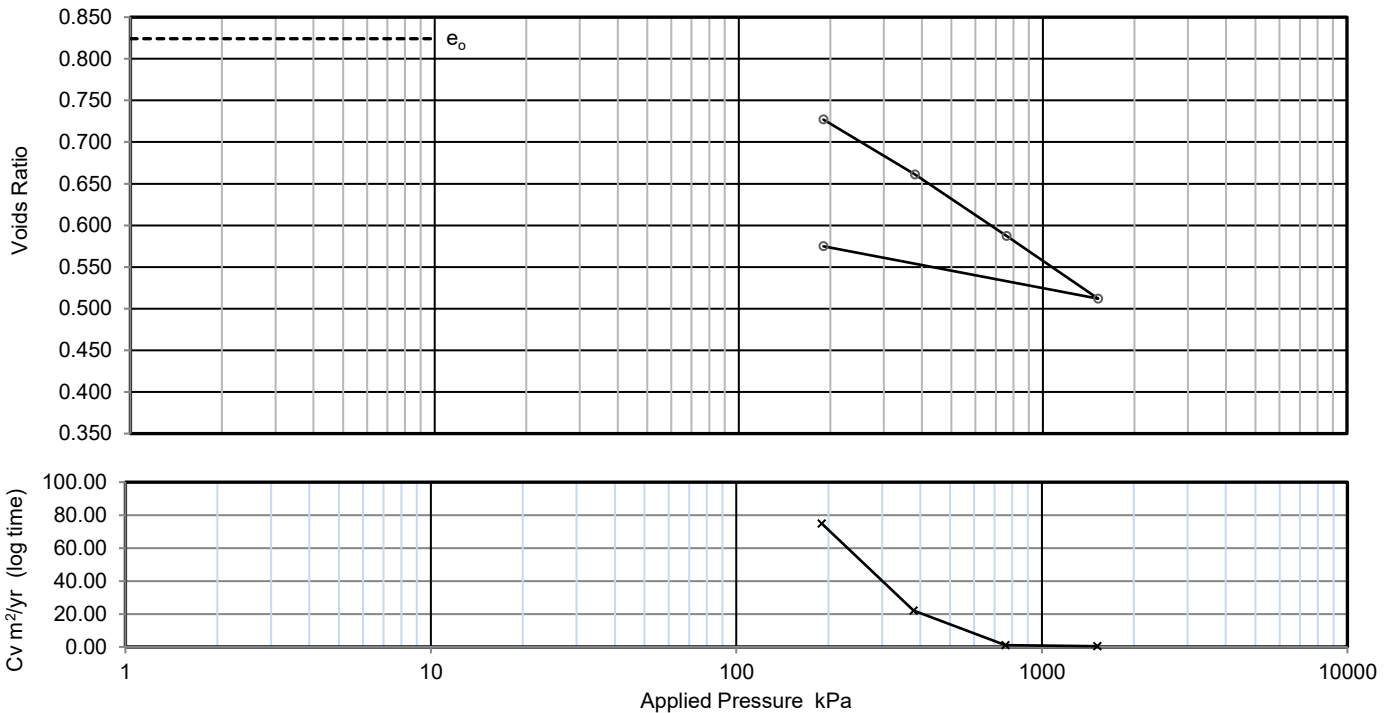
Client Reference: STS5215
Job Number: 20-48817
Date Sampled: 14/12/2020
Date Received: 18/12/2020
Date Tested: 31/12/2020
Sampled By: Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 1726350
Hole No.: BH05
Sample Reference: 16
Sample Description: Brownish grey CLAY

Depth Top [m]: 9.50
Depth Base [m]: Not Given
Sample Type: U

[illegible]

Preparation

Index tests

Orientation of the sample

Particle density

Liquid limit

Plastic limit

Specimen details

Diameter

Height

Moisture Content

Bulk density

Dry density

Voids Ratio

Saturation

Avg. temperature for test

Swelling Pressure

Settlement on saturation

Vertical		
assumed	2.65	Mg/m3
N/A		%
N/A		%

Initial	Final	
50.00	-	mm
19.97	17.24	mm
28	26	%
1.86	2.12	Mg/m3
1.45	1.68	Mg/m3
0.824	0.575	
91	120	%
22.0		°C
Not measured		kPa
		%

Note: C_v corrected to 20°C

Remarks:

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



One Dimensional Consolidation Test

Tested in Accordance with: BS 1377-5: 1990: Clause 3

Client: Soiltechnics Limited

Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY

Contact: Lauren Wenham

Site Address: Cranwood, 100 Woodside Avenue, London

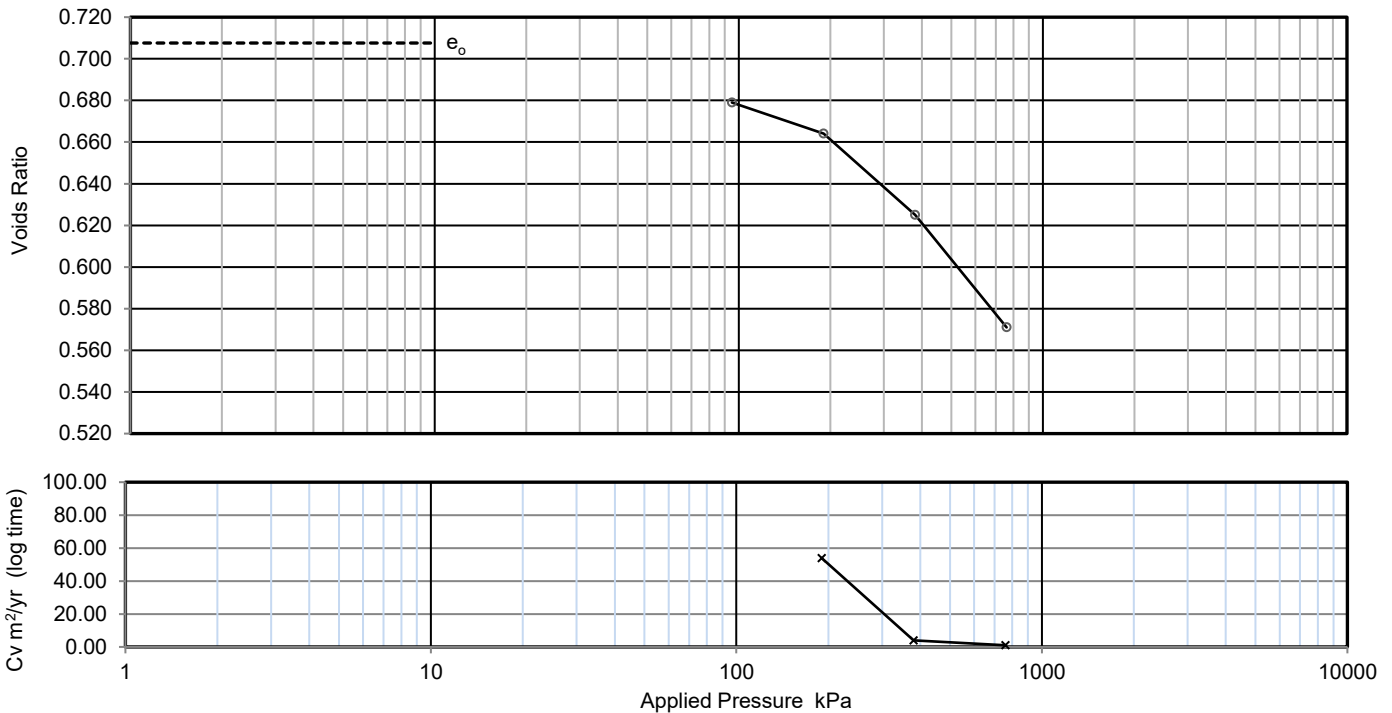
Client Reference: STS5215
Job Number: 20-48817
Date Sampled: Not Given
Date Received: 18/12/2020
Date Tested: 15/01/2021
Sampled By: Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 1726350_1
Hole No.: BH05
Sample Reference: 16
Sample Description: Brownish grey CLAY

Depth Top [m]: 9.50
Depth Base [m]: Not Given
Sample Type: UT

[illegible]

Preparation

Index tests

Orientation of the sample

Particle density

Liquid limit

Plastic limit

Specimen details

Diameter

Height

Moisture Content

Bulk density

Dry density

Voids Ratio

Saturation

Avg. temperature for test

Swelling Pressure

Settlement on saturation

Vertical		
assumed	2.65	Mg/m3
N/A		%
N/A		%

Initial	Final	
50.00	-	mm
20.00	18.41	mm
26	25	%
1.95	2.12	Mg/m3
1.55	1.69	Mg/m3
0.708	0.571	
96	118	%
22.0		°C
Not measured		kPa
		%

Note: Cv corrected to 20°C

Remarks: stage 1 - swelling

Signed:

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Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

One Dimensional Consolidation Test

Tested in Accordance with: BS 1377-5: 1990: Clause 3

Client: Soiltechnics Limited

Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY

Contact: Lauren Wenham

Site Address: Cranwood, 100 Woodside Avenue, London

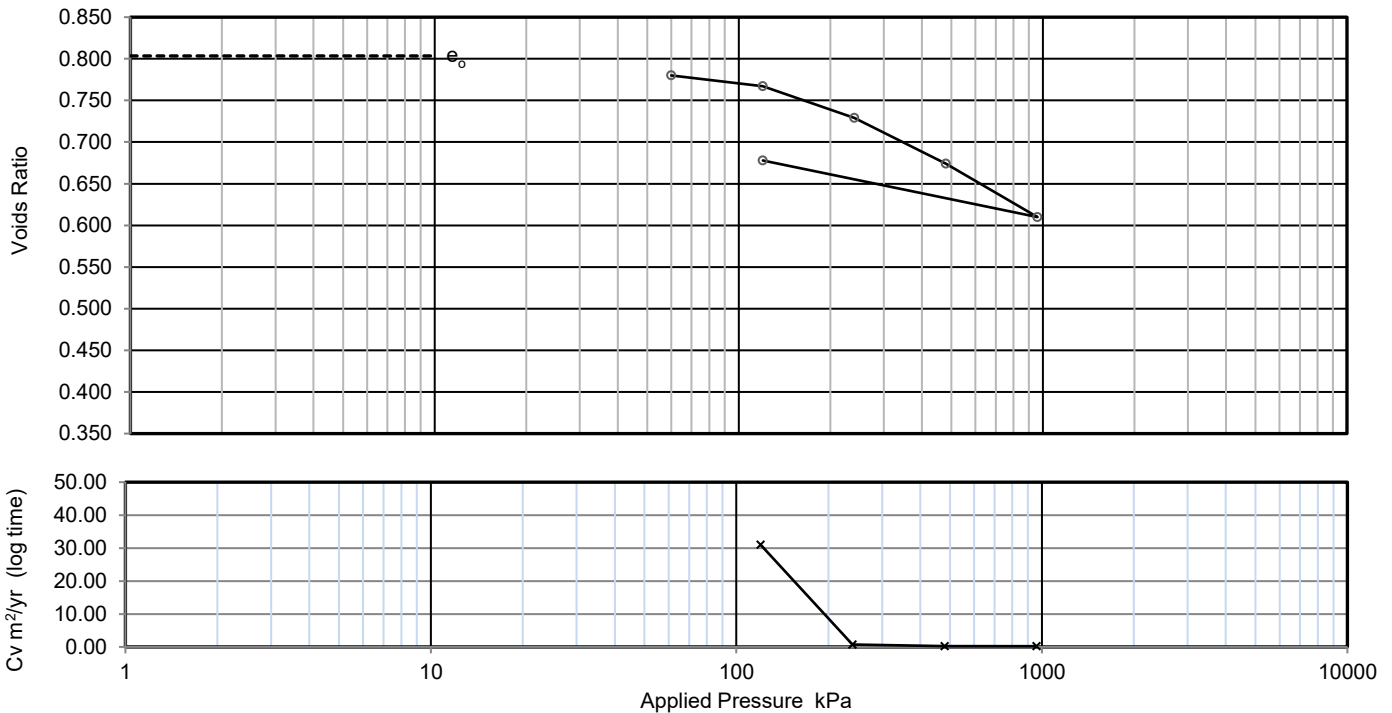
Client Reference: STS5215
Job Number: 20-48817
Date Sampled: 16/12/2020
Date Received: 18/12/2020
Date Tested: 31/12/2020
Sampled By: Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 1726351
Hole No.: BH06
Sample Reference: 8
Sample Description: Brown CLAY

Depth Top [m]: 3.00
Depth Base [m]: Not Given
Sample Type: U

[illegible]

Preparation

Index tests

Orientation of the sample

Particle density

Liquid limit

Plastic limit

Specimen details

Diameter

Height

Moisture Content

Bulk density

Dry density

Voids Ratio

Saturation

Avg. temperature for test

Swelling Pressure

Settlement on saturation

Vertical		
assumed	2.65	Mg/m3
N/A		%
N/A		%

Initial	Final	
50.01	-	mm
20.00	18.61	mm
30	29	%
1.91	2.04	Mg/m3
1.47	1.58	Mg/m3
0.803	0.678	
98	114	%
22.0		°C
Not measured		kPa
		%

Note: C_v corrected to 20°C

Remarks: Stage 1 - swelling

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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Tested in Accordance with: BS 1377-5: 1990: Clause 3

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY

Contact: Lauren Wenham
Site Address: Cranwood, 100 Woodside Avenue, London

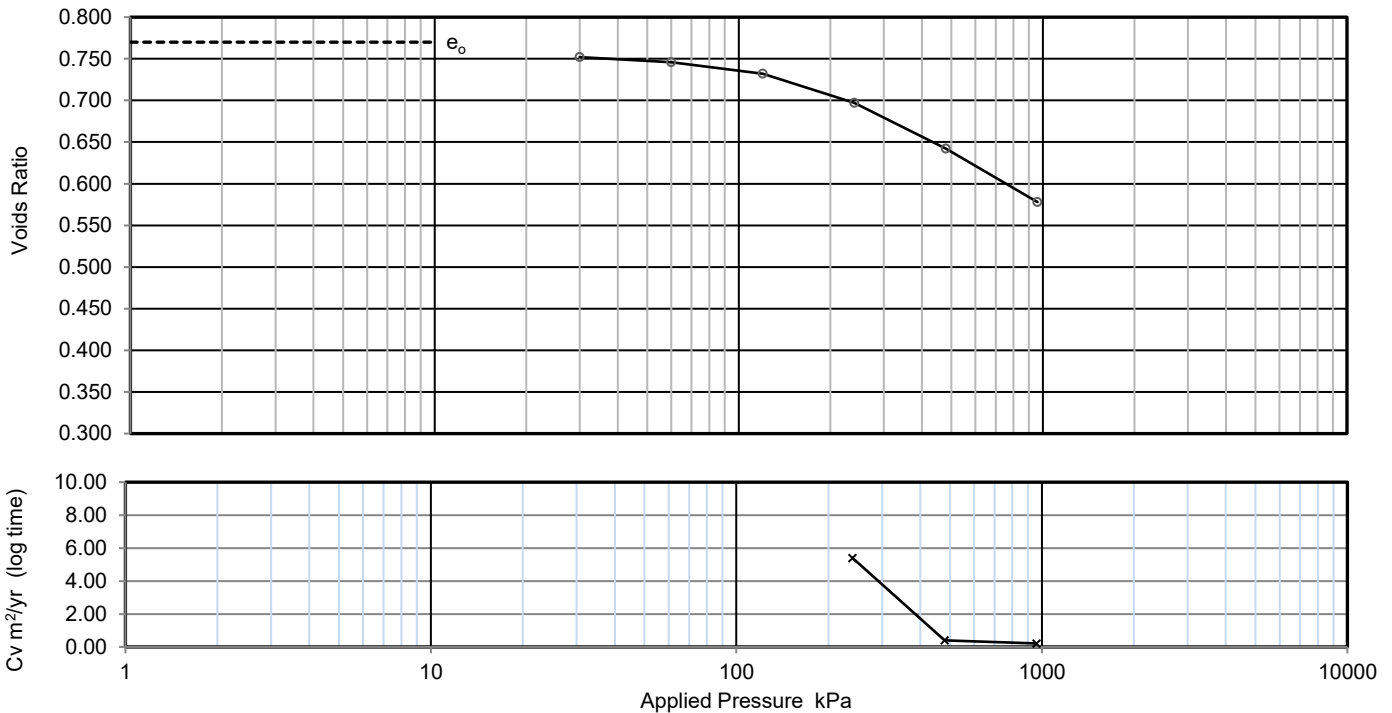
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: STS5215
Job Number: 20-48817
Date Sampled: Not Given
Date Received: 18/12/2020
Date Tested: 15/01/2021
Sampled By: Client

Test Results:

Laboratory Reference: 1726351_1
Hole No.: BH06
Sample Reference: 8
Sample Description: Brown CLAY

Depth Top [m]: 3.00
Depth Base [m]: Not Given
Sample Type: UT



Applied Pressure kPa	Voids ratio	Mv m2/MN	Cv (t50, log) m2/yr	Cv (t90, root) m2/yr	Csec
0	0.770	-	-	-	-
30	0.752	0.34	N/A	N/A	N/A
60	0.746	0.12	N/A	N/A	N/A
120	0.732	0.13	N/A	N/A	N/A
240	0.697	0.17	5.4	5.6	0.0013
480	0.642	0.14	0.4	0.43	0.0019
960	0.578	0.081	0.21	0.22	0.0025

Preparation

Index tests

Orientation of the sample

Particle density

Liquid limit

Plastic limit

Vertical	
assumed	2.65 Mg/m3
N/A	%
N/A	%

Specimen details

Diameter

Height

Moisture Content

Bulk density

Dry density

Voids Ratio

Saturation

Avg. temperature for test

Swelling Pressure

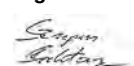
Settlement on saturation

Initial	Final	
50.02	-	mm
20.00	17.83	mm
28	26	%
1.92	2.11	Mg/m3
1.50	1.68	Mg/m3
0.770	0.578	
97	119	%
22.0		°C
Not measured		kPa
		%

Note: Cv corrected to 20°C

Remarks: stage 1,2,3 - swelling

Signed:



Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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One Dimensional Consolidation Test

Tested in Accordance with: BS 1377-5: 1990: Clause 3

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY

Contact: Lauren Wenham
Site Address: Cranwood, 100 Woodside Avenue, London

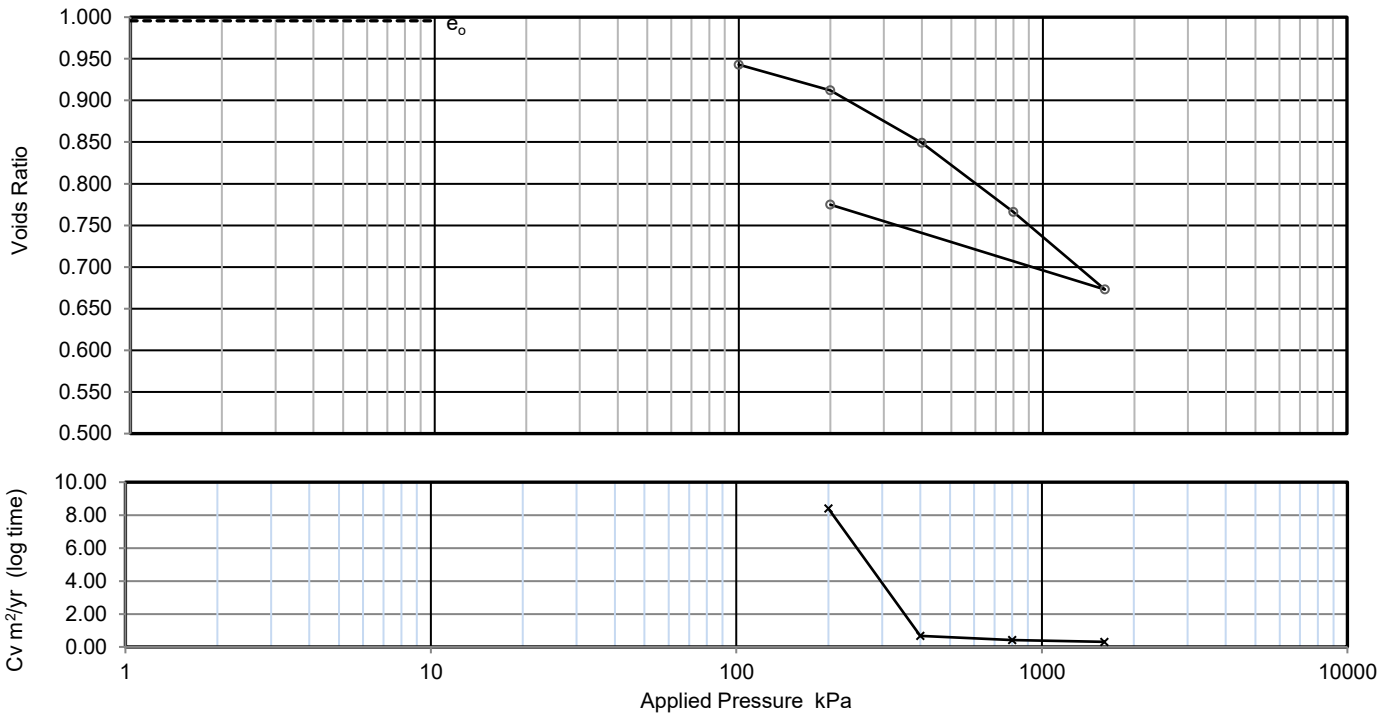
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: STS5215
Job Number: 20-48817
Date Sampled: 16/12/2020
Date Received: 18/12/2020
Date Tested: 31/12/2020
Sampled By: Client

Test Results:

Laboratory Reference: 1726352
Hole No.: BH06
Sample Reference: 12
Sample Description: Brown CLAY

Depth Top [m]: 5.00
Depth Base [m]: Not Given
Sample Type: U

[illegible]

Preparation

Index tests

Orientation of the sample

Particle density

Liquid limit

Plastic limit

Specimen details

Diameter

Height

Moisture Content

Bulk density

Dry density

Voids Ratio

Saturation

Avg. temperature for test

Swelling Pressure

Settlement on saturation

Vertical		
assumed	2.65	Mg/m3
N/A		%
N/A		%

Initial	Final	
50.06	-	mm
20.06	17.85	mm
36	33	%
1.80	1.98	Mg/m3
1.33	1.49	Mg/m3
0.996	0.775	
95	111	%
22.0		°C
Not measured		kPa
		%

Note: C_v corrected to 20°C

Remarks: Stage 1 - swelling

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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One Dimensional Consolidation Test

Tested in Accordance with: BS 1377-5: 1990: Clause 3

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY

Contact: Lauren Wenham
Site Address: Cranwood, 100 Woodside Avenue, London

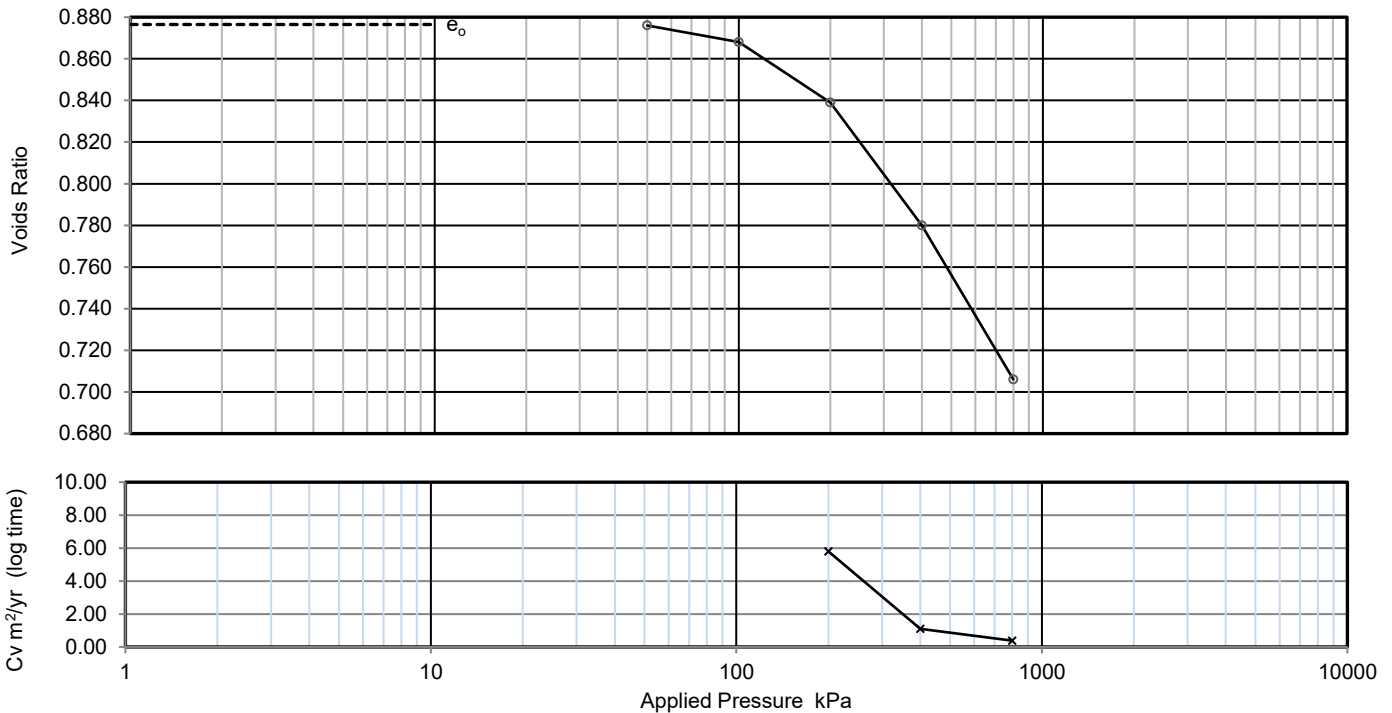
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: STS5215
Job Number: 20-48817
Date Sampled: Not Given
Date Received: 18/12/2020
Date Tested: 15/01/2021
Sampled By: Client

Test Results:

Laboratory Reference: 1726352_1
Hole No.: BH06
Sample Reference: 12
Sample Description: Brown CLAY

Depth Top [m]: 17.00
Depth Base [m]: Not Given
Sample Type: UT

[illegible]

Preparation

Index tests

Orientation of the sample

Particle density

Liquid limit

Plastic limit

Specimen details

Diameter

Height

Moisture Content

Bulk density

Dry density

Voids Ratio

Saturation

Avg. temperature for test

Swelling Pressure

Settlement on saturation

Vertical		
assumed	2.65	Mg/m3
N/A		%
N/A		%

Initial	Final	
50.04	-	mm
20.01	18.19	mm
34	31	%
1.89	2.04	Mg/m3
1.41	1.55	Mg/m3
0.876	0.706	
102	117	%
22.0		°C
Not measured		kPa
		%

Note: C_v corrected to 20°C

Remarks: stage 1,2 - swelling

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY
Contact: Alexa Band
Site Address: Cranwood, 100 Woodside Avenue, London

Client Reference: STS5215
Job Number: 20-49064
Date Sampled: 17/12/2020
Date Received: 21/12/2020
Date Tested: 06/01/2021
Sampled By: Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

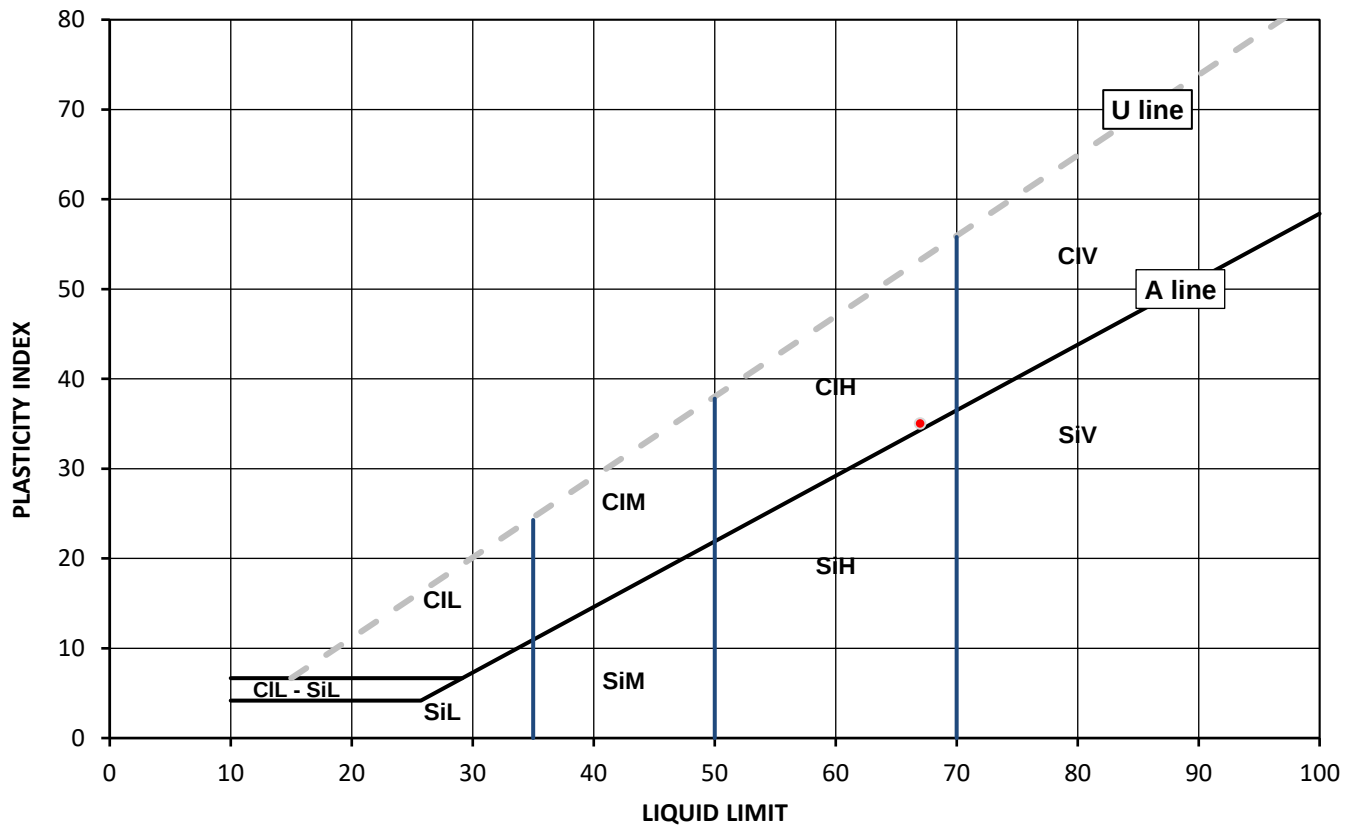
Test Results:

Laboratory Reference: 1727810
Hole No.: BH01
Sample Reference: Not Given
Soil Description: Brown gravelly CLAY

Depth Top [m]: 1.00
Depth Base [m]: Not Given
Sample Type: D

Sample Preparation: Tested after washing to remove >425um

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425um BS Test Sieve
25	67	32	35	64



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Monika Janoszek
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY
Contact: Alexa Band
Site Address: Cranwood, 100 Woodside Avenue, London

Client Reference: STS5215
Job Number: 20-49064
Date Sampled: 17/12/2020
Date Received: 21/12/2020
Date Tested: 07/01/2021
Sampled By: Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

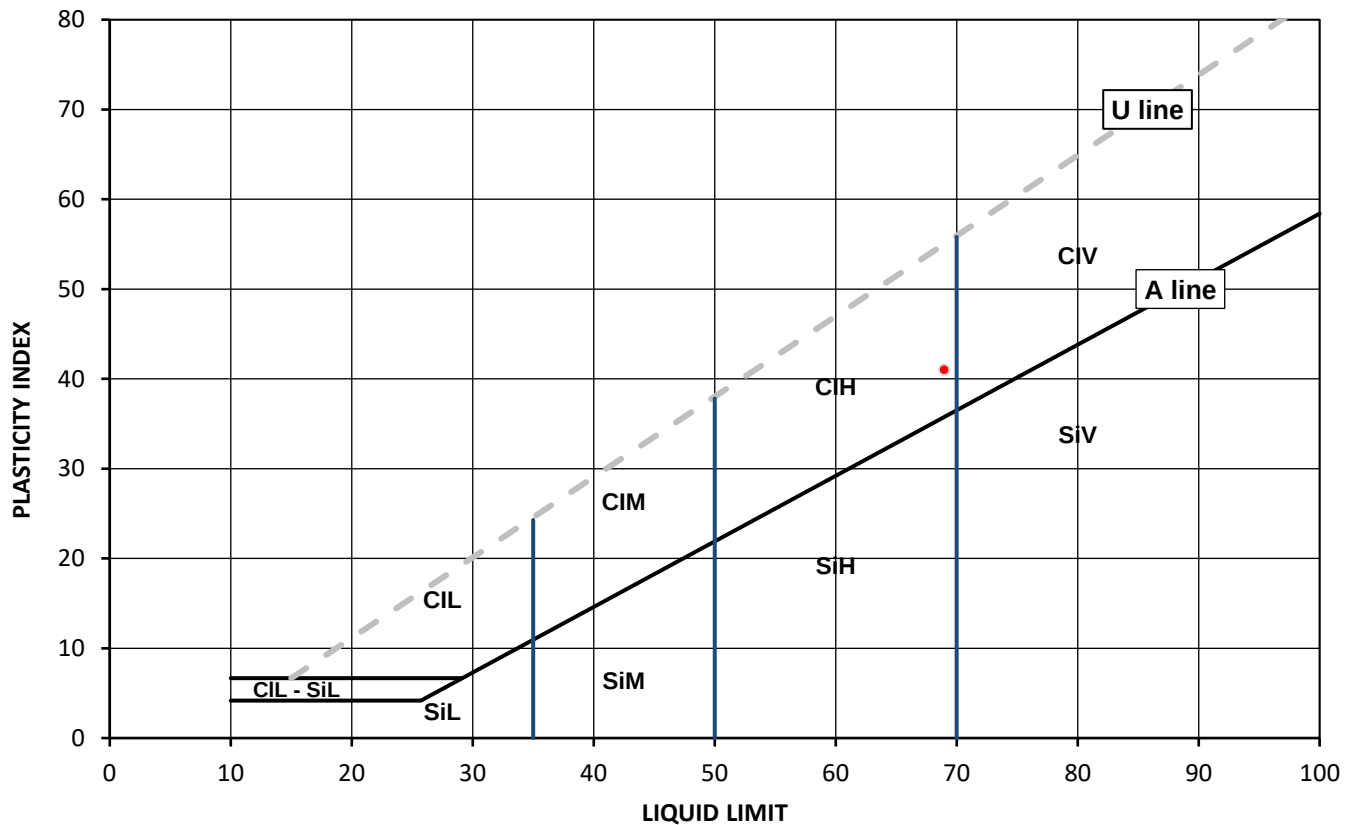
Test Results:

Laboratory Reference: 1727811
Hole No.: BH01
Sample Reference: Not Given
Soil Description: Greyish brown CLAY

Depth Top [m]: 5.00
Depth Base [m]: Not Given
Sample Type: U

Sample Preparation: Tested in natural condition

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
27	69	28	41	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	L Low below 35
Si	Silt	M Medium 35 to 50
	H High 50 to 70	V Very high exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Monika Janoszek
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY
Contact: Alexa Band
Site Address: Cranwood, 100 Woodside Avenue, London

Client Reference: STS5215
Job Number: 20-49064
Date Sampled: 18/12/2020
Date Received: 21/12/2020
Date Tested: 07/01/2021
Sampled By: Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

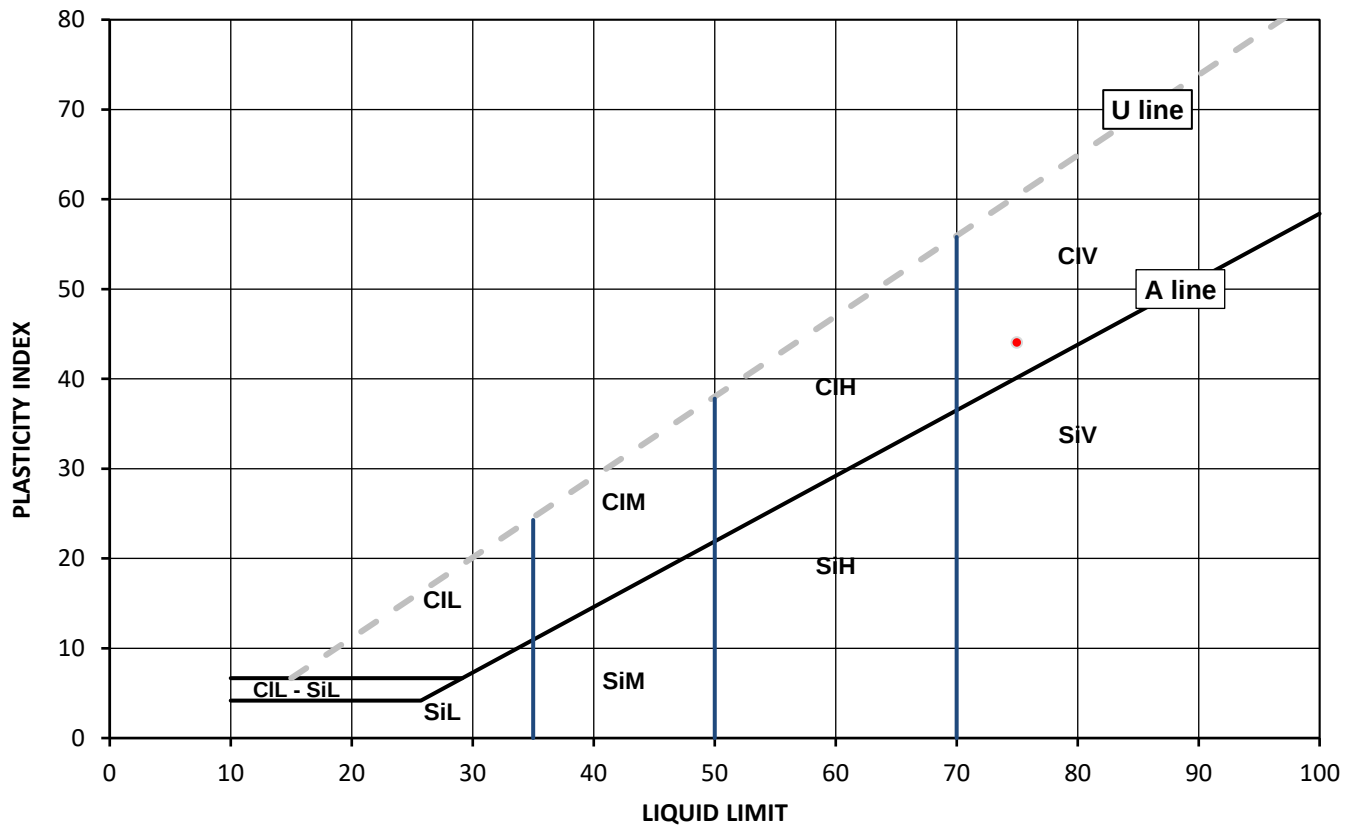
Test Results:

Laboratory Reference: 1727813
Hole No.: BH01
Sample Reference: Not Given
Soil Description: Greyish brown CLAY

Depth Top [m]: 20.00
Depth Base [m]: Not Given
Sample Type: U

Sample Preparation: Tested in natural condition

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
28	75	31	44	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Monika Janoszek
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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SUMMARY REPORT

Summary of Classification Test Results

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Tested in Accordance with:

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY
Contact: Alexa Band
Site Address: Cranwood, 100 Woodside Avenue, London

Moisture Content by BS 1377-2: 1990: Clause 3.2; Water Content by BS EN
17892-1: 2014; Atterberg by BS 1377-2: 1990: Clause 4.3 (4 Point Test),
Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2: 1990: Clause 8.2

Client Reference: STS5215
Job Number: 20-49064
Date Sampled: 17/12 - 18/12/2020
Date Received: 21/12/2020
Date Tested: 06/01 - 07/01/2021
Sampled By: Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Moisture Content [W]	Water Content [W]	Atterberg				Density			Total Porosity#		
		Reference	Depth Top	Depth Base	Type					% Passing 425um	WL	Wp	Ip	bulk	dry	PD			
			m	m															
1727810	BH01	Not Given	1.00	Not Given	D	Brown gravelly CLAY	Atterberg 1 Point	25		64	67	32	35						
1727811	BH01	Not Given	5.00	Not Given	U	Greyish brown CLAY	Atterberg 1 Point	27		100	69	28	41						
1727812	BH01	Not Given	14.00	Not Given	U	Greyish brown CLAY		28											
1727813	BH01	Not Given	20.00	Not Given	U	Greyish brown CLAY	Atterberg 1 Point	28		100	75	31	44						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Monika Janoszek
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Particle Size Distribution

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Tested in Accordance with: BS 1377-2: 1990

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY
Contact: Alexa Band
Site Address: Cranwood, 100 Woodside Avenue, London

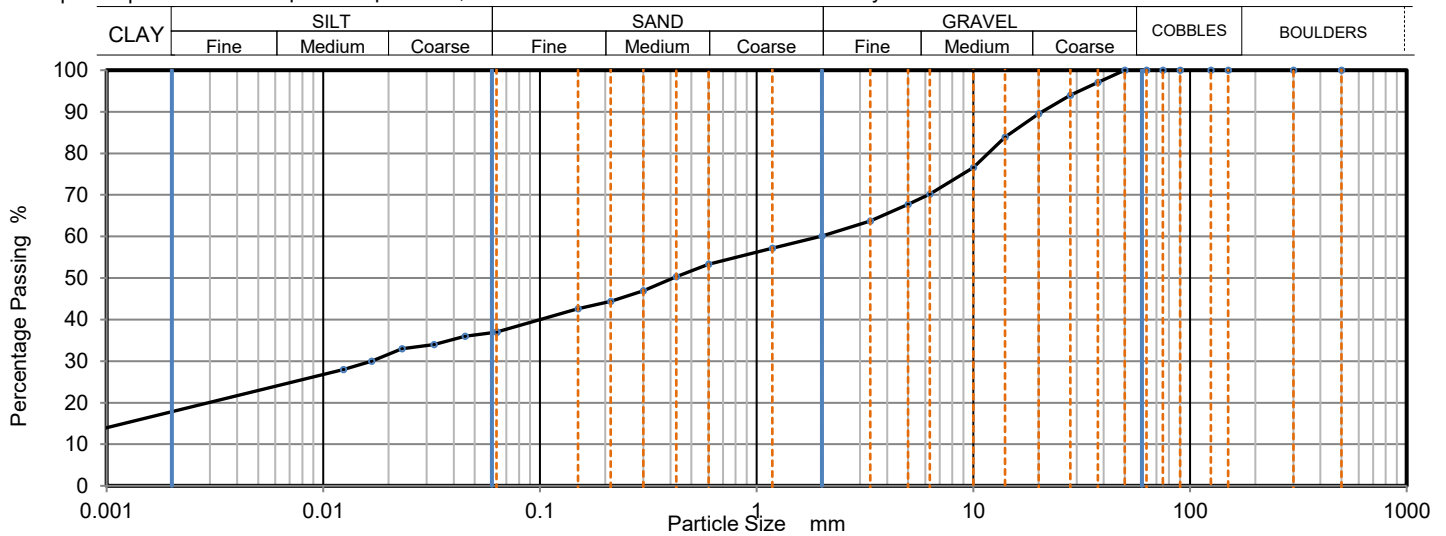
Client Reference: STS5215
Job Number: 20-49064
Date Sampled: 17/12/2020
Date Received: 21/12/2020
Date Tested: 06/01/2021
Sampled By: Client

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

Laboratory Reference: 1727809
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Brown clayey silty very sandy GRAVEL
Sample Preparation: Sample was quartered, oven dried at 106.0 °C and broken down by hand.

Depth Top [m]: 0.60
Depth Base [m]: 0.70
Sample Type: B



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
500	100	0.0634	37
300	100	0.0452	36
150	100	0.0324	34
125	100	0.0231	33
90	100	0.0167	30
75	100	0.0124	28
63	100	0.0008	13
50	100		
37.5	97		
28	94		
20	90		
14	84		
10	77		
6.3	70		
5	68		
3.35	64	Particle density (assumed) 2.65 Mg/m ³	
2	60		
1.18	57		
0.6	53		
0.425	50		
0.3	47		
0.212	44		
0.15	43		
0.063	37		

Sample Proportions	% dry mass
Very coarse	0.00
Gravel	39.90
Sand	23.50
Silt	18.90
Clay	17.70

Grading Analysis	
D100	mm 50
D60	mm 1.95
D30	mm 0.0173
D10	mm
Uniformity Coefficient	> 2300
Curvature Coefficient	

Uniformity Coefficient and Coefficient of Curvature calculated in accordance with BS EN ISO 14688-2: 2004 + A1: 2013

Note: Tested in Accordance with BS1377:Part 2:1990, clauses 9.2 and 9.5

Remarks:

Signed:

Monika Janoszek
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Unconsolidated Undrained

Triaxial Compression
Tested in Accordance with:
BS 1377-7: 1990: Clause 8

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY
Contact: Alexa Band
Site Address: Cranwood, 100 Woodside Avenue, London
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: STS5215
Job Number: 20-49064
Date Sampled: 17/12/2020
Date Received: 21/12/2020
Date Tested: 07/01/2021
Sampled By: Client

Test Results:

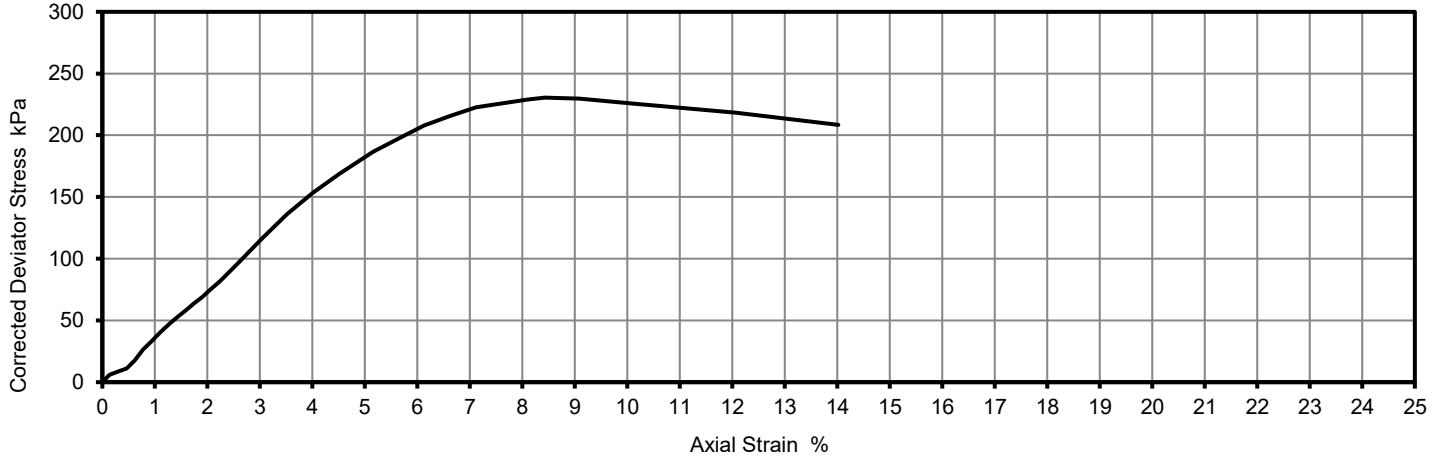
Laboratory Reference: 1727811
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Greyish brown CLAY

Depth Top [m]: 5.00
Depth Base [m]: Not Given
Sample Type: U

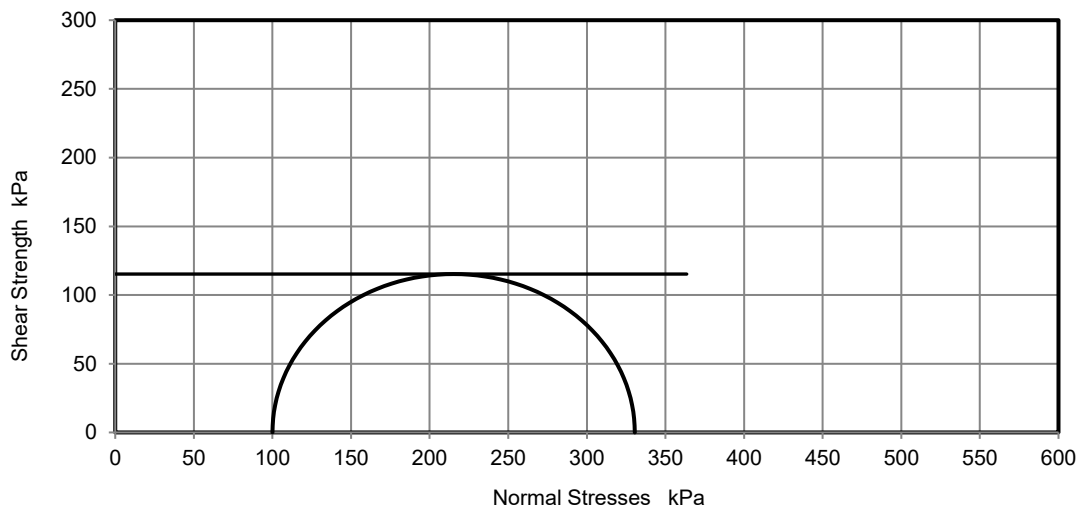
Test Number	1
Length	199.66 mm
Diameter	102.78 mm
Bulk Density	1.93 Mg/m ³
Moisture Content	27 %
Dry Density	1.51 Mg/m ³
Membrane Correction	0.52 kPa

Rate of Strain	2.00 %/min
Cell Pressure	100 kPa
Axial Strain at failure	8.4 %
Deviator Stress, ($\sigma_1 - \sigma_3$) _f	230 kPa
Undrained Shear Strength, c_u	115 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Mode of Failure	Compound
Membrane thickness	0.27 mm

Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377.
This is provided for information only.

Remarks:

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Signed:



Monika Janoszek
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

Tested in Accordance with: BS 1377-5: 1990: Clause 3

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY

Contact: Alexa Band
Site Address: Cranwood, 100 Woodside Avenue, London

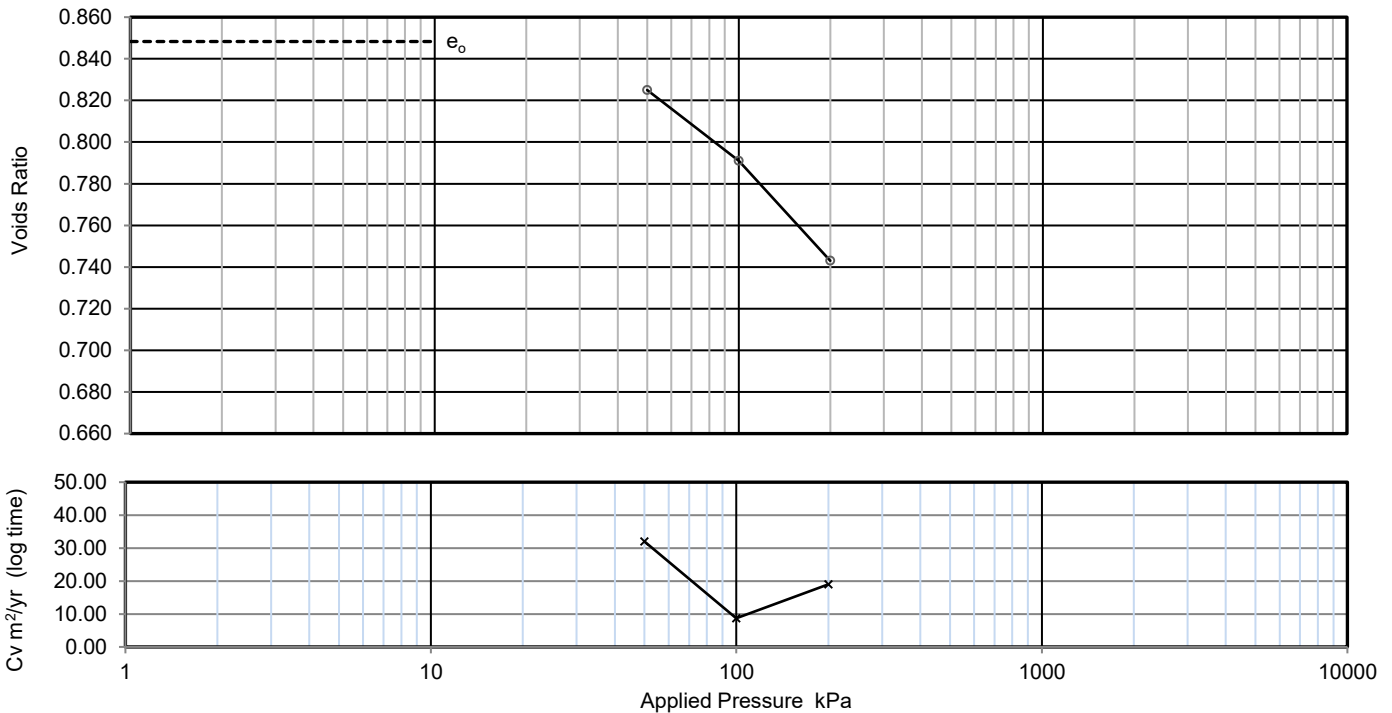
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: STS5215
Job Number: 20-49064
Date Sampled: 17/12/2020
Date Received: 21/12/2020
Date Tested: 08/01/2021
Sampled By: Client

Test Results:

Laboratory Reference: 1727811
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Greyish brown CLAY

Depth Top [m]: 5.00
Depth Base [m]: Not Given
Sample Type: U



Applied Pressure kPa	Voids ratio	Mv m2/MN	Cv (t50, log) m2/yr	Cv (t90, root) m2/yr	Csec
0	0.848	-	-	-	-
50	0.825	0.26	32	47	0.0013
100	0.791	0.36	8.7	15	0.0013
200	0.743	0.27	19	35	0.0013

Preparation

Index tests

Orientation of the sample

Particle density

Liquid limit

Plastic limit

Vertical	
assumed	2.65 Mg/m3
N/A	%
N/A	%

Specimen details

Diameter

Height

Moisture Content

Bulk density

Dry density

Voids Ratio

Saturation

Avg. temperature for test

Swelling Pressure

Settlement on saturation

Initial	Final	
50.00	-	mm
20.00	18.86	mm
28	27	%
1.84	1.93	Mg/m3
1.43	1.52	Mg/m3
0.848	0.743	
88	97	%
22.0		°C
Not measured		kPa
		%

Note: Cv corrected to 20°C

Remarks:

Signed:

Monika Janoszek

PL Deputy Head of Geotechnical Section

for and on behalf of i2 Analytical Ltd

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One Dimensional Consolidation Test

Tested in Accordance with: BS 1377-5: 1990: Clause 3

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY

Contact: Alexa Band
Site Address: Cranwood, 100 Woodside Avenue, London

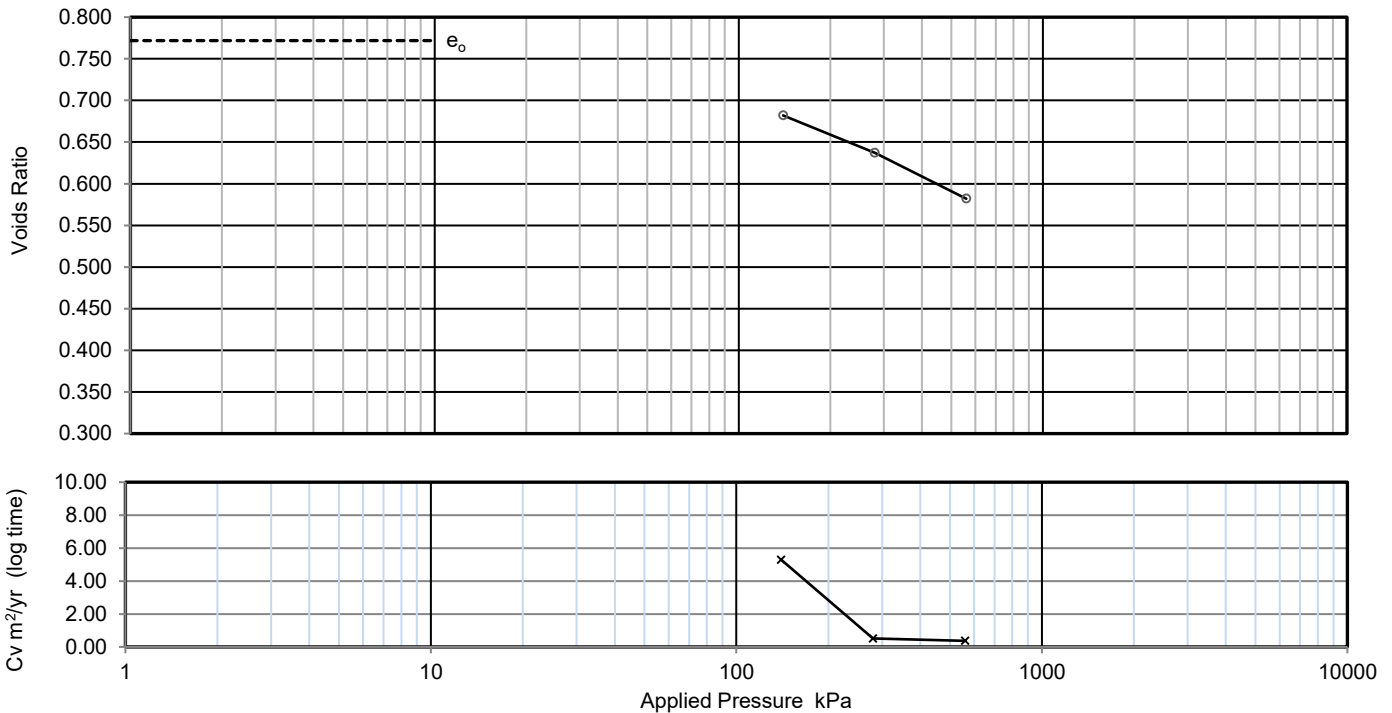
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: STS5215
Job Number: 20-49064
Date Sampled: 17/12/2020
Date Received: 21/12/2020
Date Tested: 08/01/2021
Sampled By: Client

Test Results:

Laboratory Reference: 1727812
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Greyish brown CLAY

Depth Top [m]: 14.00
Depth Base [m]: Not Given
Sample Type: U

[illegible]

Preparation

Index tests

Orientation of the sample

Particle density

Liquid limit

Plastic limit

Specimen details

Diameter

Height

Moisture Content

Bulk density

Dry density

Voids Ratio

Saturation

Avg. temperature for test

Swelling Pressure

Settlement on saturation

Vertical		
assumed	2.65	Mg/m3
N/A		%
N/A		%

Initial	Final	
50.10	-	mm
19.94	17.80	mm
28	27	%
1.92	2.12	Mg/m3
1.50	1.68	Mg/m3
0.772	0.582	
96	121	%
22.0		°C
Not measured		kPa
		%

Note: C_v corrected to 20°C

Remarks:

Signed:

Monika Janoszek
PL Deputy Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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Tested in Accordance with: BS 1377-5: 1990: Clause 3

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY

Contact: Alexa Band
Site Address: Cranwood, 100 Woodside Avenue, London

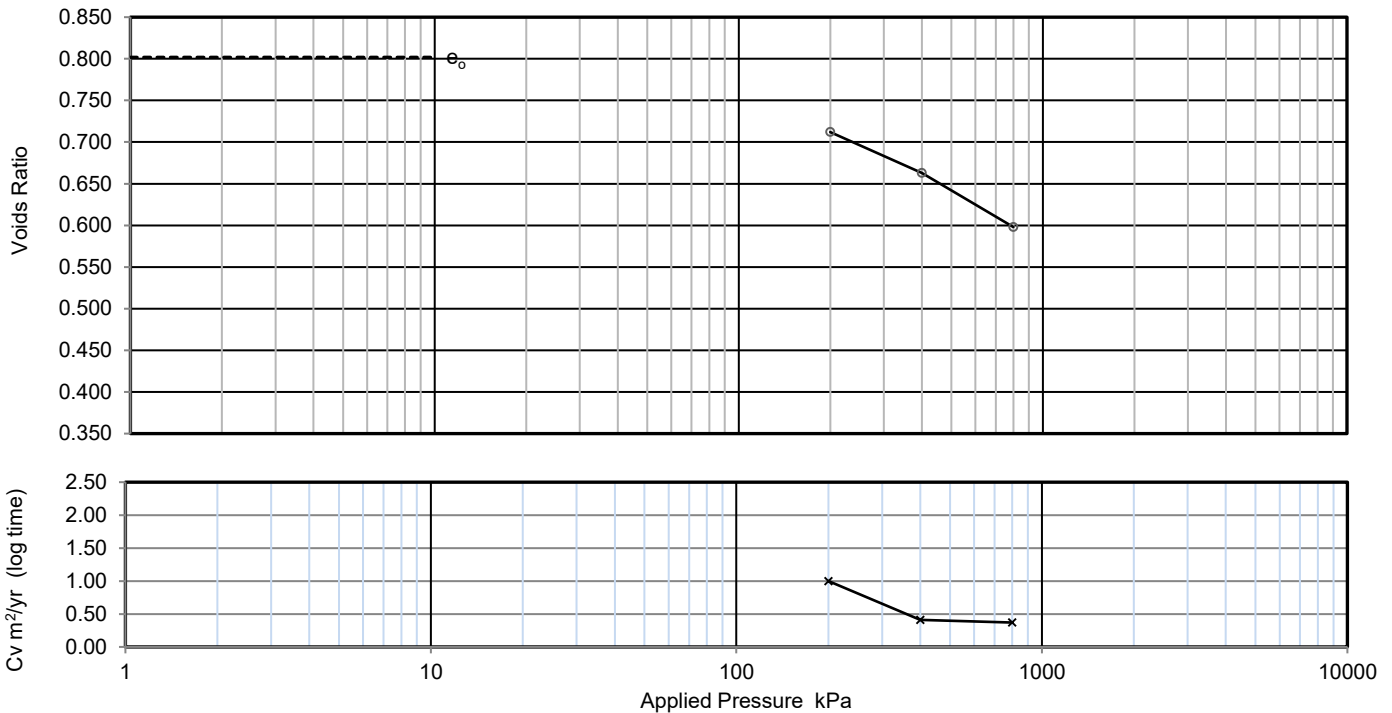
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: STS5215
Job Number: 20-49064
Date Sampled: 18/12/2020
Date Received: 21/12/2020
Date Tested: 08/01/2021
Sampled By: Client

Test Results:

Laboratory Reference: 1727813
Hole No.: BH01
Sample Reference: Not Given
Sample Description: Greyish brown CLAY

Depth Top [m]: 20.00
Depth Base [m]: Not Given
Sample Type: U



Applied Pressure kPa	Voids ratio	Mv m2/MN	Cv (t50, log) m2/yr	Cv (t90, root) m2/yr	Csec
0	0.802	-	-	-	-
200	0.712	0.25	1	12	0.0013
400	0.663	0.14	0.41	0.55	0.0019
800	0.598	0.098	0.37	0.96	0.0025

Preparation

Index tests

Orientation of the sample

Particle density

Liquid limit

Plastic limit

Vertical	
assumed	2.65 Mg/m3
N/A	%
N/A	%

Specimen details

Diameter

Height

Moisture Content

Bulk density

Dry density

Voids Ratio

Saturation

Avg. temperature for test

Swelling Pressure

Settlement on saturation

Initial	Final	
50.00	-	mm
20.00	17.74	mm
29	28	%
1.89	2.12	Mg/m3
1.47	1.66	Mg/m3
0.802	0.598	
95	122	%
22.0		°C
Not measured		kPa
		%

Note: Cv corrected to 20°C

Remarks:

Signed:

Monika Janoszek

PL Deputy Head of Geotechnical Section

for and on behalf of i2 Analytical Ltd

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Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY
Contact: Alexa Band
Site Address: Cranwood, 100 Woodside Avenue, London

Client Reference: STS5215
Job Number: 21-54119
Date Sampled: 06/01/2021
Date Received: 12/01/2021
Date Tested: 04/02/2021
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

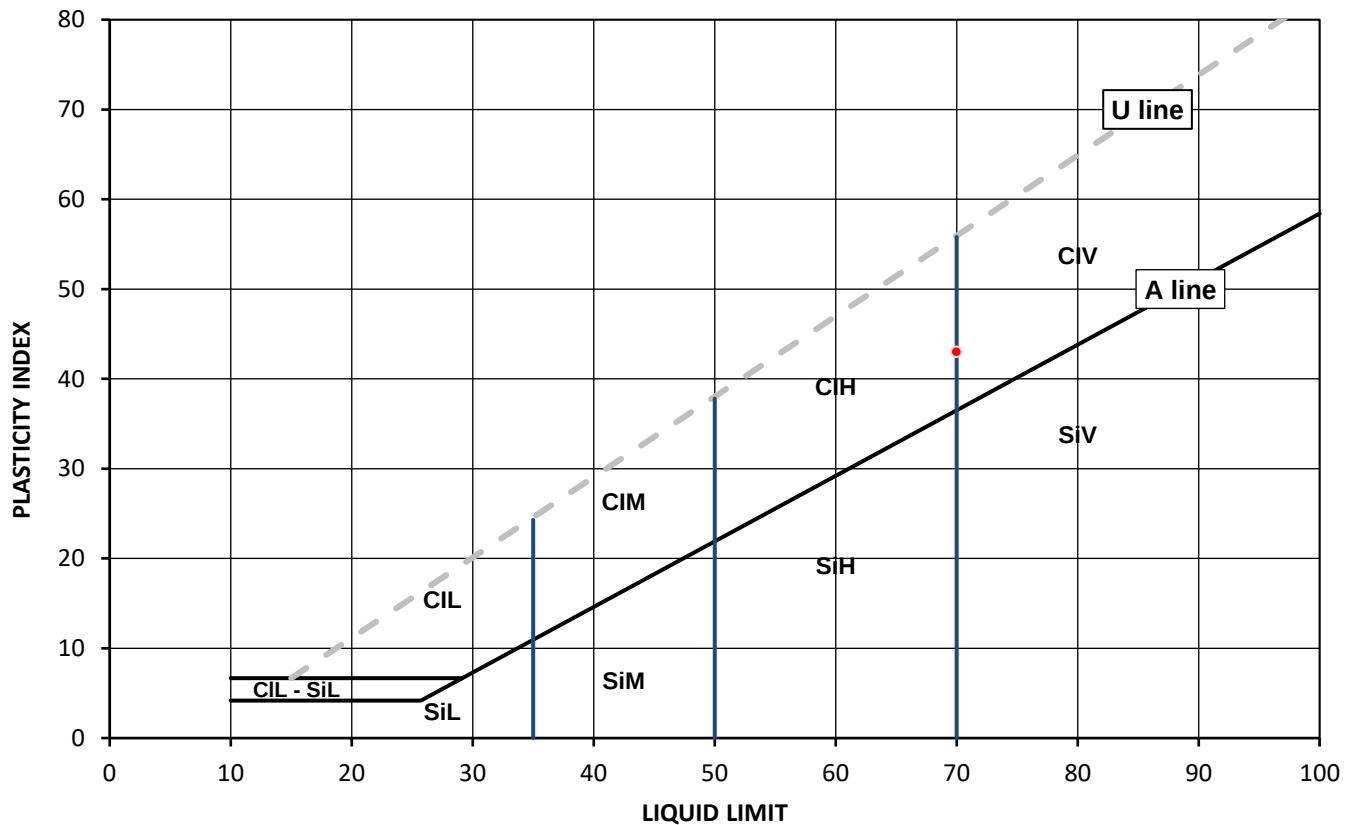
Test Results:

Laboratory Reference: 1754176
Hole No.: BH02
Sample Reference: 7
Soil Description: Brown CLAY

Depth Top [m]: 3.50
Depth Base [m]: 3.95
Sample Type: UT

Sample Preparation: Tested in natural condition

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
29	70	27	43	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY
Contact: Alexa Band
Site Address: Cranwood, 100 Woodside Avenue, London

Client Reference: STS5215
Job Number: 21-54119
Date Sampled: 06/01/2021
Date Received: 12/01/2021
Date Tested: 04/02/2021
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Śląska, Poland

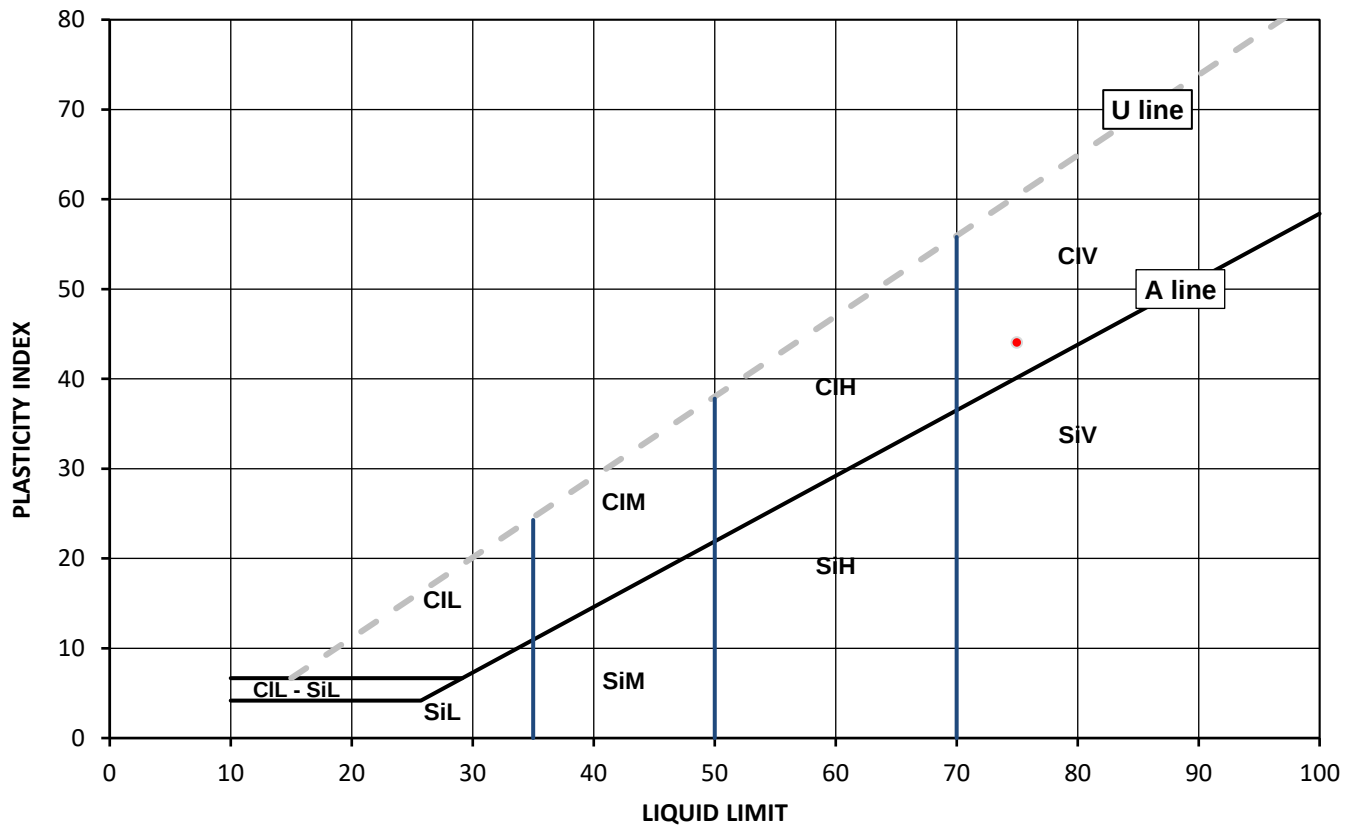
Test Results:

Laboratory Reference: 1754177
Hole No.: BH03
Sample Reference: 9
Soil Description: Greyish brown CLAY

Depth Top [m]: 5.50
Depth Base [m]: 5.95
Sample Type: UT

Sample Preparation: Tested in natural condition

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
29	75	31	44	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl Clay	L Low	below 35
Si Silt	M Medium	35 to 50
	H High	50 to 70
	V Very high	exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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Tested in Accordance with: BS 1377-2: 1990: Clause 4.4 and 5

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY
Contact: Alexa Band
Site Address: Cranwood, 100 Woodside Avenue, London

Client Reference: STS5215
Job Number: 21-54119
Date Sampled: 06/01/2021
Date Received: 12/01/2021
Date Tested: 04/02/2021
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

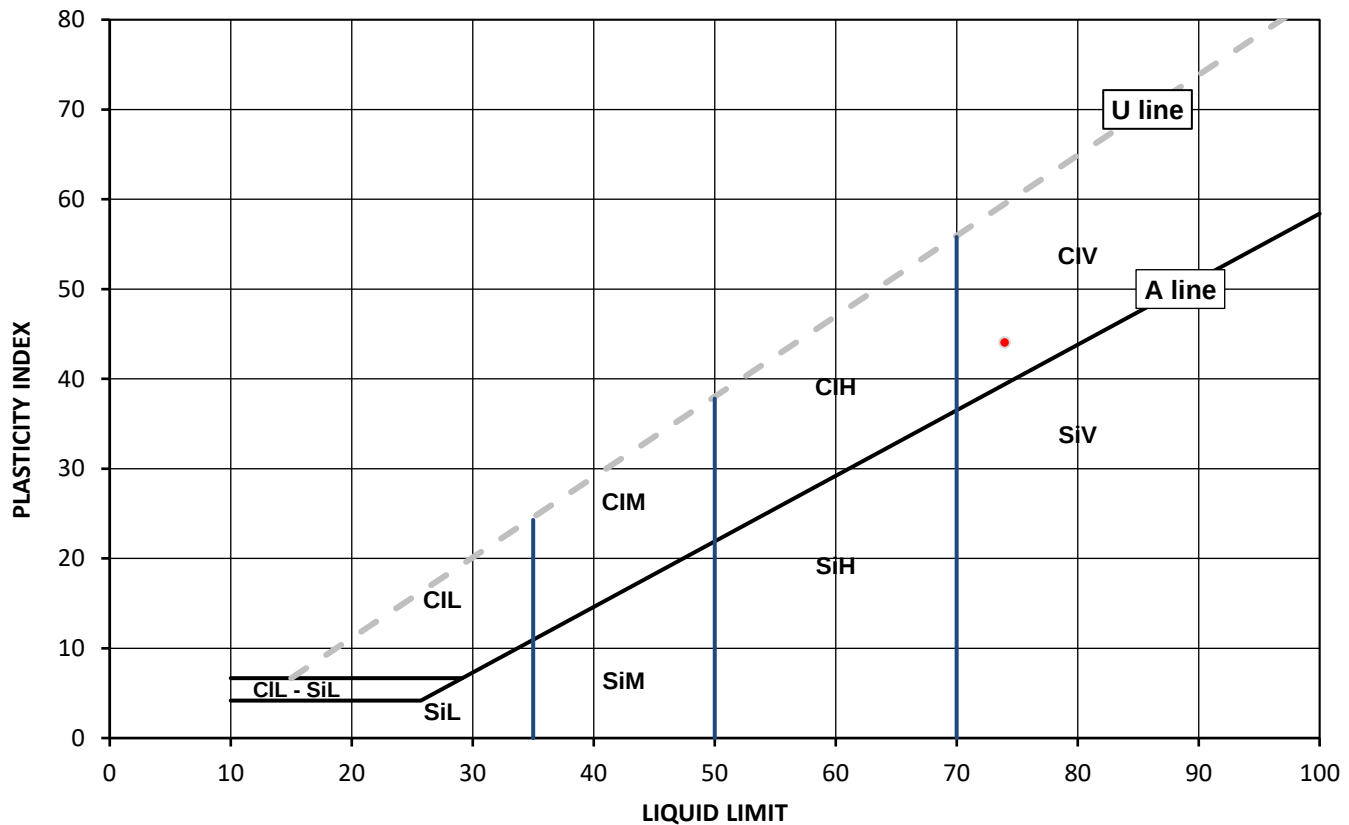
Test Results:

Laboratory Reference: 1754178
Hole No.: BH04
Sample Reference: 13
Soil Description: Brown CLAY

Depth Top [m]: 9.50
Depth Base [m]: 9.95
Sample Type: UT

Sample Preparation: Tested in natural condition

As Received Moisture Content [W] %	Liquid Limit [WL] %	Plastic Limit [Wp] %	Plasticity Index [Ip] %	% Passing 425µm BS Test Sieve
28	74	30	44	100



Legend, based on BS EN ISO 14688 2:2018 Geotechnical investigation and testing – Identification and classification of soil

	Plasticity	Liquid Limit
Cl	Clay	L Low below 35
Si	Silt	M Medium 35 to 50
		H High 50 to 70
		V Very high exceeding 70
	O Organic	append to classification for organic material (eg CIHO)

Note: Moisture Content by BS 1377-2: 1990: Clause 3.2

Remarks:

Signed:

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SUMMARY REPORT

Summary of Classification Test Results

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB



Tested in Accordance with:

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY
Contact: Alexa Band
Site Address: Cranwood, 100 Woodside Avenue, London

Moisture Content by BS 1377-2: 1990: Clause 3.2; Water Content by BS EN
17892-1: 2014; Atterberg by BS 1377-2: 1990: Clause 4.3 (4 Point Test),
Clause 4.4 (1 Point Test) and 5; PD by BS 1377-2: 1990: Clause 8.2

Client Reference: STS5215
Job Number: 21-54119
Date Sampled: 06/01/2021
Date Received: 12/01/2021
Date Tested: 04/02/2021
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test results

Laboratory Reference	Hole No.	Sample				Description	Remarks	Moisture Content [W]	Water Content [W]	Atterberg				Density			Total Porosity#		
		Reference	Depth Top	Depth Base	Type					% Passing 425um	WL	Wp	Ip	bulk	dry	PD			
			m	m															
1754176	BH02	7	3.50	3.95	UT	Brown CLAY	Atterberg 1 Point	29		100	70	27	43						
1754177	BH03	9	5.50	5.95	UT	Greyish brown CLAY	Atterberg 1 Point	29		100	75	31	44						
1754178	BH04	13	9.50	9.95	UT	Brown CLAY	Atterberg 1 Point	28		100	74	30	44						

Note: # Non accredited; NP - Non plastic

Comments:

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Unconsolidated Undrained

Triaxial Compression

Tested in Accordance with:
BS 1377-7: 1990: Clause 8

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY
Contact: Alexa Band
Site Address: Cranwood, 100 Woodside Avenue, London

Client Reference: STS5215
Job Number: 21-54119
Date Sampled: 06/01/2021
Date Received: 12/01/2021
Date Tested: 04/02/2021
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

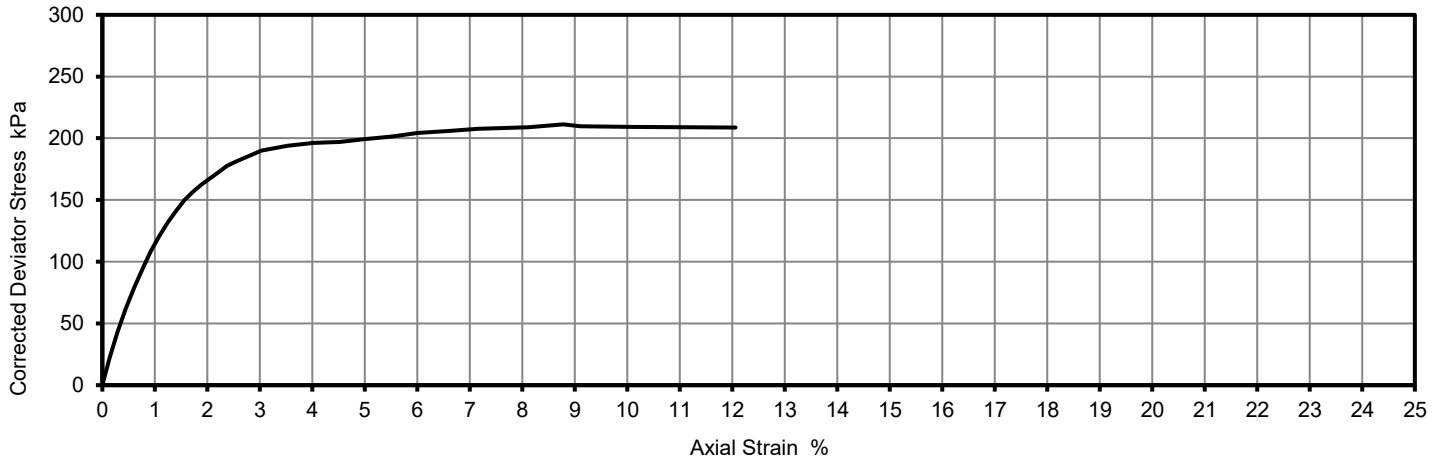
Laboratory Reference: 1754176
Hole No.: BH02
Sample Reference: 7
Sample Description: Brown CLAY

Depth Top [m]: 3.50
Depth Base [m]: 3.95
Sample Type: UT

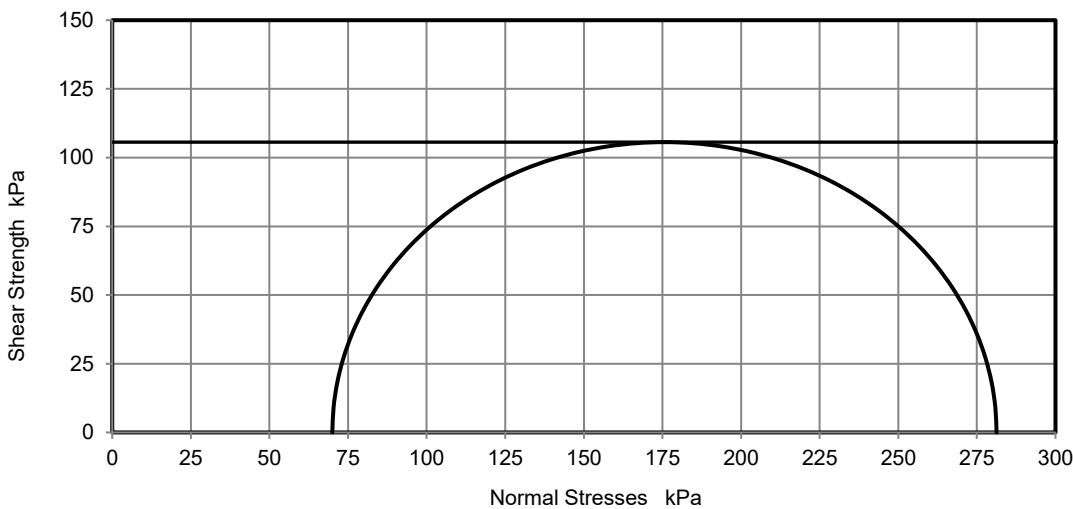
Test Number	1
Length	201.47 mm
Diameter	103.00 mm
Bulk Density	1.96 Mg/m ³
Moisture Content	29 %
Dry Density	1.52 Mg/m ³
Membrane Correction	0.59 kPa

Rate of Strain	1.99 %/min
Cell Pressure	70 kPa
Axial Strain at failure	8.8 %
Deviator Stress, $(\sigma_1 - \sigma_3)_f$	211 kPa
Undrained Shear Strength, c_u	106 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Mode of Failure	Brittle
Membrane thickness	0.30 mm

Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377.
This is provided for information only.

Remarks: Test carried out at OVB pressure.

Signed:



Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Unconsolidated Undrained

Triaxial Compression

Tested in Accordance with:
BS 1377-7: 1990: Clause 8

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY
Contact: Alexa Band
Site Address: Cranwood, 100 Woodside Avenue, London

Client Reference: STS5215
Job Number: 21-54119
Date Sampled: 06/01/2021
Date Received: 12/01/2021
Date Tested: 04/02/2021
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

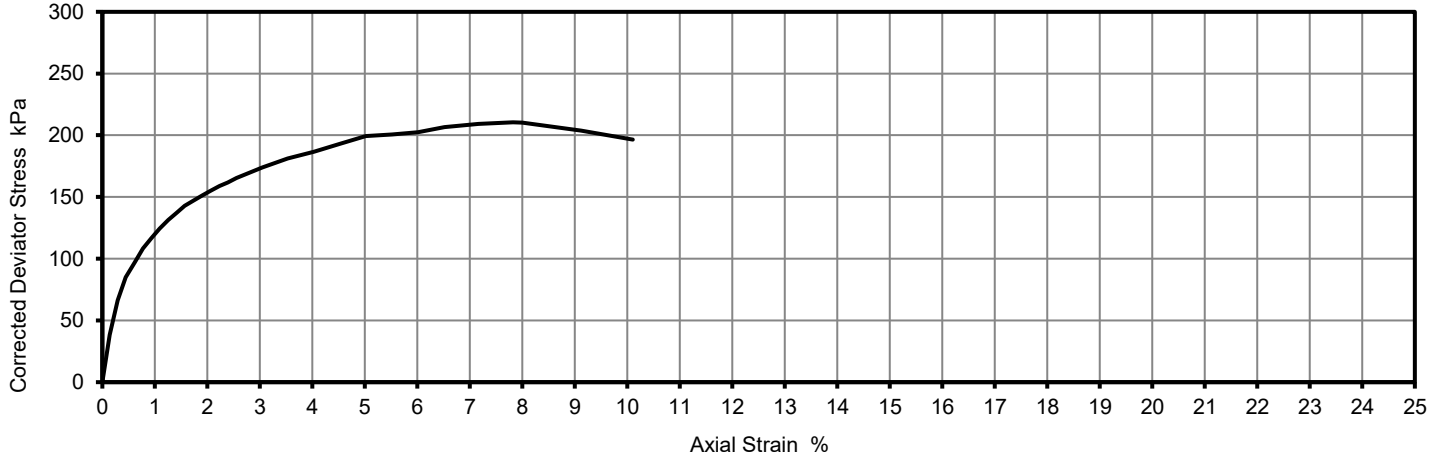
Laboratory Reference: 1754177
Hole No.: BH03
Sample Reference: 9
Sample Description: Greyish brown CLAY

Depth Top [m]: 5.50
Depth Base [m]: 5.95
Sample Type: UT

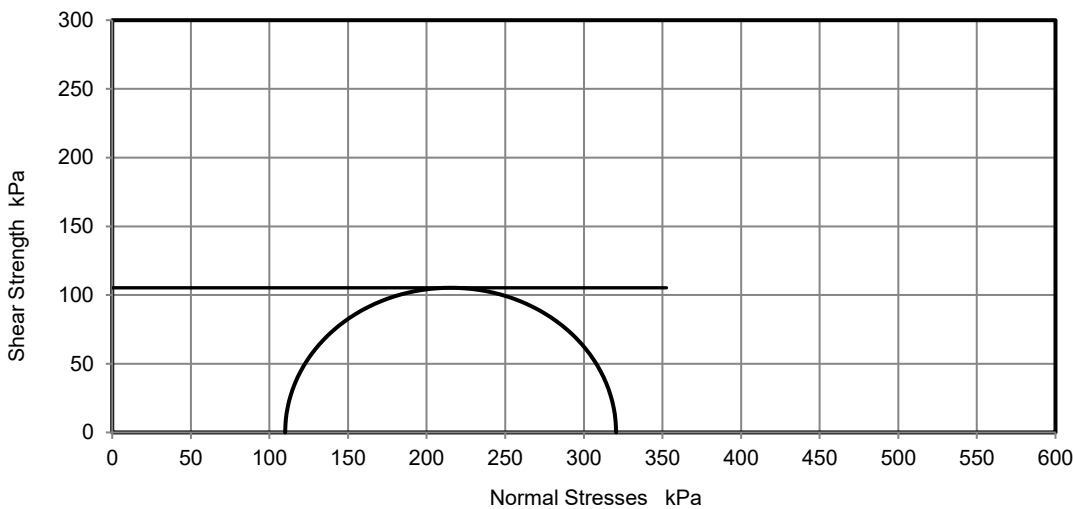
Test Number	1
Length	203.58 mm
Diameter	103.25 mm
Bulk Density	1.98 Mg/m ³
Moisture Content	29 %
Dry Density	1.53 Mg/m ³
Membrane Correction	0.56 kPa

Rate of Strain	1.96 %/min
Cell Pressure	110 kPa
Axial Strain at failure	7.8 %
Deviator Stress, ($\sigma_1 - \sigma_3$) _f	210 kPa
Undrained Shear Strength, c_u	105 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Mode of Failure	Brittle
Membrane thickness	0.31 mm

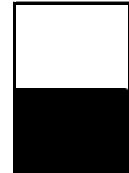
Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377.
This is provided for information only.

Remarks: Test carried out at OVB pressure.

Signed:



Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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TEST CERTIFICATE

Unconsolidated Undrained

Triaxial Compression

Tested in Accordance with:
BS 1377-7: 1990: Clause 8

i2 Analytical Ltd
Unit 8 Harrowden Road
Brackmills Industrial Estate
Northampton NN4 7EB

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY
Contact: Alexa Band
Site Address: Cranwood, 100 Woodside Avenue, London

Client Reference: STS5215
Job Number: 21-54119
Date Sampled: 06/01/2021
Date Received: 12/01/2021
Date Tested: 04/02/2021
Sampled By: Not Given

Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Test Results:

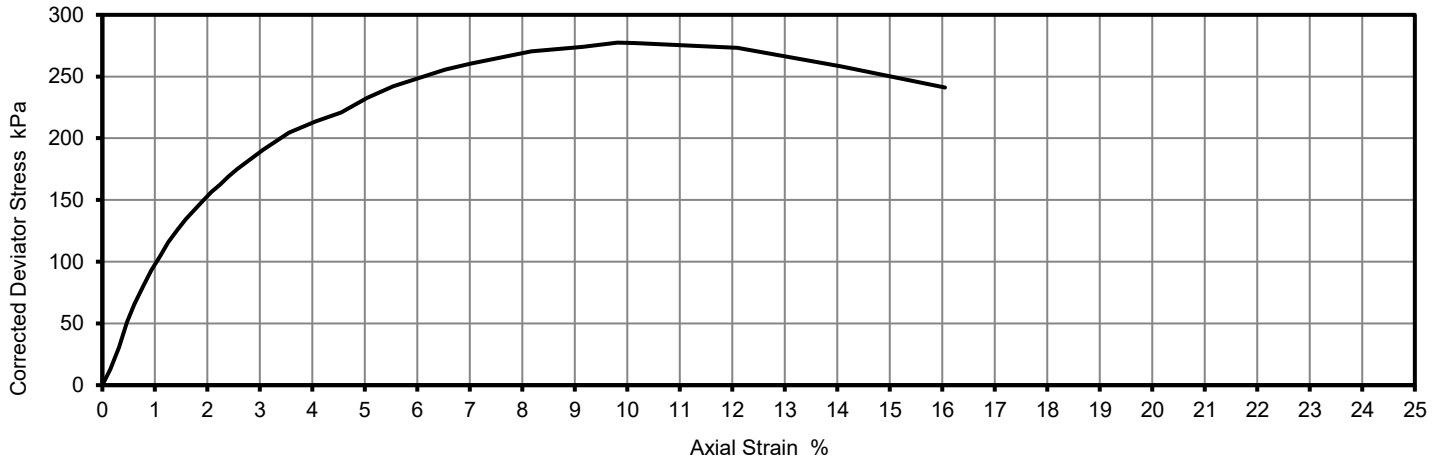
Laboratory Reference: 1754178
Hole No.: BH04
Sample Reference: 13
Sample Description: Brown CLAY

Depth Top [m]: 9.50
Depth Base [m]: 9.95
Sample Type: UT

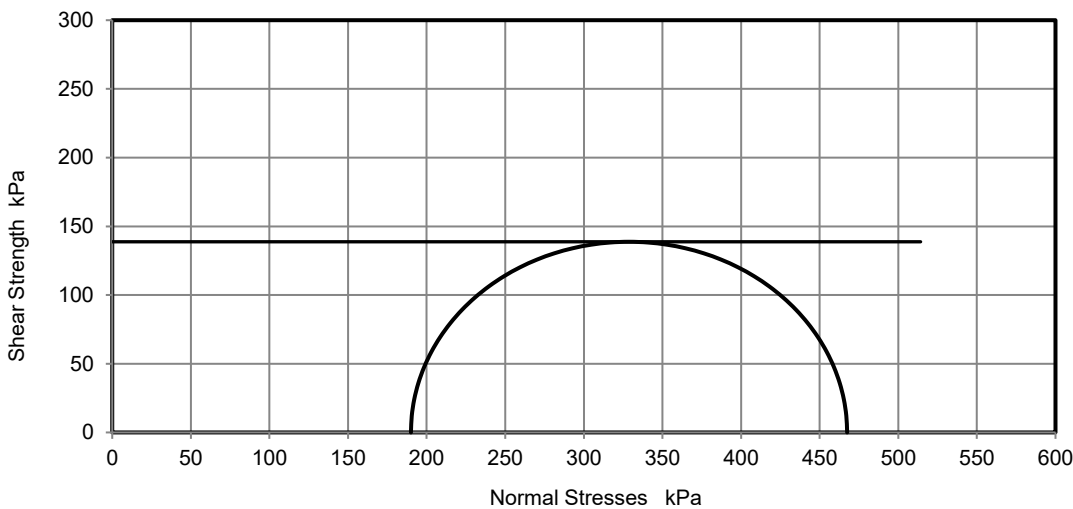
Test Number	1
Length	201.30 mm
Diameter	101.68 mm
Bulk Density	2.01 Mg/m ³
Moisture Content	28 %
Dry Density	1.57 Mg/m ³
Membrane Correction	0.63 kPa

Rate of Strain	1.99 %/min
Cell Pressure	190 kPa
Axial Strain at failure	9.8 %
Deviator Stress, ($\sigma_1 - \sigma_3$) _f	277 kPa
Undrained Shear Strength, c_u	139 kPa $\frac{1}{2}(\sigma_1 - \sigma_3)_f$
Mode of Failure	Brittle
Membrane thickness	0.29 mm

Deviator Stress v Axial Strain



Mohr Circles



Position within sample



Note: Deviator stress corrected for area change and membrane effects. Mohr circles and their interpretation is not covered by BS1377.
This is provided for information only.

Remarks: Test carried out at OVB pressure.

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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One Dimensional Consolidation Test

Tested in Accordance with: BS 1377-5: 1990: Clause 3

Client: Soiltechnics Limited
Client Address: Cedar Barn, White Lodge,
Walgrave, Northampton,
NN6 9PY

Contact: Alexa Band
Site Address: Cranwood, 100 Woodside Avenue, London

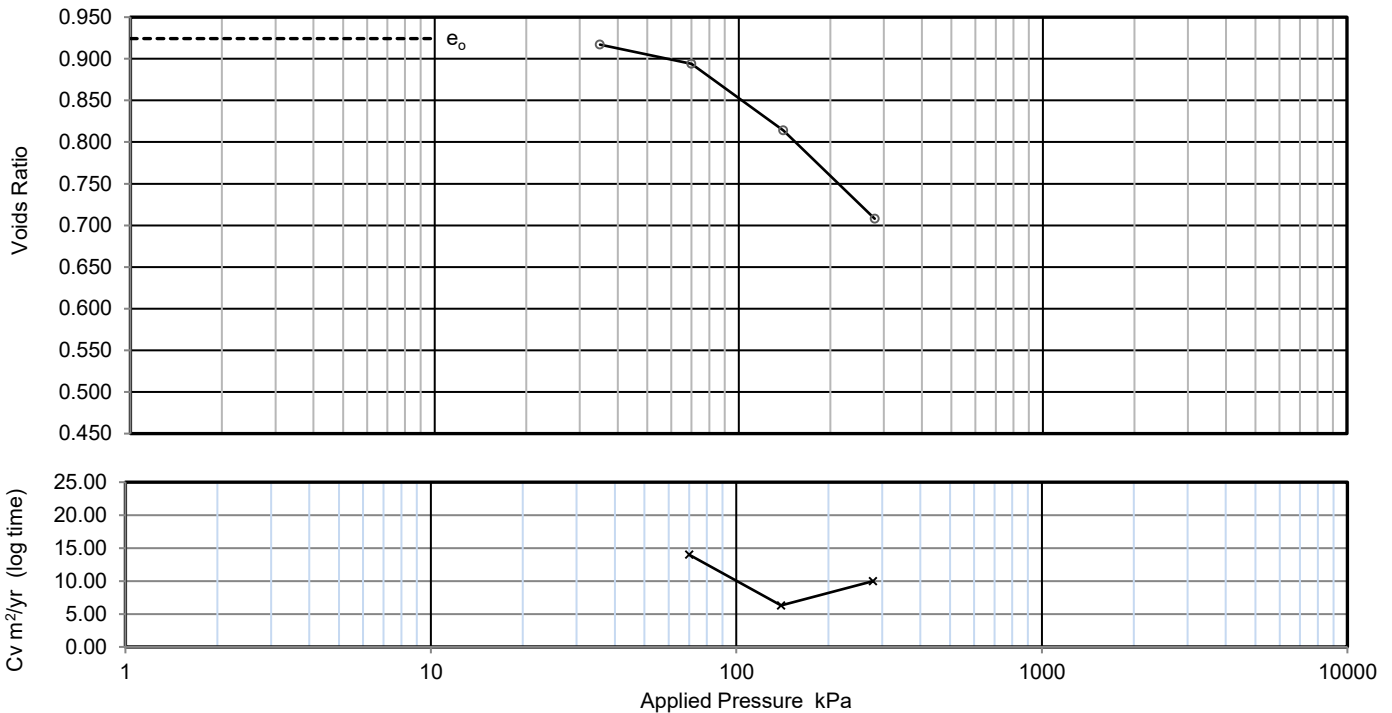
Testing carried out at i2 Analytical Limited, ul. Pionierow 39, 41-711 Ruda Slaska, Poland

Client Reference: STS5215
Job Number: 21-54119
Date Sampled: 06/01/2021
Date Received: 12/01/2021
Date Tested: 08/02/2021
Sampled By: Not Given

Test Results:

Laboratory Reference: 1754176
Hole No.: BH02
Sample Reference: 7
Sample Description: Brown CLAY

Depth Top [m]: 3.50
Depth Base [m]: 3.95
Sample Type: UT

[illegible]

Preparation

Index tests

Orientation of the sample

Particle density

Liquid limit

Plastic limit

Specimen details

Diameter

Height

Moisture Content

Bulk density

Dry density

Voids Ratio

Saturation

Avg. temperature for test

Swelling Pressure

Settlement on saturation

Vertical		
assumed	2.65	Mg/m3
N/A		%
N/A		%

Initial	Final	
50.02	-	mm
20.02	17.77	mm
31	31	%
1.80	2.04	Mg/m3
1.38	1.55	Mg/m3
0.924	0.708	
88	117	%
22.0		°C
Not measured		kPa
		%

Note: C_v corrected to 20°C

Remarks: stage 1-swelling

Signed:

Szczepan Bielatowicz
PL Deputy of Head of Geotechnical Section
for and on behalf of i2 Analytical Ltd

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