A14 – Land Contamination

A14.1 – Geotechnical Baseline Report (Hyder Consulting (UK) Limited)

A14.2 – Geotechnical Desk Study (Mott MacDonald)

A14.3 – Unexploded Ordnance Desk Study (MACC International)

A14.4 – Redevelopment of 81 King William Street (Wembley Laboratories Limited)

A14.5 – Redevelopment of 10 King William Street (Wimpey Laboratories Limited)

A14.6 – The Walbrook Development (Fugro Engineering Services Limited)

A14.7 – NM Rothschild Bank (Ground Investigations) (Norwest Holst Soil Engineering Ltd)

A14.8 – The Walbrook Square Development (Soiltechnics)

A14.9 – Bank Station Capacity Upgrade – Abstraction and Historic Wells Current Status (London Underground Limited)

A14.10 – Envirocheck Report (Landmark)

A14.1 – Geotechnical Baseline Report (Hyder Consulting (UK) Limited)

Bank Station Capacity Upgrade

Geotechnical Baseline Report

Report No	0011-UA04557-UP31R-02
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Bank Station Capacity Upgrade

Geotechnical Baseline Report

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Report No	0011-UA04557-UP31R-02	
Date	3 October 2012	

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CONTENTS

1 Introduction

This Geotechnical Baseline Report has been prepared for issue as part of the tender documents as a contractual frame of reference for the ground.

The Baseline Statements in the report are not necessarily fact and the report does not provide a warranty that the Baseline conditions will be encountered. The actual conditions encountered during construction could be more or less favourable than the conditions described in the Baseline Statements. The parameters provided in the report are not therefore 'design parameters' and should not be adopted as such. Responsibility for design and construction including the selection of 'design parameters' will lie with those organisations contracted for those tasks. The Baseline Statements made in this Geotechnical Baseline Report may contradict statements made elsewhere in the contract documents. They do not relieve the Contractor of its health and safety responsibilities.

The report, including the Baseline Statements, has been prepared to reflect the Base Case RIBA D design as described in the following reports:

- London Underground, Bank Station Capacity Upgrade – Base Case RIBA D Final report – Volume 1, LUSTN-0008798-DOC-004307 v1.0, March 2012

- London Underground, Bank Station Capacity Upgrade – Base Case RIBA D Final report – Volume 2, LUSTN-0008798-DOC-004468 v1.0, March 2012

The site area covered extends from the northern tie-in to the southern tie-in to the Northern Line southbound tunnel and is illustrated on Figure 1.1.

The design to date has been progressed without project specific ground investigation being undertaken. As a result there is little project specific information available to accurately determine 'design parameters' for soils and groundwater conditions. Information contained within this report, including the Baseline Statements, is based on information currently available to LU. It may be contradicted or superseded either as a result of changes to the Base Case RIBA D design or following the receipt of currently unavailable ground investigation data and any project specific ground investigation. Records of the available ground investigation data used to produce this report are provided in Appendix 1. The geotechnical desk study referred to a number of site investigations for developments in the area. However, at the time of writing this information had not been obtained, with the exception of those borehole logs available on the British Geological Survey's website. This website also contains records of a number of wells in the area. These have not been included in Appendix 1 or used in the assessment given their general lack of detailed soil descriptions.

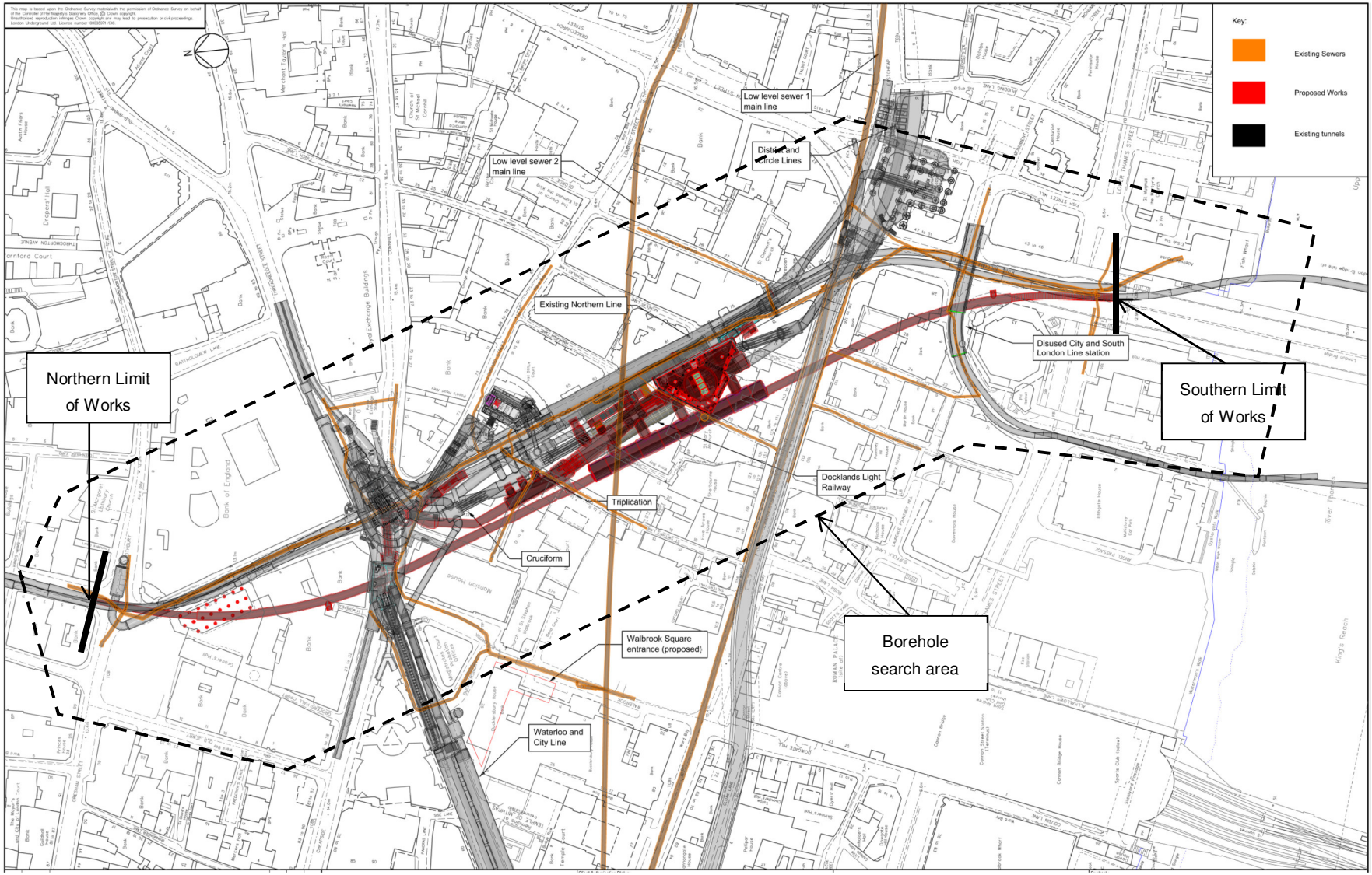


Figure 1.1 Plan of Extent of Base Case RIBA D works

2 Site Geological Characterisation

2.1 Terminology

In this report, the terms “fissure”, “fissures”, “fissured” and “fissuring” have been used to describe all non-bedding related naturally occurring discontinuities (such as joints, shears etc.) other than those directly associated with faulting.

In this report, coarse-grained soils are defined as those soils that consist of over about 65% gravel and sand size particles. Conversely, fine-grained soils are defined as soils that consist of more than about 35% clay and silt size particles.

In this report “works at the 10KWS site” has been used to describe shaft excavation and lining work at 10 King William Street described in the Base Case RIBA D design.

In this report “remainder of the works” has been used to describe all underground excavation, lining, settlement mitigation and treatment of foundation clashes described in the Base Case RIBA D design, other than works at the 10KWS site.

In this report “the whole works” has been used to describe works at the 10KWS site and the remainder of the works.

2.2 Geological Sequence

Site characterisation is based on information from the ground investigations listed in Section 3. The geological sequence at the site is listed below; descriptions of each stratum are given in Sections 2.2 to 2.6 and 3.3.1 to 3.3.4.

- Made Ground
- Alluvium
- River Terrace Deposits (Taplow Gravel Formation)
- London Clay Formation
- Lambeth Group
- Thanet Sand Formation
- Chalk Group

2.3 Made Ground

Towards the bank of the River Thames the Made Ground is associated with reclamation and wharf construction and redevelopment over a prolonged period. The site area in general has been subject to cycles of reconstruction since Roman times, dominated more recently by backfilling of bomb craters, foundation and basement construction, highway development and installation of utilities.

The range of material to be encountered is correspondingly varied, with borehole logs indicating generally granular material to be dominant.

2.4 Alluvium

Alluvium is present adjacent to the River Thames as far north as Arthur Street and is also associated with the former course of the River Walbrook, a tributary of the Thames.

Alluvium in the site area is composed of cohesive deposits.

2.5 River Terrace Deposits

River Terrace Deposits (Taplow Gravel Formation) are present across the site area site except where removed or cut by the alluvial deposits of the Wallbrook valley. Locally they will be absent due to excavation for basement construction.

Where present, they comprise very loose to very dense brown and black sands and fine to coarse gravels locally with subordinate cohesive beds. The gravels are subangular to rounded and the sand is fine to coarse

2.6 London Clay Formation

The London Clay Formation is present beneath the entire site area.

The London Clay Formation is heavily over consolidated and can be divided into a number of units (King, 1981), with the lower units (A3 and A2) being more sandy than the upper units (A3 (II) and B). Insufficient project detail is currently available to assign the London Clay at the site to a particular unit or units.

The London Clay Formation is generally firm becoming stiff to very stiff/hard with depth and is brown where weathered but otherwise grey in colour. It is extremely closely fissured in places with occasional partings of silt or fine sand. Some claystone nodules and the presence of pyritised material and fossil shells have been noted.

2.7 Lambeth Group, Thanet Sands Formation and Chalk Group

These strata are present beneath the whole of the site area but are not anticipated to be encountered during the proposed tunnelling works. The top of the Lambeth Group lies at between 58m and 66m below existing ground level along the proposed new running tunnel alignment.

2.8 Groundwater Conditions

Two aquifers are typically encountered in the Central London area, upper and lower, separated by the London Clay Formation and cohesive layers of the Lambeth Group. The upper aquifer occurs in the superficial deposits (River Terrace Deposits and granular Made Ground). The lower, confined aquifer occurs in the deeper permeable strata comprising the Upnor Formation (basal unit of the Lambeth Group), Thanet Sands Formation and the Chalk Group.

Dewatering of the lower aquifer (comprising the Chalk Group, Thanet Sand and Upnor Formations) by groundwater extraction during the 19th and 20th centuries has resulted in underdrained conditions in the low permeability London Clay Formation and Lambeth Group, creating a characteristic under-drained pore water profile. Since the mid-1960's the rate of abstraction has declined with the result that groundwater levels in the confined lower aquifer

began to rise. Beginning in 1999, new public water supply abstractions were implemented in selected locations as a result of the GARDIT initiative to control the rise, and groundwater levels are now broadly stable in the London Basin.

Groundwater pore water pressure profiles in central London are critically influenced by the lower aquifer water levels. Typically, the existing pore water pressure profiles in the London Clay and Lambeth Group are sub-hydrostatic as a consequence of under-drainage from aquifer pumping. Further complexity is added by the presence of the Harwich Formation (where present below the London Clay Formation) and sandier layers within the low permeability clays of the Lambeth Group. This leads to the presence of hydraulically isolated pockets of watercharged sands with a significant reservoir capacity within predominantly clay layers.

3 Baseline Statements

Background information is given to set the context where relevant, this does not form part of the Baseline Statements. The Baseline Statements are shown in ***bold italics***.

Levels are given in metres above tunnel datum (mATD). The tunnel datum is 100m below Ordnance Datum.

3.1 Man Made Features

3.1.1 Foundations

There are many structures throughout the site which have basements or foundations which could potentially interface with the proposed works. According to the information available to London Underground it is anticipated that the following structures include basements. Unless indicated otherwise these structures should be assumed to be founded on shallow foundations. In cases where information regarding foundations is not available at present any assumptions regarding foundation type are stated below.

One Lothbury
This building has a lower ground floor and basement with a secant piled retaining wall.

6-8 Prince's Street
This building has a sub-basement and basement, and is founded on piles with a toe level understood to be approximately 80.1m ATD.

Grocers Hall
This building has a lower ground floor. It is assumed that the foundations comprise both strip footings and piles.

5 Prince's Street, 27-35 Poultry
This building has a three level basement. Mass concrete shallow foundations are assumed. Potential redevelopment of this structure is understood to include construction of piles.

1 Prince's Street
This building has a three level basement assumed to be founded on a raft slab, however, there are indications that caissons were sunk during construction.

Mansion House
This building has a cellar/vault and is supported on timber piles (reinforced with concrete). The building has been subject to a number of phases of underpinning work.

1-6 Lombard Street
This building has a single basement level.

8-10 Mansion House Place
This building has a lower ground floor and basement, and is founded on piles with a toe level understood to be approximately 71.3m ATD. Some piles supporting an earlier structure on the site were re-used, however, their toe level is unknown.

1-10 St Swithin's Lane
This building has a lower ground floor and basement, and is founded on piles with a toe level understood to be approximately 70m ATD. Archive drawings indicate that an earlier building on the site was founded on piles. The north-east part of the new building was constructed over an

existing basement and no further piling was carried out. It is not known if these piles were re-used.

20 St Swithin's Lane comprising Sandeman House and Don Restaurant, 19 St Swithin's Lane, 21-23 St Swithin's Lane
Nos.20 and 21-23 have two levels of vaulted cellars assumed to be supported on strip footings. No.19 is assumed to be founded on piles.

1 King William Street
This building has a lower ground level, sub-basement and basement.

5 King William Street
This building has a two level basement.

15 Abchurch Lane
This building has a two level basement. It is assumed to be founded either on pad foundations or a raft.

St Mary Abchurch
This church lies above a 14th century crypt.

Sherbourne House: 119 Cannon Street; 14 Sherbourne Lane
This building has a two level basement.

121 Cannon Street
It is not yet known whether this building has a basement. The building is assumed to be founded on strip footings.

123-127 Cannon Street, 5 Abchurch Yard, St Mary Abchurch House
It is not yet known whether this building has a basement. The building is assumed to be founded on strip footings.

129 Cannon Street, 1 Abchurch Yard
It is not yet known whether this building has a basement. The building is assumed to be founded on strip footings.

131-133 Cannon Street
It is not yet known whether this building has a basement. The building is assumed to be founded on strip footings.

135-141 Cannon Street
This building has a lower ground floor and basement with a strongroom supported by piles

20 Abchurch Lane
This building has a lower ground floor and basement.

10 King William Street
This building has a lower ground floor and basement with a bored piled retaining wall.

12 Nicholas Lane
This building has a single basement.

14 Nicholas Lane
This building has a single basement.

143-149 Cannon Street
This building has two basement levels. The building is assumed to be founded on piles.

18 King William Street
This building has a lower ground floor and basement with a bored piled retaining wall. The building is assumed to be founded on piles.

Guild Church of St Mary Woolnoth
This original church crypt has been redeveloped to form part of the booking hall of Bank Station. Shafts for the Station's Lombard Street lifts were sunk from within the church.

87 King William Street
This building was constructed to form an entrance and ticket office to Bank Station below. It is assumed to be founded on strip footings.

85 King William Street, 10-16 Lombard Street, Post Office Court
The nature of the basement of this building is currently unknown, but it is assumed to contain at least one basement level. It is understood that the perimeter foundation of a previous building on the site has been re-used, with underpinning undertaken to a level of 88.3m ATD along the Abchurch Lane elevation.

81 King William Street
This building has a lower ground floor and basement.

75 King William Street
It is not yet known whether this building has a basement. The building is assumed to be founded on piles.

110 Cannon Street
This building has a lower ground level, sub-basement and basement. The building is assumed to be founded on piles.

116-126 Cannon Street
This building has a single basement level.

29 Martin Lane
This building has a single basement level. The building is assumed to be founded on strip footings.

27 Martin Lane, 28 Martin Lane
This building has a single basement level. The building is assumed to be founded on strip footings.

24 Martin Lane
This building is assumed to have a single basement level and be founded on piles.

24-28 King William Street
This building has a single basement level.

33 King William Street
This building is assumed to have a single basement level. It is supported on piles. Potential redevelopment of this structure is understood to include construction of additional piles.

Adelaide House
The nature of the basement is uncertain, however, the building is supported on timber piles.

Bank Of England
This building is understood to have three basement levels, with reconstruction in the 1930s involving extensive underpinning. It is assumed to be founded on shallow foundations.

King William Street Bridge
This structure is generally founded on 610mm diameter piles with toe levels 15.25m below the surface of the London Clay. The exception is the east end of the south abutment which is founded on a single 2.5m diameter pile taken 18.3m into the London Clay with an under-reamed bell of 7m diameter.

King William Street Vaults
These vaults are assumed to be founded on shallow foundations.

London Bridge
The north abutment of this structure is founded on two caisson piles with a toe level of approximately 73m ATD.

Bank Station
Numerous existing London Underground Limited and Docklands Light Railway assets are present below ground level. It is possible that temporary works, e.g. timbering may be found behind permanent structures.

For the purpose described in the Introduction to this GBR the Baseline Statement relating to possible foundations is:

- ***There is a high risk of encountering basement slabs during works at the 10KWS site.***

For the purpose described in the Introduction to this GBR, for construction of the new Northern Line southbound running tunnel, the Baseline Statements relating to possible foundations are:

- ***There is a high risk of encountering piles beneath 6-8 Prince's Street, 8-10 Mansion House Place, 1-10 St Swithin's Lane and 33 King William Street.***

- ***There is some risk of encountering piles or other deep foundations beneath 1 Lothbury, 1 Prince's Street, 143-149 Cannon Street, 110 Cannon Street, 24 Martin Lane, King William Street Bridge and London Bridge.***

- ***There is a risk that potential redevelopment of structures may result in some risk of encountering piles beneath 27-35 Poultry and 33 King William Street.***

- ***There is a high risk of encountering previous temporary works behind permanent London Underground and Docklands Light Railway structures underground within the whole works area.***

3.1.2 Archaeology

The archaeology of the site is discussed in the Baseline Report - Archaeology (ref. 2). For the purpose described in the Introduction to this GBR the Baseline Statement relating to archaeological remains is:

- ***There is potential that buried archaeological remains will be encountered during works around the southern, northern and western edges at the 10KWS site in areas not affected by the lower basement.***

3.1.3 Excavations/Infilled Ground

Made Ground extending up to a depth of 14.3m was found during the site investigations within the site area. At 10 King William Street in particular up to 6.5m of Made Ground was proven in boreholes sunk in the basement prior to construction of the current building. As part of the

redevelopment of this building, a new basement was constructed with a sub-basement slab soffit level of approximately 106m ATD. This is likely to have resulted in the removal of most, if not all of the Made Ground beneath the footprint of 10 King William Street.

For the purpose described in the Introduction to this GBR the Baseline Statement relating to infilled ground is:

- ***There is a very low risk that in-filled ground will be encountered during works at the 10KWS site.***

3.1.4 Groundwater monitoring Installations and Wells

Historic water well positions are indicated on drawing No. LUSTN-0008798-DWG-004281. Three wells are indicated on the site on 10 King William Street, however, there is a possibility that one of these is a duplicate.

For the purpose described in the Introduction to this GBR the Baseline Statement relating to existing boreholes and wells is:

- ***The boreholes, wells and installations indicated in Table 3.1 exist within 50m of the works.***

Well Number	Location	Easting, Northing
TQ38/352A-E	41 Lothbury	83039, 35893
TQ38/353A-D	27-32 Poultry	82948, 35855
TQ38/354A-C	Prince's Street	83017, 35834
TQ38/391	St Mary Woonoth, Lombard Street	83076, 35782
TQ38/393A&B	5-6 Lombard Street	83045, 35763
TQ38/392	1-2 King William Street	83034, 35693
TQ38/395	Salters Hall, St Swithin's Lane	83033, 35693
TQ38/396A&B	King William Street	83073, 35652
TQ38/396C	King William Street	83033, 35693
TQ38/424	81 King William Street	83143, 35660
TQ38/425A&B	10 King William Street	83122, 35621
TQ38/426	10 King William Street	83122, 35621
TQ38/397A&B	77 King William Street	83172, 35630
TQ38/403	Stafford House, King William Street	83130, 35560
TQ38/405	110 Cannon Street	83110, 35541
TW38SW/427	Arthur Street West, King William Street	83167, 35450
TQ38/409A&B	King William Street House	83117, 35441
TQ38/426	King William Street	83122, 35621
TQ38/411A	Regis House, King William Street	83186, 35409
TQ38/411B	Regis House, King William Street	83206, 35399

Table 3.1 Wells within 50m of the Proposed Works

3.1.5 Unexploded Ordnance

The City of London was heavily bombed during the Second World War. An unexploded ordnance desk study and detailed risk assessment was carried out as part of the Geotechnical Desk Study (ref 1). The results of this study are included in the PCIP and within the site bomb strikes were recorded at the following locations:

- The south-west corner of the Bank of England
- The northern corner of No. 5 King William Street
- King William Street next to the north-east corner of Adelaide House
- Around St Mary Abchurch
- Bank Underground Station

A 'Medium to High' UXO risk level, as defined in the MACC UXO Threat Assessment, was assigned to proposed ground investigations with a recommendation to implement a robust UXO mitigation strategy for borings up to a depth of 8m below ground level.

There is no evidence of bombs falling on the 10 King William Street plot.

For the purpose described in the Introduction to this GBR the Baseline Statements relating to unexploded ordnance are:

- ***There is a medium to high risk, as defined in the MACC UXO Threat Assessment, that UXO will be encountered during ground investigations within the whole works area.***

- ***There is a very low risk that UXO will be encountered during construction within the whole works area.***

3.1.6 Contamination and Waste

No soil or groundwater chemical test results or waste classification test results are currently available for the site area. It is recommended that such testing is carried out as part of any ground investigation at the site.

The Geotechnical Desk Study contains extracts of historic Ordnance Survey mapping of the site. It also describes local land use generally from Roman times and development in the 10 King William Street area from late Tudor times onwards. No evidence of potentially contaminative historic site uses at or immediately around 10 King William Street are noted, however, there is reference to commercial properties being present although their uses are either unknown or not stated.

It is noted, however, that basement construction is likely to have removed much of any historic contamination. However, the possibility of more recent spillages or leaks of contaminants within the basement, or the migration of liquid contamination through the surrounding soils cannot be discounted.

For the purpose described in the Introduction to this GBR the Baseline Statement relating to contamination and waste is:

- ***There is a very low risk that significant contamination will be encountered during works at the 10KWS site.***

3.2 Geology

3.2.1 Elevation or Position of Strata Boundaries

The elevations of the stratigraphic boundaries relevant to the Bank Station Capacity Upgrade can be found on the geological section along the running tunnel alignment – north to south, Figure No. 6 within the Geotechnical Desk Study.

The geological profile likely to be encountered within the limits of the station area has been interpreted from the borehole records in Appendix 1 and is summarised below. Descriptions of each stratum are given in Section 2.

For the purpose described in the Introduction to this GBR the Baseline Statement relating to strata boundary positions is:

- ***The elevations of the strata boundaries relevant to the whole works are shown in Table 3.2.***

Structure	Elevation of Bottom of Made Ground (m ATD)	Elevation of Bottom of Alluvium (m ATD)	Elevation of Bottom of River Terrace Deposits (m ATD)	Elevation of Bottom of London Clay Formation (m ATD)
Max	**111**	**105**	**106**	**62**
Min	**100**	**99**	**97**	
Notes		**Not present throughout the whole area**		**Proven in one borehole**

Table 3.2 Baseline Stratigraphy at the Site

3.2.2 Length or Area of Occurrence

For the purpose described in the Introduction to this GBR the Baseline Statement relating to strata occurrence is:

- ***The stratigraphy shown in Table 3.2, above, should be assumed to be specific for the whole works.***

3.3 Strata Description

3.3.1 Made Ground

Made Ground will be encountered across the site as extremely variable material including demolition rubble and re-worked natural deposits such as Alluvium, River Terrace Deposits and London Clay.

For the purpose described in the Introduction to this GBR the Baseline Statements relating to Made Ground are:

- ***The presence of Made Ground is not anticipated beneath the existing basement in the works at the 10KWS site.***
- ***The thickness of the Made Ground will vary between 0.0m and 14m, across the whole of the works area.***
- ***Made Ground will be variable with both fine-grained and coarse-grained elements across the whole of the works area.***
- ***Standard penetration testing in the Made Ground gave 'N' values from 0 to 84 across the whole of the works area.***

3.3.2 Alluvium

Alluvium will be encountered across the north-western and southern parts of the whole works area. It will comprise cohesive soils.

For the purpose described in the Introduction to this GBR the Baseline Statement relating to Alluvium is:

- ***Alluvium will not be present in works at the 10KWS site.***

3.3.3 River Terrace Deposits

River Terrace Deposits (RTD) will be encountered across the site. It will mainly be made up of sandy sub-angular and rounded flint gravel. It will also contain fine to coarse sand layers with occasional beds of clay and silt.

For the purpose described in the Introduction to this GBR the Baseline Statements relating to River Terrace Deposits are:

- ***The thickness of the RTD will range between 0.5m and 2.0m in the works at the 10KWS site.***
- ***Gravel content will be sub-angular to rounded in the works at the 10KWS site.***
- ***Standard penetration tests carried out in the RTD encountered in the boreholes located near to the works at the 10KWS site gave 'N' values between 4 and 114 in the works at the 10KWS site.***

3.3.4 London Clay Formation

The London Clay Formation that will be encountered is described as firm to very stiff and brown in colour becoming grey with increasing depth. The intensity of fissuring declines at depth, and the orientation varies from near horizontal to near vertical, often with more than one orientation represented at a given level. Very closely spaced partings of silty sand are present in places, and occasional claystones were encountered in previous ground investigations. The upper parts of the Formation show evidence of remoulding with black or iron stained fissures infilled with soft clay.

For the purpose described in the Introduction to this GBR the Baseline Statements relating to the London Clay are:

- ***Standard Penetration Testing within the London Clay in the area of the whole works yielded minimum and maximum 'N' Values of 21 and 75 respectively***

- ***The London Clay Formation encountered in the area of the whole works will have a maximum plasticity index of 60%***

- ***The minimum and maximum London Clay Formation undrained shear strengths encountered in the works at the 10KWS site will be 40kPa and 150kPa respectively with the exception of claystones***

- ***The minimum and maximum London Clay Formation undrained shear strengths encountered in the remainder of the works will be 40kPa and 330kPa respectively with the exception of claystones***

- ***In the London Clay Formation in the area of the whole works, local water seepage will occur from fissures and in the vicinity of claystone layers.***

3.3.5 Lambeth Group

The Lambeth Group lies below the level of the whole of the works. A maximum thickness of 1.5m was proven in a borehole at 10 King William Street. The material was described as a matrix of hard friable mottled grey-green brown silty CLAY with up to cobble-size intact fragments of grey-green-brown silty CLAY with frequent polished and striated surfaces, With depth it became stiff to hard mottled brown-blue silty CLAY with a pronounced framework of discontinuities at 45^{o} to the horizontal, the surfaces of which were polished and striated.

For the purpose described in the Introduction to this GBR the Baseline Statement relating to the Lambeth Group is:

- ***The Lambeth Group will not be present in the whole of the works.***

3.4 Geological Features

3.4.1 Faults

No faults or series of faults are noted near to the construction area for the Bank Station Capacity Upgrade on the local 1:50,000 British Geological Survey map. For the purpose described in the Introduction to this GBR the Baseline Statement relating to faults is:

- ***Fault zones will not be encountered in the area of the whole works.***

3.4.2 Hard Strata

Claystones are known to occur within the London Clay Formation and will extend horizontally beyond the zone of influence of the Works.

For the purpose described in the Introduction to this GBR the Baseline Statements relating to hard strata are:

- ***Claystone beds will be encountered in the area of the whole works and will extend horizontally***

- ***Individual claystones in the area of the whole works will have a maximum dimension of 600mm***

3.4.3 Deep drift infilled hollows in the London Clay

Figure 7 in the Geotechnical Desk Study shows contours of the surface of the London Clay Formation beneath the site. In the vicinity of the Lombard Street/King William Street junction there is a depression, or possible scour hollow, approximately 8m deep in the surface of the London Clay possible resulting from fluvial or periglacial processes. The more general fall in level of the surface of the London Clay to the south and south-west may be attributed to down-cutting by the Rivers Thames and Wallbrook.

For the purpose described in the Introduction to this GBR the Baseline Statement relating to deep drift infilled hollows in the London Clay Formation is:

- ***There is a low risk of encountering in-filled hollows in the surface of the London Clay Formation in the area of the whole works.***

3.4.4 Ground Gas

No observations of ground gas were noted on the borehole logs reviewed during preparation of this report.

For the purpose described in the Introduction to this GBR the Baseline Statements relating to ground gas are:

- ***Ground gas presents a low risk to construction workers operating in open excavation works at the 10KWS site.***
- ***Ground gas presents a low risk to construction workers operating in confined spaces in the remainder of the works.***

3.5 Groundwater

3.5.1 Piezometric levels

An upper and a lower aquifer exist at the site, these are separated by the London Clay Formation and the clay and silt units of the Lambeth Group.

For the purpose described in the Introduction to this GBR the Baseline Statements relating to piezometric levels are:

- ***The works at the 10KWS site will not encounter either the Upper Aquifer or the Lower Aquifer***
- ***The piezometric level in the lower aquifer in the area of the whole works will have a piezometric level of +76+/-5m ATD during construction.***

3.5.2 Pore Water Pressure

Within the River Terrace Deposits and London Clay Formation there will be a hydrostatic increase in piezometric pressure for an equivalent groundwater level of 107+/-1.5m ATD.

For the purpose described in the Introduction to this GBR the Baseline Statements relating to piezometric levels are:

- ***The maximum piezometric pressure encountered within the excavation limits of the whole works will be 250kPa.***

3.5.3 Groundwater inflows

Groundwater control will be partly achieved by constructing shafts from within the existing basement of 10 King William Street. Groundwater levels in the Upper Aquifer lie close to the boundary between the River Terrace Deposits and the London Clay, however, it is anticipated that little or none of the former remains in-situ beneath 10 King William Street. The sprayed concrete and permanent concrete linings of the shaft will form the principal groundwater control measure for the post construction long term condition.

The contractor shall devise his own measures for temporary control of ground water during construction which shall avoid a reduction in ground water level outside the proposed works.

For the purpose described in the Introduction to this GBR the Baseline Statement relating to groundwater inflow is:

- ***Groundwater is present within the Made Ground and River Terrace Deposits at the 10KWS site.***

3.5.4 Water bearing strata or similar phenomena

For the purpose described in the Introduction to this GBR the Baseline Statement relating to water bearing strata is:

- ***The London Clay in the area of the whole works will not be water bearing, with the exception of claystones and silty layers where seepage will be present.***

3.5.5 Strata Permeability

A range of permeabilities for each stratum are anticipated.

For the purpose described in the Introduction to this GBR the Baseline Statement relating to permeability is:

- ***The range of permeability for the ground conditions encountered by the works is provided in Table 3.3***

Strata	Minimum Permeability (m/s)	Maximum Permeability (m/s)
Made Ground	**$1x10^{-8}$**	**$1x10^{-4}$**
Alluvium	**$1x10^{-11}$**	**$1x10^{-10}$**
River Terrace Deposits	**$1x10^{-8}$**	**$1x10^{-3}$**
London Clay	**$1x10^{-11}$**	**$1x10^{-8}$**
London Clay – claystone beds	**$1x10^{-11}$**	**$1x10^{-6}$**
Sand lenses in Lambeth Group	**$1x10^{-7}$**	**$1x10^{-5}$**
Lambeth Group	**$1x10^{-13}$**	**$1x10^{-5}$**

Table 3.3 Baseline Permeability

References

1. Mott MacDonald Ltd, November 2011 MACC UXO Threat Assessment, ref. N133-BCR-MMD-00-2-DC-X-0001-S2-1.0; LUSTN-0008798-DOC-001220 v1.0
2. Mott MacDonald Ltd, August 2011 Baseline Report - Archaeology, ref. N133-BCR-MMD-00-Z-DC-N-0013-S2-0.1; LUSTN-0008798-DOC-001181 v0.1

Appendix 1 – Included Borehole Information

TQ38SW1945

2. BORING AND GROUND CONDITIONS.

2.1. Location of Site.

The site is located at Grocers' Hall Court, Princes Street, London, E.C.2.

2.2. Location of Borehole.

The borehole was drilled on the grass verge in the court yard of Grocers'Hall Court, Princes Street, London, E.C.2.

2.3. Dates.

The borehole was drilled between the 27th and 29th February, 1968.

2.4. Boring.

The borehole was drilled with shell and auger type drilling equipment and was 6 inches in diameter.

2.5. Sampling and Site Tests.

Representative samples of the different strata were taken from the boring tools and placed in jars with tight-fitting lids for detailed examination. These samples are taken in duplicate. After examination, one set of samples is sent to the client for correlation with the descriptions given on the Borehole Section Sheets: the duplicate set is retained in the laboratory.

Undisturbed core samples of cohesive soils were taken in the standard 4 inch diameter sampling tube. This consists of a thin-walled steel tube about 18 ins. long fitted with a cutting shoe of slightly smaller internal diameter (area ratio about 22%). The samples are thus obtained in as undisturbed condition as possible. After being taken, the ends of the samples are packed to prevent damage in transit to the laboratory and the tubes sealed to make them airtight. The samples arriving at the laboratory are thus as representative as possible of the soil as it exists on the site.

Bulk samples, about 15-20 lbs. in weight of granular soils were taken. These samples are transported in metal containers to avoid loss of the fine fraction.

TQ38SW/1945

GROUND EXPLORATIONS LTD.

BOREHOLE No. 1A

Contract Name GROCERS' HALL Report No. 4280A/PT

Client Messrs. Hurst, Peirce and Malcolm, Site Address

Address Aldwych House, Princes Street,

Aldwych, London, E.C.2.

London, W.C.2.

Standing Water Level ---

Water Struck ---

Ground Level 45·28 O.D.

Method of Boring Shell/Auger

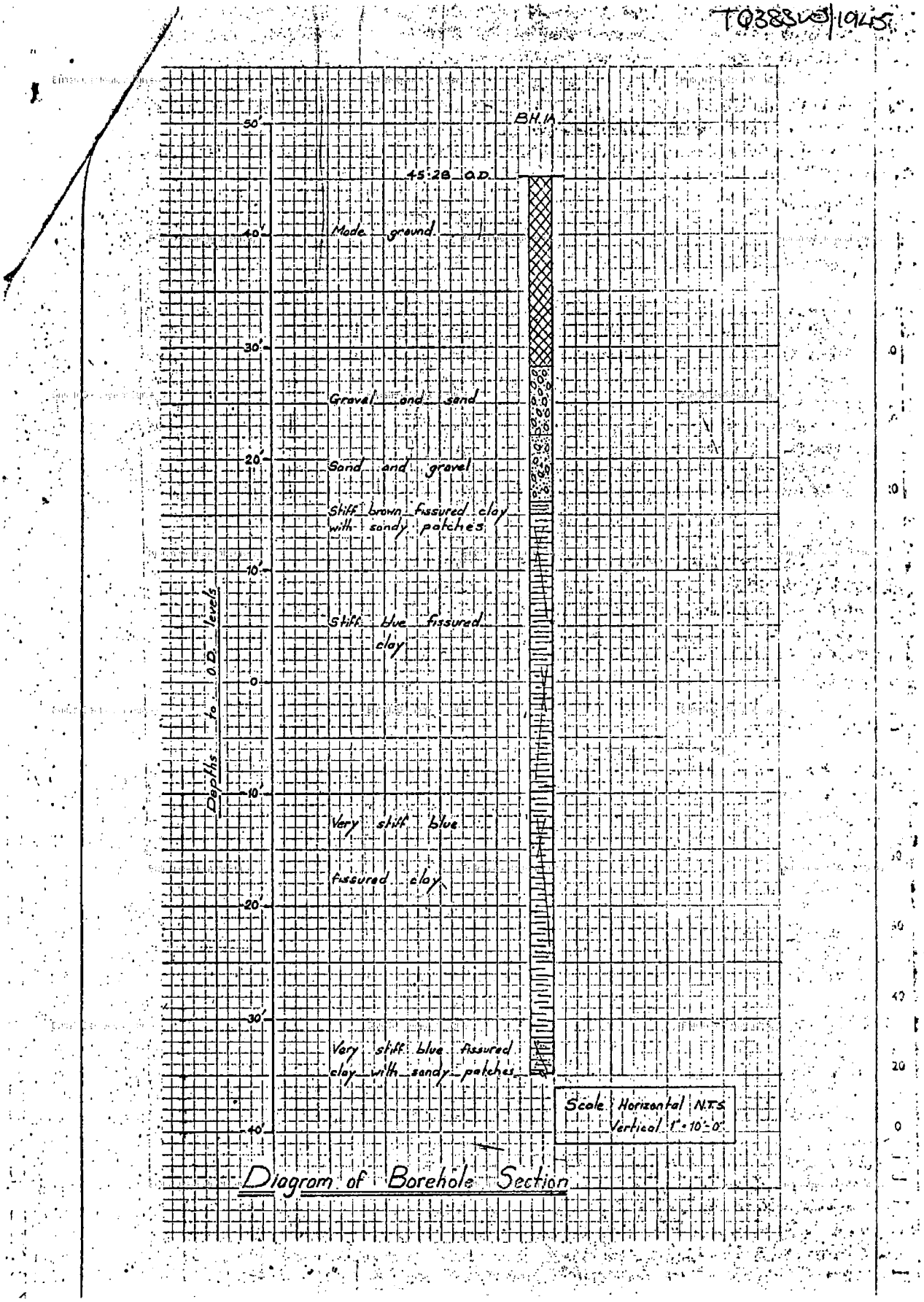
Diameter 6 inches

Start 27.2.68 Finish 29.2.68

Remarks

JARS		CORES	BULK	
2769 2'0"	2791 60'0"	2778 29'0"	2773 18'0"	
2770 7'0"	2793 65'0"	2780 35'0"	2775 23'0"	
2771 12'0"	2795 70'0"	2782 38'6"	2777 28'0"	
2772 17'6"	3801 75'0"	2784 43'6"		
2774 23'0"	3803 80'0"	2786 48'6"		
2776 28'0"		2788 53'6"		
2779 30'0"		2790 58'6"		
2781 36'6"		2792 63'6"		
2783 40'0"		2794 68'6"		
2785 45'0"		2796 73'6"		
2787 50'0"		3802 78'6"		
2789 55'0"				

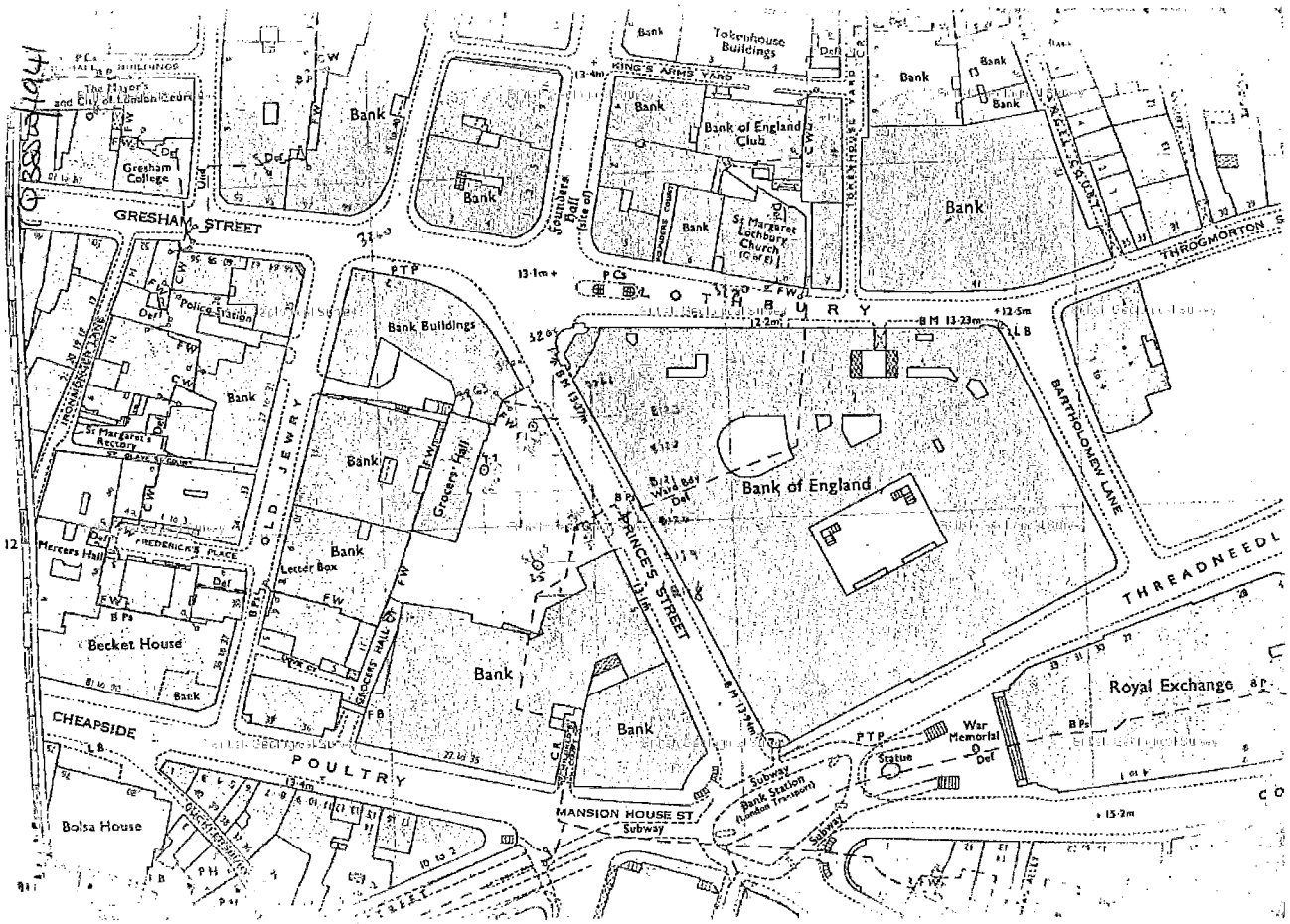
Description	Thickness	Depth
MGRD Made ground (brown clay with stones and pieces of brick)	17'0"	17'0"
Gravel and sand	6'0"	23'0"
SUPD Sand and gravel	6'0"	29'0"
Stiff brown fissured clay with sandy patches	1'0"	30'0"
Stiff blue fissured clay	25'0"	55'0"
LC Very stiff blue fissured clay	22'0"	77'0"
Very stiff blue fissured clay with sandy patches	3'0"	80'0"

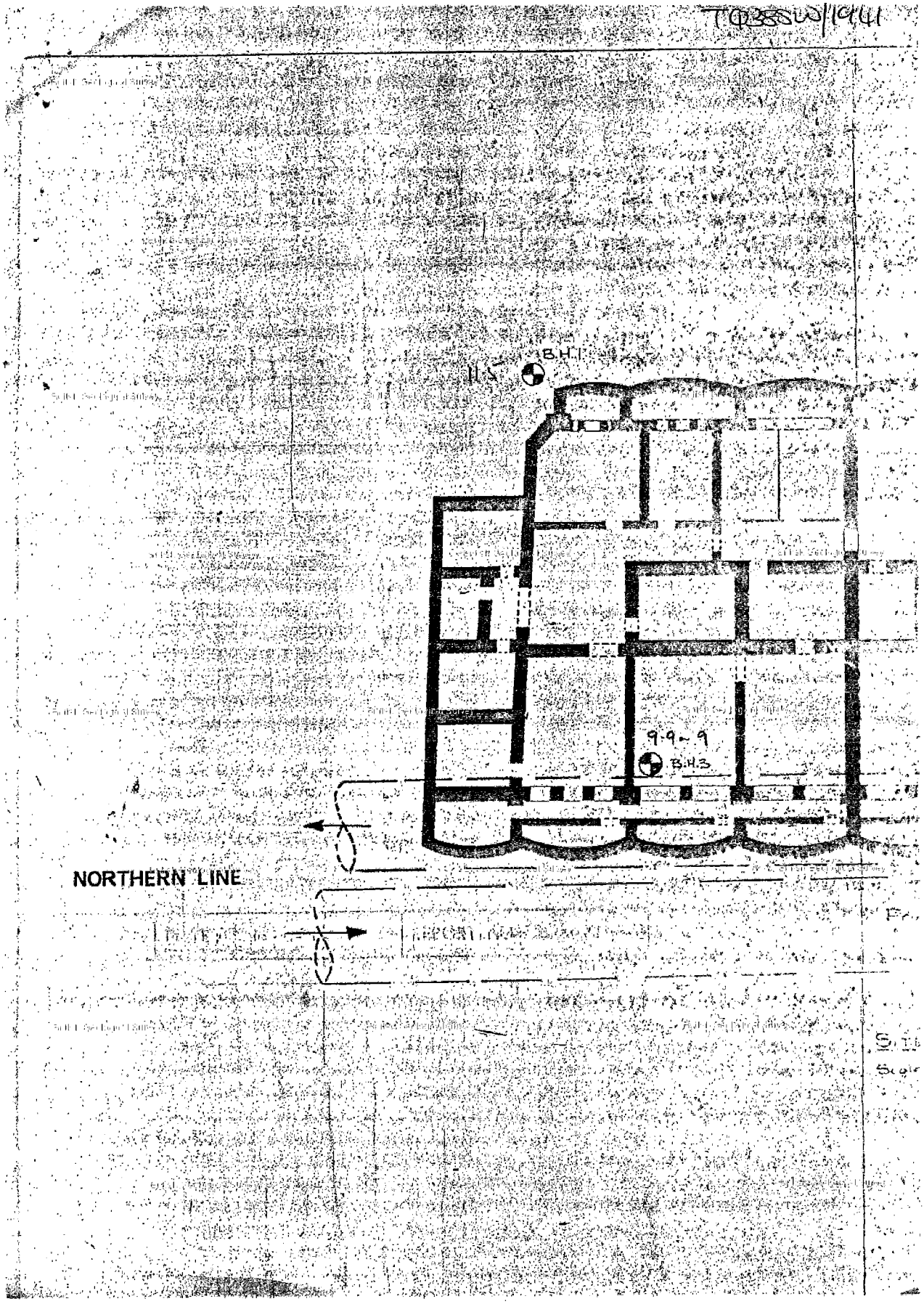

TQ38SW/1945
BH.1
45·28 O.D.
Made ground
Gravel and sand
Sand and gravel
Stiff brown fissured clay with sandy patches
Stiff blue fissured clay
Very stiff blue fissured clay
Very stiff blue fissured clay with sandy patches
Depths to O.D. levels
50'
40'
30'
20'
10'
0
-10
-20
-30
-40
Scale Horizontal N.T.S.
Vertical 1" = 10'-0"
Diagram of Borehole Section

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Report an issue with this borehole

- <<
- < Prev
- Page 5 of 5
- **Next >**
- >>

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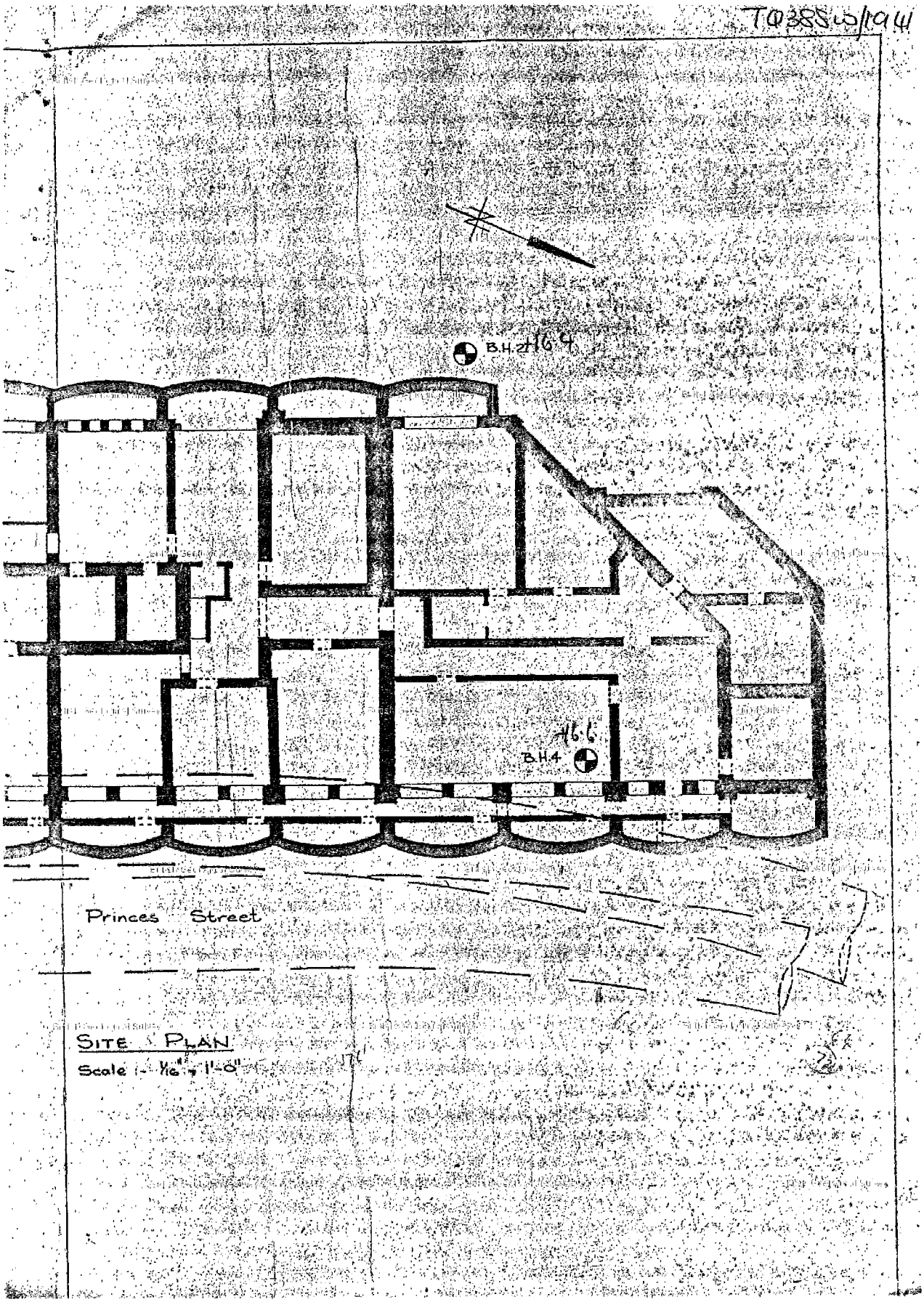
B.H.1
B.H.3
NORTHERN LINE


TQ38SW/194
B.H.2 46.4
46.6
B.H.4
Princes Street
SITE PLAN
Scale 1" = 1'-0"

TQ38SW 1941/A

Appendix 1 Sheet 1

BOREHOLE NO. 1 NGR 32644 81189

Ground Level 44.5 OD Diameter of Boring 8"

Water Struck 16.5 OD Method Shell and Auger

Standing Water Level Demolition prevented long term observation Start 12.1.70 Finish 14.1.70

REMARKS: Piezometer installed with candle at 75'0"

Description of Strata	Thickness	Depth	Reduced Level	Disturbed Samples	Undisturbed Samples and Insitu Tests
Made ground (Black soil, gravel, bricks peat, shells and wood) MGRD	20'0"			2'6" J6401 7'6" J6403 12'6" J6405 17'6" J6407	5'0" U6402 10'0" U6404 15'0" U6406
Medium dense brown sand and gravel with a little brown silty clay SUPD	4'0"	20'0"	24.5	20'0" B6408 21'6" J6409	20'0" N=25
Firm brown sandy clayey silt with a little gravel in places SUPD	3'0"	24'0"	20.5	26'6" J6411 27'0" U6412	24'6" U6410
Medium dense brown sand and gravel SUPD	6'0"	27'0"	17.5	28'0" B6413 29'6" J6414	25'0" N=27
Stiff brown clay with claystone LC	2'6"	33'0"	11.5	33'6" B6415 35'3" J6416	33'6" U*
Stiff grey silty clay with claystone in places LC		35'6"	9.0	40'6" J6418	37'0" U6417 42'0" U6419
TOTALS				Continued.....	.....

NOTES: Descriptions in accordance with C.P.2001 "Site Investigations"

TQ38SW 1941

BOREHOLE NO. 1/contd

Ground Level..... Diameter of Boring.....

Water Struck..... Method.....

Standing Water Level..... Start..... Finish.....

REMARKS:

Description of Strata	Thickness	Depth	Reduced Level	Disturbed Samples	Undisturbed Samples and Insitu Tests
Stiff grey silty clay with claystone in places LC	10'6"	46'0"	-1.5	45'6" J6420	
					47'0" U6421
				50'6" J6422	
					52'0" U6423
				55'6" J6424	
Stiff grey silty clay LC	19'0"				57'0" U6425
				60'6" J6426	
					62'0" U6427
		65'0"	-20.5	65'6" J6428	
					67'0" U6429
				70'6" J6430	
					73'0" U6431
				75'6" J6432	
Very stiff grey silty clay with traces of grey silty sand, fissured in places LC	25'0"				77'0" U6433
				80'6" J6434	
					83'0" U6435
				85'6" J6436	
					88'6" U6437
		90'0"	-45.5		
Bottom of Borehole					
TOTALS	90'0"	90'0"			

NOTES: Descriptions in accordance with C.P.2001 "Site Investigations"
J = Jar Sample B = Bulk Sample W = Water Sample
U = Undisturbed Core Samples, 4 in dia. x 18 in. long. Depth shown to top of sample. U* = Sample not recovered.
N = Number of blows per ft. penetration in Standard Penetration Test.

Appendix 1, Sheet 3 TQ38SW/1941/B

BOREHOLE NO. 2 NGR 32630 81216

Ground Level 44.7 OD Diameter of Boring 8"

Water Struck 21.7 OD Method Shell and Auger

Standing Water Level 18.7 OD (19.1.70) Start 17.1.70 Finish 19.1.70

REMARKS:

Description of Strata	Thickness	Depth	Reduced Level	Disturbed Samples	Undisturbed Samples and Insitu Tests
Made ground (Brick, black soil, concrete, ashes, wood, peat, brown clay) MGRD	15'0"	15'0"	29.7	2'6" J6438 5'0" B6439 7'6" J6440 12'6" J6442	5'0" N=60 10'0" U6441
Medium dense gravel and brown sand with traces of brown and grey clay SUPD	13'3"	28'3"	16.4	16'0" B6443 18'6" J6444 21'0" B6445 22'6" J6446 23'0" W6447 26'0" B6448 27'6" J6449	16'0" N=21 21'0" N=24 26'0" N=27
Stiff dark brown silty clay LC	1'0"	29'3"	15.4	28'3" J6450	28'3" U6451
Stiff grey silty clay with claystone in places and occasional fissures infilled with silt LC				32'6" J6453 37'6" J6455 42'6" J6457	30'0" U6452 35'0" U6454 40'0" U6456 45'0" U6458
TOTALS				Continued...	

NOTES: Descriptions in accordance with C.P.2001 "Site Investigations"
J = Jar Sample B = Bulk Sample W = Water Sample
U = Undisturbed Core Samples, 4 in dia. X 18 in long. Depth shown to top of sample. U* = Sample not recovered.

TQ38SW1941

BOREHOLE NO. 2/contd

Ground Level..... Diameter of Boring.....

Water Struck..... Method.....

Standing Water Level..... Start..... Finish.....

REMARKS:

Description of Strata	Thickness	Depth	Reduced Level	Disturbed Samples	Undisturbed Samples and In-situ Tests
				47'6" J6459	
					50'0" U6460
				52'6" J6461	
					55'0" U6462
				57'6" J6463	
Stiff grey silty clay with claystone in places and occasional fissures infilled with silt	40'9"				60'0" U6464
LC				62'6" J6465	
					65'0" U6466
				67'6" J6467	
					68'6" U6468
		70'0"	-25.3		
				W6469	
Bottom of Borehole					
TOTALS	70'0"	70'0"			

NOTES: Descriptions in accordance with C.P.2001 "Site Investigations"
J = Jar Sample B = Bulk Sample W = Water Sample
U = Undisturbed Core Samples, 4 in dia. × 18 in long. Depth shown to top of sample. U* = Sample not recovered
[illegible] in Standard Penetration Test.

Appendix 1 Sheet 5 TQ38SW1941 C

NGR 30658 81200

BOREHOLE NO. 3

Ground Level 44.1 OD Diameter of Boring 8"

Water Struck 15.1 OD Method Shell and Auger

Standing Water Level 19.9 OD (17.3.70) Start 22.1.70 Finish 7.4.70

REMARKS: 25' of water observation tube installed
Bottom 10' of borehole backfilled with concrete

Description of Strata	Thickness	Depth	Reduced Level	Disturbed Samples	Undisturbed Samples and Insitu Tests
Cellar	10'9"	10'9"	33.3		
Pit	4'3"	15'0"	29.1		
MGRD Made ground (Black soil, bricks gravel and brown clay)	6'0"	21'0"	23.1	16'6" J6501	18'0" U6502
Aum. Stiff black slightly organic silty clay with pebbles in places SUPD - 3	4'0"	25'0"	19.1	23'6" J6504	21'0" U6503
Firm brown sandy clayey silt with a trace of gravel SUPD - 2	3'0"	28'0"	16.1	27'6" J6506	25'0" U6505
Medium dense brown sand and gravel SUPD - 2	6'2"	34'2"	9.9	28'0" B6507 29'0" W6508 30'6" J6509 32'0" B6510 33'6" J6511	28'0" N=23 32'0" N=25
Firm brown silty clay with occasional flints LC	11"	35'1"	+9.0	34'2" J6512	34'3" U6513
Firm dark grey silty clay LC	9'11"			37'6" J6515	36'0" U6514 41'0" U6516
TOTALS				Continued	

NOTES: Descriptions in accordance with C.P.2001 "Site Investigations"
J = Jar Sample B = Bulk Sample W. = Water Sample
U = Undisturbed Core Samples, 4 in dia. x 18 in long. Depth shown to top of sample. U* = Sample not recovered.

TQ38SW/1941

BOREHOLE NO. 3/contd

Ground Level..... Diameter of Boring.....

Water Struck..... Method.....

Standing Water Level..... Start..... Finish.....

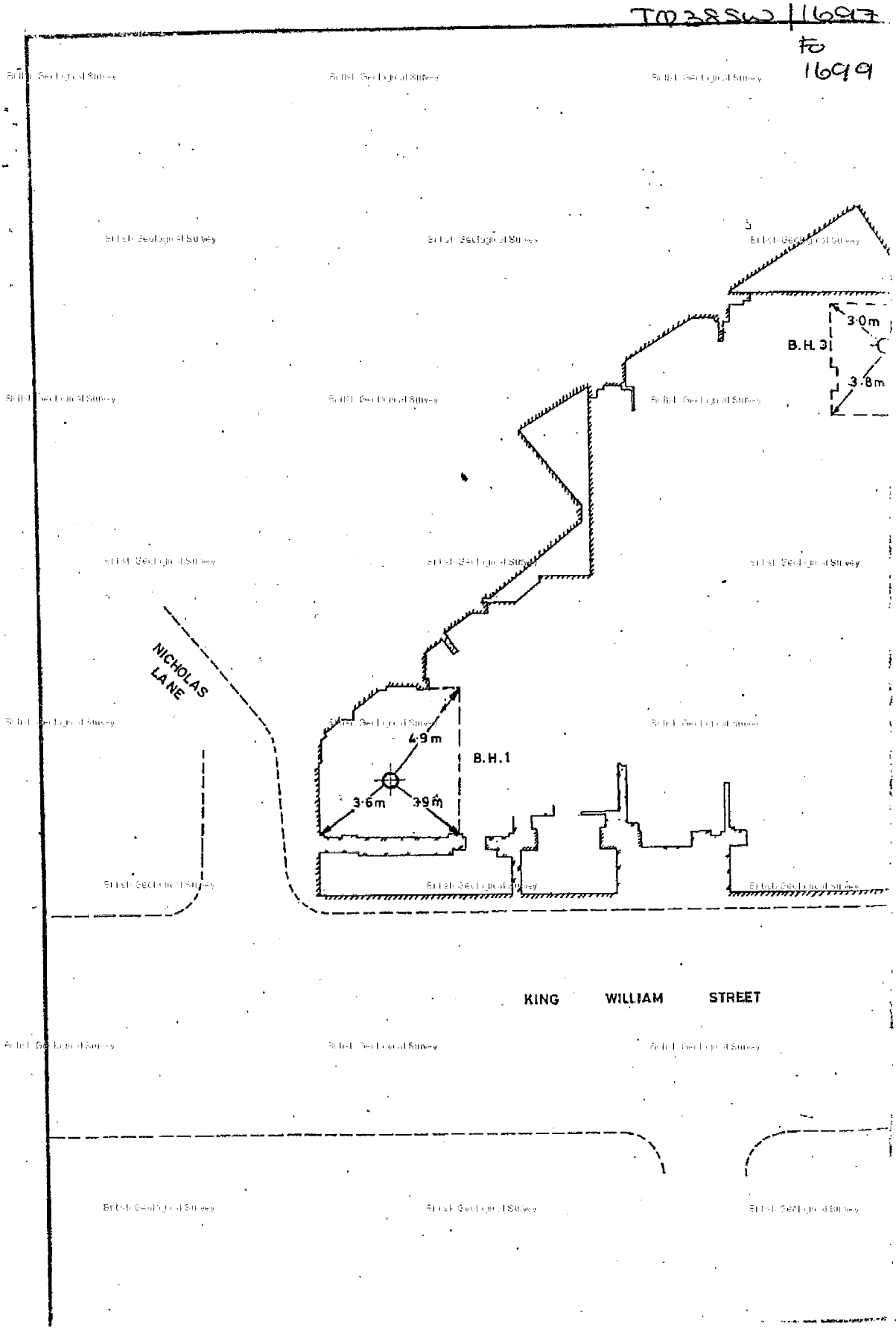
REMARKS:-

Description of Strata	Thickness	Depth	Reduced Level	Disturbed Samples	Undisturbed Samples and Insitu Tests
Firm dark grey silty clay		45'0"	-0.9	45'6" J6517	46'0" U6518
Stiff grey silty clay, soft mottled brown at 52 ft. L.C.	15'0"			50'6" J6519	52'0" U6520
				55'6" J6521	58'6" U6522
		60'0"	-15.9	W6523	
Bottom of Borehole					
TOTALS	60'0"	60'0"			

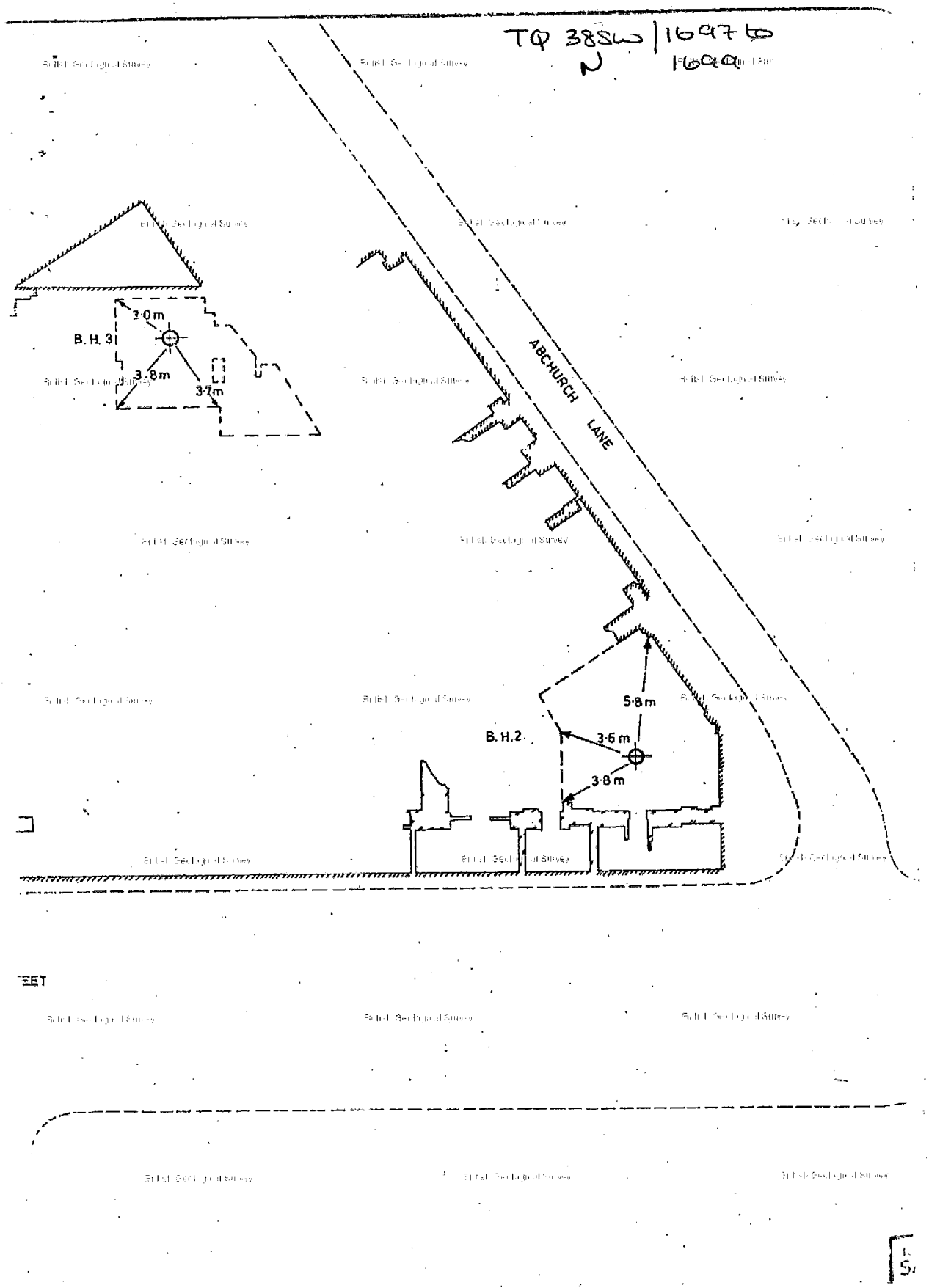
NOTES: Descriptions in accordance with C.P.2001 "Site Investigations"
J = Jar Sample. B = Bulk Sample W = Water Sample
U = Undisturbed Core Samples, 4 in dia. x 18 in long. Depth shown to top of sample. U* = Sample not recovered.
N = Blows for penetration in Standard Penetration Test.

1974

TQ38SW 1699 to 16919



10 KING WILLIAM ST.


TQ 38SW 1699
N
ABCHURCH LANE
B. H. 3
3·0m
3·8m
3·7m
B. H. 2
5·8m
3·6m
3·8m

TQ38SW | 1697

Boring Method	Shell and Auger	Location TQ 328 809	Record of BOREHOLE 3280-8092
Boring Diameter (mm)	200 to 21.00m		(sheet 1 of 3)
Casing Diameter (mm)	200 to 8.65m	Orientation	Basement Floor Level (m.O.D.) 11.50
Boring Equipment	Pilcon Wayfarer 10		Date commenced 21.10.74

Samples and in situ tests Depth (m)	Type	Casing Depth (m)	Water Depth (m)	Date and Depth (m)	DESCRIPTION OF STRATA	O.D. Level (m.O.D.)	Legend
			—	21/10			
				0.30	CONCRETE	11.20	
					FILL (brick and mortar rubble)		
				1.00		12.50	
				1.20	CONCRETE	12.30	
1.50	BD						
2.00	BD				FILL (very soft damp dark brown soil with brick fragments, mortar and pieces of shell)		
2.00-2.45	C(3)‡	NIL					
2.75	BD						
2.75-3.20	C(3)‡	2.75		3.00		10.50	
					FILL (very loose dark brown fine to coarse GRAVEL with occasional up to cobble-size brick fragments		
3.50	BD			3.50		10.00	
3.50-3.95	C(2)‡	3.50					
			3.50	4.00			
			3.50	22/10			
4.25	BD						
4.25-4.70	C(0)+	4.25					
4.40	D						
5.00	BD				FILL (very loose black-brown clayey silty SAND and GRAVEL becoming dark brown silty clayey SAND and GRAVEL with up to cobble-size brick and chalk fragments)		
5.00-5.45	C(0)+	5.00					
5.75	BD						
5.75-6.20	C(3)‡	5.75					
6.00	D						
6.50	BD						
6.50	C(24)	6.50					
6.80	W			6.80		6.70	
7.00	D						
7.25	BD				FILL (medium dense fine to coarse GRAVEL with pieces of brick and pottery) MGRD		
7.25	C(35)	7.25					
7.65	D		7.50*	7.65		5.85	
7.85	U	7.85		8.00	Firm fissured brown silty CLAY with discontinuities infilled with soft remoulded CLAY with ironstaining. Width of discontinuities decrease with depth LC	5.50	
8.35	D						
8.50	S(29)	8.50					
8.50	D						
8.95	D						
9.25	D				Firm fissured grey silty CLAY with pronounced framework of discontinuities at 45° to horizontal		
9.50-9.90	U‡	8.60			LC		
10.00	D		NIL	10.00		3.50	

REMARKS Borehole was advanced by Jackhammer and Hand Excavation from basement floor level to 1.00m (7m). Water was added to facilitate boring from 3.00m to 7.65m.

For explanation of symbols and abbreviations see Notes, pages (i) and (ii)

LAB Ref. No.		Fig.
S/ 10872	KING WILLIAM STREET - LONDON E.C. 4	1

WIMPEY LABORATORIES LIMITED

TQ 38 SW | 1697

Boring method

Boring diameter (mm)

Casing diameter (mm)

Boring equipment

Location

Orientation

Record of BOREHOLE 1 (sheet 2 of 3)

Basement Floor Level (m.O.D.)

Date commenced

Samples and in situ tests		Casing Depth (m)	Water Depth (m)	Date and Depth (m)	DESCRIPTION OF STRATA	O.D. Level (m.O.D.)	Legend
Depth (m)	Type						
10.00	S(28)	8.65	NIL	23/10			
10.50	D						
10.75	D						
11.00	U	8.65					
11.50	D						
11.50	S(35)	8.65					
12.00	D						
12.25	D						
12.50	U	8.65					
13.00	S(35)	8.65					
13.00	D						
13.50	D						
13.75	D						
14.00	U	8.65					
14.50	S (42)	8.65			Firm to stiff dark grey silty CLAY with pronounced framework of near vertical near horizontal, and at 45° to horizontal discontinuities becoming less well developed below 15.50m. Occasional horizontal discontinuities with pockets of fine grey SAND, shell fragments and pyrite nodules		
14.50	D						
15.25	D						
15.50	U	8.65					
16.00	S (39)	8.65					
16.00	D						
16.50	D						
16.75	D						
17.00	U	8.65					
17.50	D						
17.50	S(45)	8.65					
18.00	D		NIL	18.00			
18.25	D		NIL	24/10			
18.50	U	8.65					
19.00	D						
19.00	S(64)	8.65					
19.75	D				Claystone at 19.50m		
20.00	U	8.65					

LC

REMARKS

For explanation of symbols and abbreviations see Notes, pages (I) and (II)

LAB Ref. No.

Fig. 1

TQ 38 SW 1697

Boring method		Location	Record of BOREHOLE 1
Boring diameter (mm)			(sheet 3 of 3)
Casing diameter (mm)		Orientation	Basement Floor Level (m.O.D.)
Boring equipment			Date commenced

Samples and in situ tests Depth (m)	Type	Casing Depth (m)	Water Depth (m)	S.P.	PIEZ.	Date and Depth (m)	DESCRIPTION OF STRATA	O.D. Level (m.O.D.)	Legend
20.50 20.50	S(47, D	8.65	NIL			21.00	(See sheet 2) LC. END OF BOREHOLE	-7.50	
				7.40	14.41	7/11			
				7.42	13.45	14/11			
				7.43	12.80	21/11			
				7.43	12.60	28/11			
				7.43	12.41	5/12			

REMARKS Borehole was backfilled with sand from 20.50m to 18.50m, bentonite to 17.50m, cement grout to 8.20m, sand to 6.20m, natural spoil to 1.00m and concreted stop cock box to basement floor level.
A piezometer was installed at 19.50m below basement floor level.
A standpipe was inserted to 8.20m below basement floor level.

For explanation of symbols and abbreviations see Notes, pages (i) and (ii)

LAB Ref. No.		Fig.
S/ 10872	KING WILLIAM STREET - LONDON E.C. 4	1

TQ 38 SW 11698
3279 · 8094

Boring method	Shell and Auger	Location TQ 328 809	Record of BOREHOLE 2
Boring diameter (mm)	250 to 35.00m: 200 to 52.30m		(sheet 1 of 6)
Casing diameter (mm)	250 to 8.40m: 200 to 34.15m	Orientation	Basement Floor Level (m.O.D.) 11.10
Boring equipment	Pilcon Wayfarer 20		Date commenced 4.10.74

Samples and in situ tests Depth (m)	Type	Casing Depth (m)	Water Depth (m)	Date and Depth (m)	DESCRIPTION OF STRATA	O.D. Level (m.O.D.)	Legend
			NIL	5/10 0.20			
			NIL	5/10	0.30 CONCRETE	12.80	
					FILL (bricks and rubble)		
0.66	D			0.65		12.45	
0.80	BD			0.90	Mosaic floor	12.20	
					FILL (loose brick and gravel with pieces of pottery)		
					MGRD.		
				2.00		11.10	
2.10-2.56	S(4) ‡	2.10					
2.10	BD						
2.85	C(37)	2.85	1.00	2.80			
2.85	BD		1.20	7/10			
3.60	D						
3.60	C(114)	3.60			Very loose black fine to coarse rounded GRAVEL with black fine to medium SAND becoming very dense fine to coarse rounded subangular GRAVEL with fine to coarse yellow SAND		
3.60	BD						
4.00	D						
4.35-4.73	C(70) ‡	4.35					
4.35	BD						
4.70	D						
					SUPD		
5.10-5.48	C(70) ‡	5.10					
5.10	W				Nodules of very soft yellow clayey SILT down to 3.70m		
5.75	W						
5.85	BD						
5.85	C(54)	5.85					
6.40	D						
6.60	C(41)	6.60					
6.60	BD						
				7.35		5.75(4ft)	
7.35	D				Firm fissured brown-red silty CLAY with occasional rounded gravel forming a matrix of completely remoulded clay with fine to coarse gravel-size fragments of light grey clay		
7.35	U	7.35					
7.80	D		6.10	2.65		5.45(4ft)	
7.80	S(21)	7.35	5.75	8/10			
					LC		
8.85	U	8.00			Firm fissured grey silty CLAY with well developed framework of near vertical near horizontal discontinuities — some soft silty clay in discontinuities		
9.30	D						
9.30	S(25)	8.00					
10.00	D			10.00		3.10	

REMARKS Borehole was advanced by Jackhammer from basement floor level to 0.30m below basement floor level (7h).
Water was added to facilitate boring from 0.30m to 7.35m below basement floor level.

For explanation of symbols and abbreviations see Notes, pages (i) and (ii)

LAB Ref. No. S/10872

KING WILLIAM STREET - LONDON E.C. 4

Fig. 2

TQ 38 SW 1698

Boring method

Boring diameter (mm)

Casing diameter (mm)

Boring equipment

Location

Orientation

Record of BOREHOLE 2 (sheet 2 of 6)

Basement Floor Level (m.O.D.)

Date commenced

Samples and in situ tests Depth (m)	Type	Casing Depth (m)	Water Depth (m)	Date and Depth (m)	DESCRIPTION OF STRATA	O.D. Level (m.O.D.)	Legend
10.35	U	8.00					
10.80 10.80	D S(40)	8.00					
11.50	D						
11.85	U	8.00					
12.30 12.30	D S(40)	8.00					
13.00	D						
13.35	U	8.00					
13.80 13.80	D S(43)	8.00					
14.50	D				Firm to stiff grey silty CLAY with a well developed framework of near vertical near horizontal discontiruities. Surfaces occasionally polished and with black mottling LC		
14.85	U	8.00					
15.30 15.30	D S(48)	8.00					
16.00	D						
16.35	U	8.00					
16.80 16.80	D S(43)	8.00					
17.50	D						
17.85	U	8.00					
18.30 18.30	D S(48)	8.00					
19.00	D						
19.35	U	8.00					
19.80 19.80	D S(56)	8.00	NIL		20.00		

REMARKS

For explanation of symbols and abbreviations see Notes, pages (i) and (ii)

LAB Ref. No. S/ 10877

KING WILLIAM STREET - LONDON E.C. 4

Fig. 2 (CONT'D)

TQ38SW 1698

Boring method		Location	Record of BOREHOLE 2
Boring diameter (mm)			(sheet 3 of 6)
Casing diameter (mm)		Orientation	Basement Floor Level (m.O.D.)
Boring equipment			Date commenced

Samples and in situ tests		Casing Depth (m)	Water Depth (m)			Date and Depth (m)	DESCRIPTION OF STRATA	O.D. Level (m.O.D.)	Legend
Depth (m)	Type								
			NIL			9/10			
20.50	D								
20.85	U	8.00							
21.30	D								
21.30	S(60)	8.00							
22.00	D								
22.35	U	8.00							
22.80	D								
22.80	S(51)	8.00							
23.50	D								
23.85	U	8.00					Stiff fissured grey silty CLAY with very pronounced framework of near horizontal near vertical discontinuities, surfaces polished with occasional black mottling and pockets of pyrites		
24.30	D								
24.30	S(56)	8.00							
25.00	D								
25.35	U	8.00							
25.80	D								
25.80	S(64)	8.00					Frequent irregularly spaced partings of fine grey silty SAND below 25.80m. Partings typically at 25-40mm centres		
26.50	D								
26.85	U	8.00							
27.30	D								
27.30	S(66)	8.00							
28.00	D								
28.35	U	8.00	NIL			28.35			
28.80	D		NIL			10/10			
28.80	S(76)	8.00							
29.50	D								
29.85	U	8.00							

REMARKS

For explanation of symbols and abbreviations see Notes, pages (i) and (ii)

LAB Ref. No.		Fig.
S/ 10872	KING WILLIAM STREET - LONDON E.C. 4	2 (CONT'D)

TQ38SW 1698

Boring method				Location	Record of BOREHOLE 2 (sheet 4 of 6)
Boring diameter (mm)					
Casing diameter (mm)				Orientation	Basement Floor Level (m.O.D.)
Boring equipment					Date commenced

Samples and in situ tests		Casing Depth (m)	Water Depth (m)			Date and Depth (m)	DESCRIPTION OF STRATA	O.D. Level (m.O.D.)	Legend
Depth (m)	Type								
30.30	D								
30.30	S(69)	8.00							
31.00	D								
31.35	U	8.00							
31.80	D								
31.80	S(59)	8.00							
32.00	D								
32.50	D								
32.85	U	8.00							
33.30	D								
33.30	S(60)	8.00							
34.00	D								
34.35	U	8.00							
34.80	D								
34.80	S(57)	34.15	NIL			35.00	Stiff to very stiff becoming hard fissured grey silty CLAY with frequent partings of grey silty sand below 25.80m at 5-30mm centres and with framework of near horizontal and 45° to horizontal discontinuities surfaces polished.		
			NIL			11/10			
35.50	D								
36.35	U	34.15							
36.80	D								
36.80	S(69)	34.15							
37.50	D								
38.35	U	34.15							
38.80	D								
38.80	S(71)	34.15							
39.50	D								
			NIL			40.00			

L.C.

REMARKS

For explanation of symbols and abbreviations see Notes, pages (i) and (ii)

LAB Ref. No.		Fig.
S/10372	KING WILLIAM STREET - LONDON E.C. 4	2 (CONT'D)

TQ38SW 1698

Boring method		Location	Record of BOREHOLE 2
Boring diameter (mm)			(sheet 5 of 6)
Casing diameter (mm)		Orientation	Basement Floor Level (m.O.D.)
Boring equipment			Date commenced

Samples and in situ tests Depth (m)	Type	Casing Depth (m)	Water Depth (m)	Date and Depth (m)	DESCRIPTION OF STRATA	O.D. Level (m.O.D.)	Legend
40.35	U	34.15	NIL	12/10 40.35	(See sheet 4)	-27.25	
40.80	D						
40.80	S(68)	34.15					
41.50	D						
42.35	U	34.15					
42.80	C(71)	34.15					
42.80	D						
43.50	D						
44.35	U	34.15	NIL	44.35			
44.35	W				Hard fissured grey silty CLAY, becoming very silty below 44.35m, with occasional partings of grey fine sand. Framework of near vertical near horizontal discontinuities in sample at 44.35m		
44.80	D						
44.80	S(75)	34.15					
45.50	D				LC		
46.35	U	34.15					
46.80	D						
46.80	S(61)	34.15					
47.50	D						
48.35	U	34.15					
48.80	S(64)	34.15					
48.80	D						
49.50	D						
			NIL	50.00			

REMARKS

For explanation of symbols and abbreviations see Notes, pages (i) and (ii)

LAB Ref. No.		Fig.
S/ 10372	KING WILLIAM STREET - LONDON E.C. 4	2 (CONT'D)

WIMPEY LABORATORIES LIMITED

TQ38SW 1698

Pumping method	Location	Record of BOREHOLE 2
Casing diameter (mm)		(sheet 6 of 6)
Casing diameter (mm)	Orientation	Basement Floor Level (m.O.D.)
Casing equipment		Date commenced

Samples and in situ tests Depth (m)	Type	Casing Depth (m)	Water Depth (m)	PIEZ.	PIEZ.	Date and Depth (m)	DESCRIPTION OF STRATA	O.D. Level (m.O.D.)	Legend
			NIL			15/10			
50.35	U	34.15	50.50				(See sheet 5) LC		
50.80-51.30	S(114)	34.15				50.80		-37.70	
							Hard friable mottled grey-green-brown silty CLAY as a matrix with up to cobble-size intact fragments of grey-green-brown silty CLAY with frequent polished and striated surfaces, becoming stiff to hard mottled brown-blue silty CLAY with pronounced framework of discontinuities at 45° to horizontal. Surfaces polished and striated WRB	-124'	
51.30	U	34.15							
51.95-52.33	S(109)	34 15							
			44.50			52.30		-39.20	
							END OF BOREHOLE		
				22.37	34.90	7/11			
				26.75	34.72	14/11			
				27.00	34.72	21/11			
				27.00	34.75	28/11			
				26.97	34.79	5/12			

REMARKS Ground-water observed after completion of sampling rose to 44.50m in 1h.
Piezometers were installed at 50.35m and 34.70m below basement floor level.
Borehole was backfilled from 52.30m to 49.00m with sand, bentonite to 48.50m, cement grout to 36.00m, bentonite to 35.50m, sand to 33.50m, bentonite to 33.00m, cement grout to 0.50m and concreted stop cock box to basement floor level.

For explanation of symbols and abbreviations see Notes, pages (i) and (ii)

LAB Ref. No.		Fig.
S/10872	KING WILLIAM STREET - LONDON E.C. 4	2 (CONT'D)

TQ38SW | 1044

3278 · 8092

Boring method	Shell and Auger	Location TQ 328 809	Record of BOREHOLE 3 (sheet 1 of 3)
Boring diameter (mm)	200 to 19.75m		
Casing diameter (mm)	300 to 9.50m	Operation	Basement Floor Level (m.O.D.) 13.50
Boring equipment	Pilcon Wayfarer 10		Date commenced 12.10.74

Samples and in situ tests Depth (m)	Type	Casing Depth (m)	Water Depth (m)	Date and Depth (m)	DESCRIPTION OF STRATA	O.D. Level (m.O.D.)	Legend
			–	12/10 0.30	CONCRETE	13.20	
			NIL	0.50	FILL (brick and concrete rubble)		
			NIL	14/10 0.80		12.70	
1.00	BD	•			FILL (soft brown CLAY with fragments of brick, pottery, plaster, sand and gravel)		
1.50	U	1.50•					
2.00–2.45	C(61)	NIL					
2.10	BD	•					
2.10	C(6)	2.10•					
2.00	BD						
2.75	BD						
2.75	C(5)	2.75					
3.00	C(50)	3.00•		3.00		10.50	
3.50–3.80	C(84)	3.50	3.65	3.60			
			3.00	16/10			
4.25	BD				FILL (loose becoming very dense yellow sandy fine to coarse SAND and fine to coarse GRAVEL with occasional brick fragments)		
4.25–4.48	C(65)	4.25					
5.00	BD						
5.00–5.23	C(67)	5.00					
5.50	W						
5.75–6.13	C(83)	5.75					
5.75	BD				MGRD		
6.50	BD			6.50		7.00	
6.50	C(60)	6.50					
			5.25	7.00	Very dense to medium dense brown sandy fine to coarse GRAVEL		
7.25	BD		5.50	17/10			
7.25	C(31)	7.25			SUPD		
7.80	D			7.80		5.70(+19)	
8.00	U	8.00			Firm fissured brown silty sandy CLAY – Discontinuities infilled with soft yellow-red clay with iron staining. Width of discontinuities decrease with depth LC		
8.50	D		8.50•	8.40		5.10	
8.65	C(32)	8.50					
8.65	BD				Firm fissured grey silty CLAY with a frame work of near vertical near horizontal discontinuities		
9.25	D						
9.50	U	8.50					
10.00	D				Claystone at 8.60m LC		
10.00	S(28)	8.50					

REMARKS Borehole was advanced by jackhammer and hand excavation from basement floor level to 1.00m (5½h). Borehole abandoned after encountering an obstruction at 3.00m. Rig moved 0.50m and rebored. Borehole advanced by hand excavation and chiselling from basement floor level to 1.00m (6h).

• Samples and tests carried out at original location of borehole.

Water was added to facilitate boring from 2.35m to 7.80m.

Borehole was advanced by chiselling from 3.60m to 8.60m (1h) cutting through claystone at 8.60m (1h).

For explanation of symbols and abbreviations see Notes, pages (i) and (ii)

LAB Ref. No.		Fig.
S/ 10872	KING WILLIAM STREET – LONDON E.C. 4	3

TQ38SW 11699

Boring method		Location	Record of BOREHOLE 3
Boring diameter (mm)			(sheet 2 of 3)
Casing diameter (mm)		Orientation	Basement Floor Level (m.O.D.)
Boring equipment			Date commenced

Samples and in situ tests Depth (m)	Type	Casing Depth (m)	Water Depth (m)	Date and Depth (m)	DESCRIPTION OF STRATA	O.D. Level (m.O.D.)	Legend
10.50	D						
10.75	D						
11.00	U	8.50					
11.50	D						
11.50	S(30)	8.50					
12.00	D						
12.25	D						
12.50	U	8.50					
13.00	D						
13.00	S(30)	8.50					
13.50	D						
13.75	D						
14.00	U	8.50	NIL	14.00	Firm to stiff fissured grey silty CLAY with framework of near vertical near horizontal and at 45° to horizontal discontinuities. Some surfaces polished and striated at 17.00m. Occasional black mottling on discontinuities		
			NIL	18/10			
14.50	D						
14.50	S(36)	8.50					
15.00	D				LC		
15.25	D						
15.50	U	8.50					
16.00	D						
16.00	S(40)	8.50					
16.50	D						
16.75	D						
17.00	U	8.50					
17.50	D						
17.50	S(45)	8.50					
18.00	D						
18.25	D						
18.50	U	8.50					
19.00	D						
19.00	S(51)	8.50					
19.50	D						
19.75	S(70)*	8.50	NIL	19.75	Claystone at 19.75m	-6.25	
					END OF BOREHOLE		

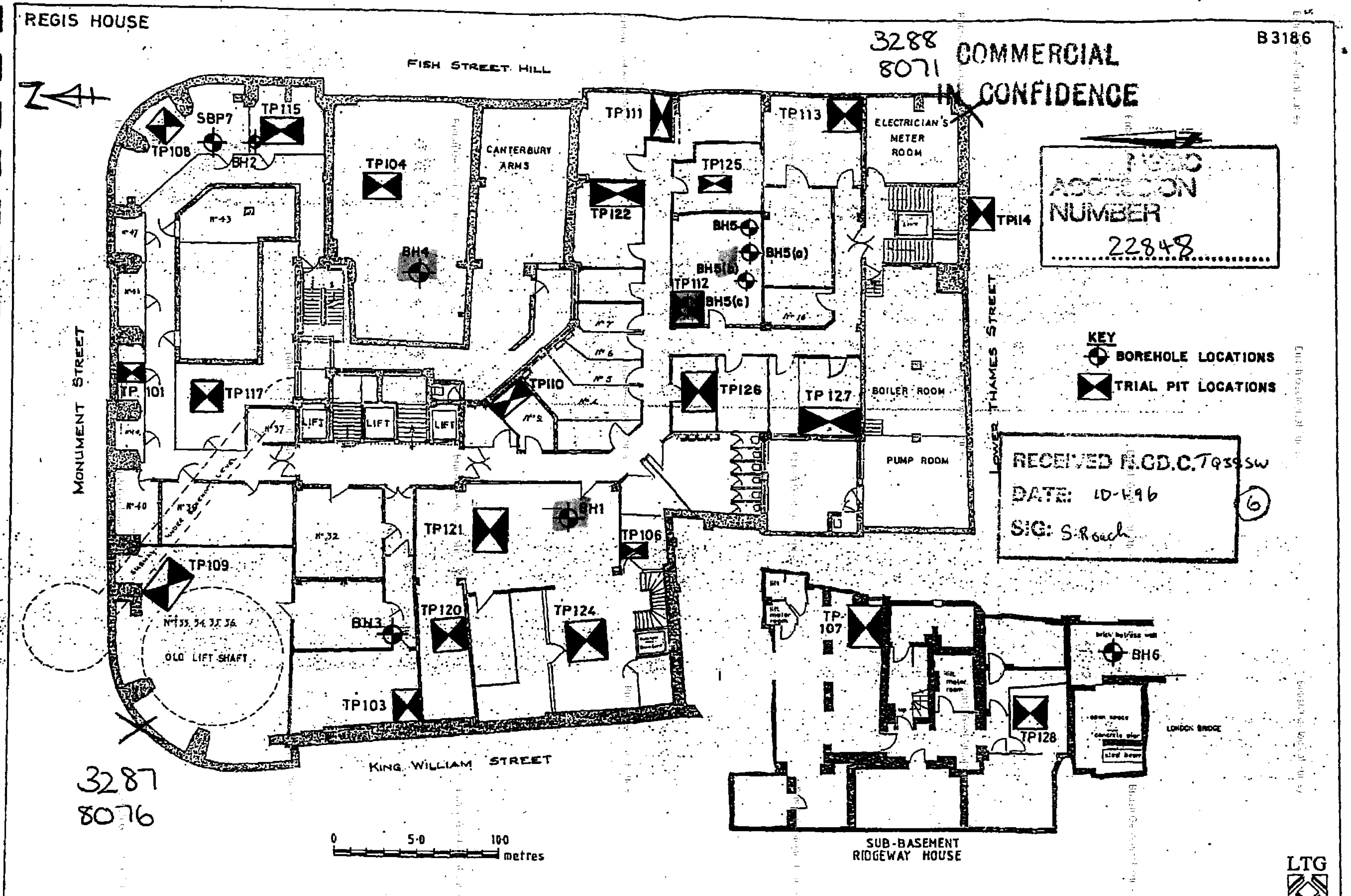
REMARKS Cutting into claystone at 19.75m (1h).
A piezometer was installed at 18.75m below basement floor level.
A standpipe was installed at 8.40m below basement floor level.
Borehole was backfilled with sand from 19.75m to 17.80m, bentonite to 17.30m, cement grout to 9.00m, sand to 7.50m, natural spoil to 1.00m and concreted stop cock box to ground level.

For explanation of symbols and abbreviations see Notes, pages (i) and (ii)

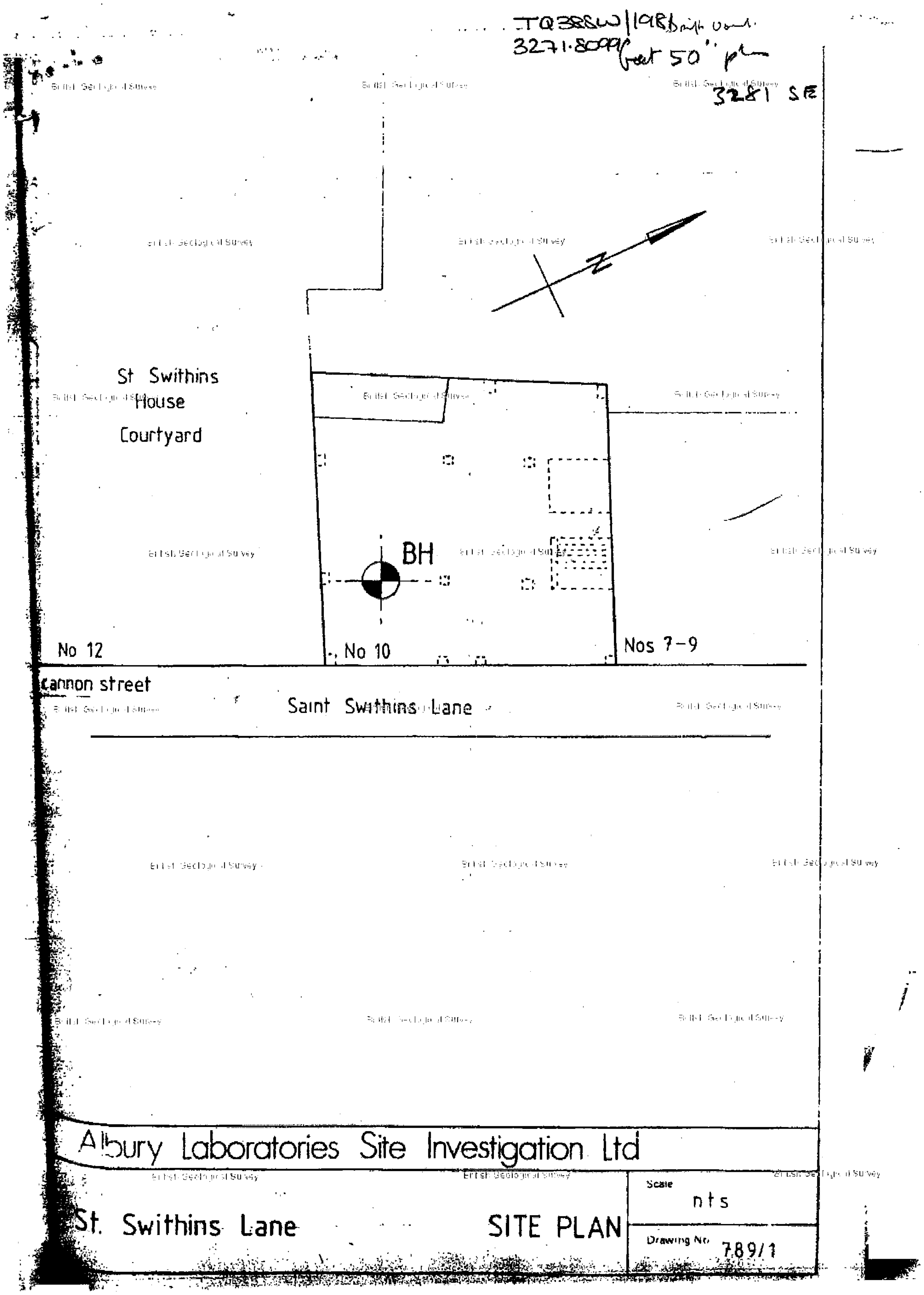
LAB Ref. No. S/10872

KING WILLIAM STREET - LONDON E.C. 4

Fig. 3



EXPLORATORY HOLE LOCATION PLAN


TQ38SW/1981
3271.8099
3281 SE
N
St Swithins House Courtyard
BH
No 12
No 10
Nos 7-9
Cannon street
Saint Swithins Lane
Albury Laboratories Site Investigation Ltd
St. Swithins Lane
SITE PLAN
Scale
nts
Drawing No
789/1

TQ 38 SW 1981

ALBURY LABORATORIES SITE INVESTIGATION LTD.,
Albury, Guildford, Surrey.

BOREHOLE No. 1

CONTRACT St. Swithins Lane

REPORT No. 789/JCST

Client Andrews, Kent & Stone

Ground Level m. O.D

Site Address 10, St. Swithins Lane, London, EC4

Boring Commenced 28.6.75.
Boring Completed 28.6.75.

Type and Dia. of Boring Shell and Auger 200mm dia.

Water Strikes
1. 8.50 (med)
2.
3.

Water Levels Recorded During Boring m

Date	28/6	28/6					
Hole Depth	18.00	10.50					
Casing Depth	10.00	9.50					
Water Level	dry	8.70					

Remarks 4 hours extra time manoeuvring rig onto and from borehole location

Samples Ref. No.	Type	Depth m	S.P.T. N	Scale 20mm = 1m Depth	Legend	Description
						Void (ground floor to basement) C+49'0D
				3.00		
1/1	D	3.75	6			Made ground (0.15m concrete slab over black/brown sandy clay with brick and tile fragments) MGRD
				4.50		
1/2	U	4.70-5.15				Brown clayey sand with stones SUPD-3
				5.00		
1/3	D	5.50	54			Very dense brown sand and gravel SUPD-4
1/4	D	6.50	53			
1/5	D	7.50	58			
1/6	D	8.50	48			

TQ 38 SW 1981

ALBURY LABORATORIES SITE INVESTIGATION LTD.
Albury, Guildford, Surrey. *Continuation Sheet No.* 1

BOREHOLE No. 1

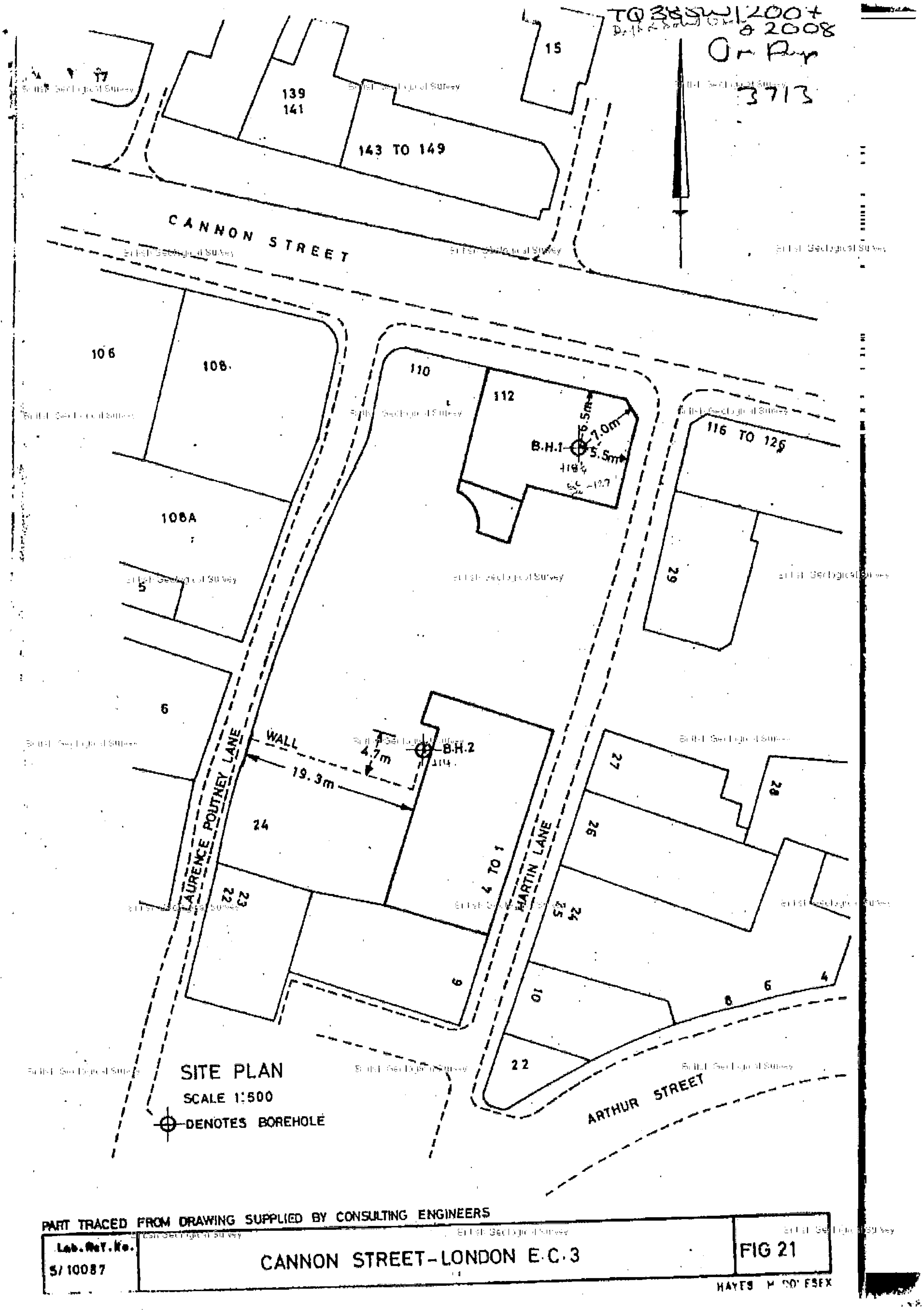
CONTRACT St. Swithins Lane

REPORT No. 789/JCST

Samples Ref. No.	Type	Depth m	S.P.T. N	Scale 20mm = 1m Depth	Legend	Description
						Very dense brown sand and gravel (contd)
				9.60		Stiff, becoming very stiff grey /blue fissured silty clay with brown mottling in the upper levels (London Clay) LC.
1/7	J	9.75				
1/8	U	9.80-10.25				
1/9	J	11.00				
1/10	U	11.30-11.75				
1/11	J	12.50				
1/12	U	12.80-13.25				
1/13	J	14.00				
1/14	U	14.30-14.75				
1/15	J	15.50				
1/16	U	15.80-16.25				
1/17	J	17.00				
1/18	U	17.30-17.75				
				18.00		

9.60
28.80
2.3
31.1

Code: U—Undisturbed Sample D—Large Disturbed Sample J—Jar Sample W—Water Sample


TQ38SW/2007
& 2008
3713
15
139
141
143 TO 149
CANNON STREET
106
108
110
112
B.H.1
6.5m
7.0m
5.5m
116 TO 126
108A
29
5
6
WALL
4.7m
B.H.2
19.3m
LAURENCE POUNTNEY LANE
24
27
28
26
23
22
4 TO 1
MARTIN LANE
25
24
9
10
8
6
4
22
ARTHUR STREET
SITE PLAN
SCALE 1:500
DENOTES BOREHOLE
PART TRACED FROM DRAWING SUPPLIED BY CONSULTING ENGINEERS
Lab. Ref. No.
S/10087
CANNON STREET-LONDON E.C.3
FIG 21

RECORD OF BOREHOLE 2 (SHEET 1) TQ38SW/2008

3278 · 8081

Basement level 9·70m above O.D. Diameter of boring: 0·20m

Method of boring: SHELL AND AUGER Lining tubes: 0·20m to 6·15m

Daily Progress	Depth to Water m	Depth of Lining Tubes m	Samples: Depth from m	Samples: Depth to m	Samples: Type	Legend	Depth m	Reduced level m	Description of Strata
6·9·73	NIL								MGRD
							0·75	8·95	FILL (Brown sand, silt, clay and bricks)
			0·75		BD				
			1·30		BD				
		1·25	1·45	1·75	C(25)				
			2·10		BD				
		2·00	2·25		C ✠				
		2·50	2·60	2·90	C (33)				
			2·45		BD				
			3·50		BD				Medium dense brown sandy GRAVEL.
		3·35	3·65	3·95	C(15)				SUPD
			4·35		BD				
		4·35	4·50	4·80	C(17)				
			5·05		BD				
		4·95	5·20	5·50	C(17)				
			5·50		D		5·40	4·30	
		5·80	5·50	5·95	U(4)		5·70	4·00	Firm fissured brown silty CLAY. LC
6·9·73	NIL								
7·9·73	NIL		6·00		D				
		6·15	6·30	6·75	U(4)				
			6·80		D				
		6·15	6·95	7·25	S(25)				
		6·15	7·65	8·10	U(4)				Stiff fissured grey silty CLAY with partings of silt and fine sand. LC
			8·15		D				
		6·15	8·30	8·60	S(19)				
		6·15	8·90	9·35	U(4)				
			9·35		D				
			9·50		BD				
		6·15	9·50	9·80	U(4)				
		6·15	9·80	10·25	U(4)				

2nd test of Alluvial Not recovered so take this as TD (EOB)

Key to type of sample:
U(4) – 102mm(4in) diameter undisturbed sample.
D – disturbed sample.
BD – bulk disturbed sample.
V – vane test.
S( ) – standard penetration test.
C( ) – dynamic cone penetration test.
Figure in brackets is No. of blows for penetration given in depth column (see Notes, page 1).

Remarks:
✠ No penetration.

In depth to water column 'S' refers to standpipe water depths, and 'P' to piezometer depths.

Lab. Ref. No. S/10087

CANNON STREET – LONDON EC3.

FIG 2

WIMPEY LABORATORIES LIMITED HAYES MIDDLESEX

Project Name: REGIS HOUSE 3287 8073			Record of Borehole No: BH 1
Project No: B3186	Client: LAND SECURITIES PROPERTIES Ltd		
Co-ordinates (National): E N	Ground level (mAOD): 5.41	Method: Cable Percussion	
Date: 03/05/94 to 09/05/94	Depth of Hole: 45.45	Hole diameter: 150mm / Casing diameter: 150mm	Sheet: 1 of 6
			Machine Number

Samples & Tests				Strata		Description of Strata	Geology	Legend	Water	Piezo Backfill
Depth (m)	No.	Type	SPT CPT 'N' value	Depth (m)	Reduced Level (m)					
				0						
				(0.30) 0.30	5.11	CONCRETE				
0.50	1	D		0.50	4.91	MADE GROUND: Brick and concrete rubble.				
1.00-1.45	2	BC	5	1 (1.30)		MADE GROUND: Dark brown clayey silty very gravelly fine to coarse sand. Gravel comprising brick and concrete. @ 1.00m: becoming a firm dark brown friable sandy very gravelly clay.				
1.80	3	D		1.80	3.61					
2.00-2.45	4	BC	4	2 (1.20)		MADE GROUND: Soft light and dark brown sandy gravelly clay with occasional brick fragments. @2.00m; locally grading to a clayey silty sand and gravel.				
2.70	5	D								
3.00-3.45	6/7	BC/D	22	3 (1.00)		Medium dense brown sandy subangular/subrounded fine to coarse GRAVEL.	FLOODPLAIN GRAV			
4.00	8	D		4	1.41					
4.80-5.25	9	U	(16)	5		Very soft light brown sandy to very sandy very gravelly CLAY.				
5.30-5.75	10/11	D/BC	4	(3.00)						
6.00	12	D		6		...@ 6.00m; locally appearing with no gravel content and brown, orange brown and dark grey veined.				
6.30-6.75	13	U	(15)							
6.80-7.25	14/15	D/BC	7	7	-1.59					
7.00	89	W		(0.30) 7.30	-1.89	Brown sandy subangular/subrounded fine to coarse GRAVEL.				
7.30	16	D		7.50	-2.09	Soft to firm brown extremely closely fissured CLAY.				
7.50-7.95	17/18	D/U	(41)	8		Stiff dark grey brown slightly mottled orange brown CLAY with occasional pockets of orange brown silt to 8.00m.	LC			

Boring Progress & Water Obs.							Chiselling			Remarks:
Date	Time	Depth	Casing	Water	Rose	Sealed	From	To	Mins	SPT's suspended at 30.00m by engineer due to slow progress. Extensometer installed to 45.45m. Eight magnets placed, as directed by the Engineer.
3\5\94	End	2.50	2.50	Dry						
4\5\94	Start	2.50	2.50	Dry						
	Strike	7.00	2.50	7.00	5.85	8.00				
	End	10.45	8.00							
5\5\94	Start	10.45	8.00							
	End	18.45	8.00				31.70	31.90	100	
8\5\94	Start	18.45	8.00							
	Strike	21.20	8.00	21.20	21.20	n/s				
	End	45.45	8.00							

For abbreviations and symbols see key sheet

GE/tech 101 Produced by I.M.Davidson on gINT, 1992

LTG

Scale: 1:50 All dimensions in metres	Processed in accordance with BS5930, BS5750 and AGS standards	Processed by: T. Kirby	Logged by: M.J. Sharratt

Project Name:						Record of Borehole No:
REGIS HOUSE						BH 1
Project No: B3186	Client: LAND SECURITIES PROPERTIES Ltd					
Co-ordinates (National): E N	Ground level (mAOD): 5.41	Method: Cable Percussion				
Date: 03/05/94 to 09/05/94	Depth of Hole: 45.45	Hole diameter: 150mm	Casing diameter: 150mm	Sheet: 2 of 6		Machine Number

Samples & Tests				Strata		Description of Strata	Geology	Legend	Water	Piezo Backfill
Depth (m)	No.	Type	SPT CPT 'N' value	Depth (m)	Reduced Level (m)					
8.00-8.45	19/20	DS	20	8		Stiff dark grey brown extremely closely fissured CLAY.				
9.00	21	D		9						
9.50-9.95	22	U	(460			...@ 9.50m; becoming very stiff				
10.00	23	D		10						
11.00	25	D		11						
11.50-11.95	26	U	(50)							
12.00-12.45	27/28	DS	30	12			LONDON CLAY			
13.00	29	D		13						
13.50-13.95	30	U	(55)							
14.00-14.45	31/32	DS	34	14						
15.00	33	D		15						
15.50-15.95	34	U	(57)							
				16	16.00	-10.59				

Boring Progress & Water Obs.							Chiselling			Remarks:
Date	Time	Depth	Casing	Water	Rose	Sealed	From	To	Mins	SPT's suspended at 30.00m by engineer due to slow progress. Extensometer installed to 45.45m. Eight magnets placed, as directed by the Engineer.
3\5\94	End	2.50	2.50	Dry						
4\5\94	Start	2.50	2.50	Dry						
	Strike	7.00	2.50	7.00	5.85	8.00				
	End	10.45	8.00							
5\5\94	Start	10.45	8.00							
	End	18.45	8.00				31.70	31.90	100	
8\5\94	Start	18.45	8.00							
	Strike	21.20	8.00	21.20	21.20	n/s				
	End	45.45	8.00							

For abbreviations and symbols see key sheet

GE/tech 101 Produced by I.M.Davidson on gINT, 1993

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Scale: 1:50	Processed in accordance with	Processed by:	Logged by:
All dimensions in metres	BS5930, BS5750 and AGS standards	T. Kirby	M.J. Sharratt

Project Name:						Record of Borehole No:
REGIS HOUSE						BH 1
Project No: B3186	Client: LAND SECURITIES PROPERTIES Ltd					
Co-ordinates (National): E N	Ground level (mAOD): 5.41	Method: Cable Percussion				
Date: 03/05/94 to 09/05/94	Depth of Hole: 45.45	Hole diameter: 150mm	Casing diameter: 150mm	Sheet: 3 of 6		Machine Number

Samples & Tests				Strata		Description of Strata	Geology	Legend	Water	Piezo/Backfill
Depth (m)	No.	Type	SPT/CPT 'N' value	Depth (m)	Reduced Level (m)					
16.00-16.45	35/36	DS	36			Very stiff dark grey brown extremely closely fissured CLAY.				
17.00	37	D								
17.50-17.95	38	U	(60)							
18.00-18.45	39/40	DS	38							
19.00	41	D								
19.50-19.95	42	U	(60)							
20.00-20.45	43/44	DS		8.00			LONDON CLAY			
21.00	45	D				...@ 21.00m: becoming with occasional small pockets/traces of fine sand to 23.00m.				
21.20	90	W								
21.50-21.95	46	U	(60)							
22.00-22.45	47/48	DS	42							
23.00	49	D				...@ 23.00m: appearing locally intact and with thin laminations of light brown fine sand.				
23.50-23.95	50	U	(60)			...@23.35m Claystone band.				
				24.00	-18.59					

Boring Progress & Water Obs.							Chiselling			Remarks:
Date	Time	Depth	Casing	Water	Rose	Sealed	From	To	Mins	SPT's suspended at 30.00m by engineer due to slow progress. Extensometer installed to 45.45m. Eight magnets placed, as directed by the Engineer.
3\5\94	End	2.50	2.50	Dry						
4\5\94	Start	2.50	2.50	Dry						
	Strike	7.00	2.50	7.00	5.85	8.00				
	End	10.45	8.00							
5\5\94	Start	10.45	8.00							
	End	18.45	8.00				31.70	31.90	100	
8\5\94	Start	18.45	8.00							
	Strike	21.20	8.00	21.20	21.20	n/s				
	End	45.45	8.00							

For abbreviations and symbols see key sheet

GE/tech 101 Produced by I.M.Davidson on pINT, 1992

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Scale: 1:50	Processed in accordance with	Processed by:	Logged by:
All dimensions in metres	BS5930, BS5750 and AGS standards	T. Kirby	M.J. Sharratt

Project Name:	REGIS HOUSE			Record of Borehole No:
Project No: B3186	Client: LAND SECURITIES PROPERTIES Ltd			BH 1
Co-ordinates (National): E N	Ground level (mAOD): 5.41	Method: Cable Percussion		
Date: 03/05/94 to 09/05/94	Depth of Hole: 45.45	Hole diameter: 150mm	Casing diameter: 150mm	Sheet: 4 of 6
				Machine Number

Samples & Tests				Strata		Description of Strata	Geology	Legend	Water	Piezo. Backfill
Depth (m)	No.	Type	SPT CPT 'N' value	Depth (m)	Reduced Level (m)					
24.00-24.45	51/52	DS	44	24		Very stiff dark grey brown extremely closely fissured CLAY locally with some/many fine gravel size pockets of fine sand.				
25.00	53	D		25		...@ 25.00m: becoming with occasional thin lenses of light grey sand to 27.00m.				
25.50-25.95	54	U	(65)							
26.00-26.45	55/56	DS	46	26						
27.00	57	D		27		...@ 27.00m: locally appearing intact.				
27.50-27.95	58	U	(67)							
28.00-28.45	59/60	DS	48	28	(4.00)		LONDON CLAY			
29.50-29.95	61/62	D/U	(70)	29						
30.00-30.45	63/64	DS	50	30		...@ 30.00m: locally with traces of fine sand on some fissure surfaces.				
31.00	65	D		31						
31.50-31.70		U	(100)							
31.75	66	D		32	32.00 -26.59	...@ 31.75m: claystone.				

Boring Progress & Water Obs.							Chiselling			Remarks:
Date	Time	Depth	Casing	Water	Rose	Sealed	From	To	Mins	SPT's suspended at 30.00m by engineer due to slow progress. Extensometer installed to 45.45m. Eight magnets placed, as directed by the Engineer.
3\5\94	End	2.50	2.50	Dry						
4\5\94	Start	2.50	2.50	Dry						
	Strike	7.00	2.50	7.00	5.85	8.00				
	End	10.45	8.00							
5\5\94	Start	10.45	8.00							
	End	18.45	8.00				31.70	31.90	100	
8\5\94	Start	18.45	8.00							
	Strike	21.20	8.00	21.20	21.20	n/s				
	End	45.45	8.00							

For abbreviations and symbols see key sheet

GE/tech 101 Produced by I.M.Davidson on gINT, 1992

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Scale: 1:50 All dimensions in metres	Processed in accordance with BS5930, BS5750 and AGS standards	Processed by: T. Kirby	Logged by: M.J. Sharratt

Project Name:	REGIS HOUSE	Record of Borehole No:
Project No: B 3 1 8 6	Client: LAND SECURITIES PROPERTIES Ltd	BH 1

Co-ordinates (National):	Ground level (mAOD):	Method:		
E N	5.41	Cable Percussion		
Date:	Depth of Hole:	Hole diameter:	Casing diameter:	Sheet:
03/05/94 to 09/05/94	45.45	150mm	150mm	5 of 6

Machine Number

Samples & Tests				Strata		Description of Strata	Geology	Legend	Water	Piezometer
Depth (m)	No.	Type	SPT CPT 'N' value	Depth (m)	Reduced Level (m)					
32.00-32.45	67	U	(80)	32		Very stiff dark grey brown thickly laminated CLAY.				
32.50	68	D				...@ 32.50m: becoming extremely closely fissured and with occasional small pockets/lenses of fine sand.				
33.00	69	D		33						
34.00-34.45	70	U	(86)	34						
34.50	71	D				...@ 34.50m: appearing slightly friable and more silty.				
35.00	72	D		35	35.00	-29.59 Very stiff dark grey brown intact sandy CLAY.	LONDON CLAY			
36.00-36.45	73	U	(90)	36						
36.50	74	D				...@ 36.50m: becoming extremely closely fissured and with frequent pockets (fine gravel size) of clayey fine sand locally grading to a very clayey silty fine sand.				
37.00	75	D		37		...@ 37.00m: becoming a sandy clay with frequent sand pockets (as above).				
38.00-38.45	76	U	(97)	38						
38.50	77	D				...@ 38.50m: locally appearing as extremely closely fissured CLAY.				
39.00	78	D		39		...@ 39.00m: appearing an intact sandy CLAY with occasional small pockets of sand.				
				40	39.60					

Boring Progress & Water Obs.							Chiselling			Remarks:
Date	Time	Depth	Casing	Water	Rose	Sealed	From	To	Mins	SPT's suspended at 30.00m by engineer due to slow progress. Extensometer installed to 45.45m. Eight magnets placed, as directed by the Engineer.
3\5\94	End	2.50	2.50	Dry						
4\5\94	Start	2.50	2.50	Dry						
	Strike	7.00	2.50	7.00	5.85	8.00				
	End	10.45	8.00							
5\5\94	Start	10.45	8.00							
	End	18.45	8.00				31.70	31.90	100	
8\5\94	Start	18.45	8.00							
	Strike	21.20	8.00	21.20	21.20	n/s				
	End	45.45	8.00							

For abbreviations and symbols see key sheet

GE/tech 101 Produced by J.M.Davidson on gINT, 1992

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Scale: 1:50 All dimensions in metres	Processed in accordance with BS5930, BS5750 and AGS standards	Processed by: T. Kirby	Logged by: M.J. Sharratt

Project Name:	REGIS HOUSE	Record of Borehole No:
Project No: B 3 1 8 6	Client: LAND SECURITIES PROPERTIES Ltd	BH 1

Co-ordinates (National):	Ground level (mAOD):	Method:		
E N	5.41	Cable Percussion		
Date:	**Depth of Hole:**	**Hole diameter:**	**Casing diameter:**	**Sheet:**
03/05/94 to 09/05/94	45.45	150mm	150mm	6 of 6

Machine Number

Samples & Tests				Strata		Description of Strata	Geology	Legend	Water	Piezo. Backfill
Depth (m)	No.	Type	SPT CPT 'N' value	Depth (m)	Reduced Level (m)					
40.00-40.45	79	U	(100)							
40.50	80	D				...@ 40.50m: appearing an extremely closely fissured CLAY with traces of fine sand on fissure surfaces.				
41.00	81	D				...@ 41.00m: appearing a sandy CLAY.				
42.00-42.45	82	U	(100)				LONDON CLAY			
42.50	83	D				...@ 42.50m: appearing an extremely closely fissured CLAY with traces of fine sand on fissure surfaces, locally pyritised and with fine gravel sized pyritic nodules.				
43.00	84	D				...@ 43.00m: becoming a friable sandy to very sandy CLAY.				
44.00-44.45	85	U	(110)							
44.50	86	D								
44.60	87	D		44.60	-39.19	...@ 44.50m: appearing with some dark green mottling.				
45.00-45.45	88	D	96	(0.50) 45.10	-39.69	Very stiff light grey slightly friable sandy very silty CLAY. ....@ 45.00m: appearing with pockets of sand.				
				(0.35) 45.45	-40.04	Very stiff brown slightly mottled brown slightly mottled light grey extremely closely fissured CLAY.				
						BOREHOLE COMPLETE AT 45.45m				

Boring Progress & Water Obs.							Chiselling			Remarks:
Date	Time	Depth	Casing	Water	Rose	Sealed	From	To	Mins	SPT's suspended at 30.00m by engineer due to slow progress. Extensometer installed to 45.45m. Eight magnets placed, as directed by the Engineer.
3\5\94	End	2.50	2.50	Dry						
4\5\94	Start	2.50	2.50	Dry						
	Strike	7.00	2.50	7.00	5.85	8.00				
	End	10.45	8.00							
5\5\94	Start	10.45	8.00							
	End	18.45	8.00				31.70	31.90	100	
8\5\94	Start	18.45	8.00							
	Strike	21.20	8.00	21.20	21.20	n/s				
	End	45.45	8.00							

For abbreviations and symbols see key sheet

GE/tech 101 Produced by J.M.Davidson on gINT, 1993

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Scale: 1:50	Processed in accordance with BS5930, BS5750 and AGS standards	Processed by: T. Kirby	Logged by: M.J. Sharratt
All dimensions in metres			

Project Name: REGIS HOUSE 3288 8073			Record of Borehole No: BH 4
Project No: B 3 1 8 6	Client: LAND SECURITIES PROPERTIES Ltd		
Co-ordinates (National): E N	Ground level (mAOD): 6.15	Method: CABLE PERCUSSION	
Date: 13/05/94 to 16/05/94	Depth of Hole: 15.50	Hole diameter: 150mm / Casing diameter: 150mm	Sheet: 1 of 2 / Machine Number

Samples & Tests				Strata		Description of Strata	Geology	Legend	Water	Piezo/Backfill
Depth (m)	No.	Type	SPT CPT 'N' value	Depth (m)	Reduced Level (m)					
				0						
0.25	1	D		0.25	5.90	CONCRETE				
0.30-0.50	2	B		0.50	5.65	MADE GROUND (Dark brown sandy clay and fine to coarse flint gravel with occasional brick fragments).				
0.50-0.95	3	BC	26			Medium dense to dense orange brown sandy sub angular to rounded fine to coarse predominantly fine flint GRAVEL.	FLOODPLAIN GRAV			
1.50	4	B				...@1.50m; locally grading to a SAND and GRAVEL				
2.00-2.45	5	BC	28							
2.90	31	W		(4.40)						
3.00	6	D								
3.50-3.95	7	BC								
4.90	8	D		4.90	1.25					
5.00-5.45	9	U4	(27)			Soft to firm becoming firm brown extremely closely fissured CLAY with occasional pockets of sandy clay.				
5.50-5.95	10\11	D\DS	13	(0.70)						
				5.60	0.55	....@ 5.50m With occasional mudstone inclusions.				
						Stiff dark grey brown extremely closely fissured CLAY.				
6.50	12	D				....@ 6.50m with traces of fossil shell fragments.	LONDON CLAY			
7.00-7.45	13	U4	(33)							
7.50-7.95	14\15	D\DS	23							
				8						

Boring Progress & Water Obs.							Chiselling			Remarks:
Date	Time	Depth	Casing	Water	Rose	Sealed	From	To	Mins	
13\5\94	Start	0.00	Nil	Dry						
		2.70	2.30	2.70	2.60	3.50				
	End	4.00	4.00	2.70						
16\5\94	Start	4.00	4.00	2.55						
	End	15.50	5.50	Dry						

For abbreviations and symbols see key sheet

GB/tech 101 Produced by I.M.Davidson on gINT, 1992

LTG

Scale: 1:50 All dimensions in metres	Processed in accordance with BS5930, BS5750 and AGS standards	Processed by: SM	Logged by: SM

Project Name:		Record of Borehole No:
REGIS HOUSE		BH 4
Project No: B 3 1 8 6	Client: LAND SECURITIES PROPERTIES Ltd	
Co-ordinates (National): E N	Ground level (mAOD): 6.15	Method: CABLE PERCUSSION
Date: 13/05/94 to 16/05/94	Depth of Hole: 15.50	Hole diameter: 150mm / Casing diameter: 150mm / Sheet: 2 of 2
		Machine Number

Samples & Tests				Strata		Description of Strata	Geology	Legend	Water	Piezo. Backfill
Depth (m)	No.	Type	SPT CPT 'N' value	Depth (m)	Reduced Level (m)					
				8		Stiff dark grey brown extremely closely fissured CLAY				
8.50	16	D								
9.00-9.45	17	U4	(40)	9		...@9.00m; becoming very stiff.				
9.50-9.95	18\19	D\DS	26			....@9.50m with some brown silt partings.				
				10						
10.50	20	D		(9.90)						
11.00-11.45	21	U4	(47)	11			LONDON CLAY			
11.50-11.95	22\23	D\DS	28							
				12						
12.50	24	D								
13.00-13.45	25	U4	(55)	13						
13.50-13.95	26\27	D\DS	31							
				14						
14.50	28	D				...@ 14.50m With traces of fossil shell fragments.				
15.00-15.45	29	U4	(60)	15						
15.50	30	D		15.50	-9.35	BOREHOLE COMPLETED AT 15.50m				

Boring Progress & Water Obs.							Chiselling			Remarks:
Date	Time	Depth	Casing	Water	Rose	Sealed	From	To	Mins	
13\5\94	Start	0.00	Nil	Dry						
		2.70	2.00	2.70	2.60	3.50				
	End	4.00	4.00	2.70						
16\5\94	Start	4.00	4.00	2.55						
	End	15.50	5.50	Dry						

For abbreviations and symbols see key sheet

GE/tech 101 Produced by I.M.Davidson on gINT, 1992

LTG

Scale: 1:50 All dimensions in metres	Processed in accordance with BS5930, BS5750 and AGS standards	Processed by: SM	Logged by: SM

Project Name: REGIS HOUSE 3287 8072			Record of Borehole No: BH 5C
Project No: B 3 1 8 6	Client: LAND SECURITIES PROPERTIES Ltd		
Co-ordinates (National): E N	Ground level (mAOD): 5.40	Method: CABLE PERCUSSION	
Date: 17/05/94 to 18/05/94	Depth of Hole: 20.00	Hole diameter: 150mm / Casing diameter: 150mm	Sheet: 1 of 3
			Machine Number

Samples & Tests				Strata		Description of Strata	Geology	Legend	Water	Piezo Backfill
Depth (m)	No.	Type	SPT CPT 'N' value	Depth (m)	Reduced Level (m)					
				0		TRIAL PIT 112 TO 2.50m.				
				(2.50)						
2.40	8	W		2.50	2.90					
2.50	1	D				MADE GROUND (Brown sandy fine to coarse predominantly medium angular to sub angular gravel with some soft brown clay pockets. Gravel is composed of flint gravel, shells and shell fragments, brick and tile fragments.)				
3.00-3.45	2	BC	4	(1.50)						
4.00	3	D		4.00	1.40					
4.50-4.95	4	BC	8			Loose to medium dense brown very sandy sub rounded fine to coarse predominantly fine GRAVEL. Sand is fine to coarse predominantly coarse.	FLOODPLAIN GRAV			
				(2.30)						
5.50	5	D								
6.00-6.45	6	BC	13							
6.30	7	D		6.30	-0.90					
						Firm brown mottled orange brown extremely closely fissured CLAY with occasional rounded fine flint gravel.	LONDON CLAY			
7.00-7.45	9	U	(35)			...@7.00m becoming stiff.				
7.45	10	D	16			...@ 7.45m becoming with traces of orange brown silt on some fissures and no gravel.				
7.50-7.95	11	DS		(2.70)						
				8						

Boring Progress & Water Obs.							Chiselling			Remarks:
Date	Time	Depth	Casing	Water	Rose	Sealed	From	To	Mins	Trial pit 112 excavated to 2.50m below basement level prior to drilling.
17\5\94	Start	2.50	2.50	2.40	2.40	6.80				
	End	14.00	7.50	Dry						
18\5\94	Start	9.65	7.50	Damp						
	End	20.00	7.50	Damp						

For abbreviations and symbols see key sheet

GE/tech 101 Produced by J.M.Davidson on gINT, 1993

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Scale: 1:50 All dimensions in metres	Processed in accordance with BS5930, BS5750 and AGS standards	Processed by: SM	Logged by: SM

Project Name:	REGIS HOUSE			Record of Borehole No:
Project No: B 3 1 8 6	Client: LAND SECURITIES PROPERTIES Ltd			BH 5C
Co-ordinates (National): E N	Ground level (mAOD): 5.40	Method: CABLE PERCUSSION		
Date: 17/05/94 to 18/05/94	Depth of Hole: 20.00	Hole diameter: 150mm	Casing diameter: 150mm	Sheet: 2 of 3
				Machine Number

Samples & Tests				Strata		Description of Strata	Geology	Legend	Water	Backfill
Depth (m)	No.	Type	SPT CPT 'N' value	Depth (m)	Reduced Level (m)					
						Stiff brown mottled orange brown extremely closely fissured CLAY.	LONDON CLAY			
				9.00	-3.60					
9.00-10.00	12	B				Stiff dark grey brown extremely closely fissured CLAY.				
10.00-10.45	13\14	D\U	(70)							
10.45	15	D				...@ 10.50m appearing locally intact with traces of fine sand size shell fragments to 12.50m				
10.50-10.95	16	DS								
11.50	17	D								
12.00-12.45	18	U	(90)	(6.10)						
12.45	19	D	28							
12.50-12.95	20	DS								
13.50	21	D								
14.00-14.25	22	U	(100)							
14.25	23	D	32			...@14.25m With some grey silt traces on some fissures.				
14.30-14.75	24	DS				...@ 14.30m Becoming Very stiff.				
				15.10	-9.70					
				15.30	-9.90	Hard grey MUDSTONE.				
15.50	25	D				Very stiff dark grey brown extremely closely fissured CLAY.				

Boring Progress & Water Obs.							Chiselling			Remarks:
Date	Time	Depth	Casing	Water	Rose	Sealed	From	To	Mins	Trial pit 112 excavated to 2.50m below basement level prior to drilling.
17\5\94	Start	2.50	2.50	2.40	2.40	6.80				
	End	14.00	7.50	Dry						
18\5\94	Start	9.65	7.50	Damp						
	End	20.00	7.50	Damp						

For abbreviations and symbols see key sheet

GE/tech 101 Produced by I.M.Davidson on gINT, 1992

LTG

Scale: 1:50 All dimensions in metres	Processed in accordance with BS5930, BS5750 and AGS standards	Processed by: SM	Logged by: SM

Project Name: REGIS HOUSE

Record of Borehole No: BH 5C

Project No: B3186

Client: LAND SECURITIES PROPERTIES Ltd

Co-ordinates (National): E N

Ground level (mAOD): 5.40

Method: CABLE PERCUSSION

Date: 17/05/94 to 18/05/94

Depth of Hole: 20.00

Hole diameter: 150mm

Casing diameter: 150mm

Sheet: 3 of 3

Machine Number

Samples & Tests				Strata		Description of Strata	Geology	Legend	Water	Piezo Backfill
Depth (m)	No.	Type	SPT CPT 'N' value	Depth (m)	Reduced Level (m)					
16.00-16.45	26	U	(50)			Very stiff dark grey brown extremely closely fissured CLAY.	LONDON CLAY			
16.45	27	D	56			...@ 16.50m hard grey brown mudstone band.				
16.50-16.95	28	DS								
17.50	29	D								
18.00-18.45	30	U	(60)							
18.45	31	D								
19.00-19.45	32	DS	31							
20.00	33	D		20.00	-14.60	...@20.00m with some brown fine sand. BOREHOLE COMPLETED AT 20.00m.				

Boring Progress & Water Obs.							Chiselling			Remarks:
Date	Time	Depth	Casing	Water	Rose	Sealed	From	To	Mins	Trial pit 112 excavated to 2.50m below basement level prior to drilling.
17\5\94	Start	2.50	2.50	2.40	2.40	6.80				
	End	14.00	7.50	Dry						
18\5\94	Start	9.65	7.50	Damp						
	End	20.00	7.50	Damp						

For abbreviations and symbols see key sheet

GE/tech 101 Produced by J.M.Davidson on gINT, 1992

LTG

Scale: 1:50 All dimensions in metres

Processed in accordance with BS5930, BS5750 and AGS standards

Processed by: SM

Logged by: SM

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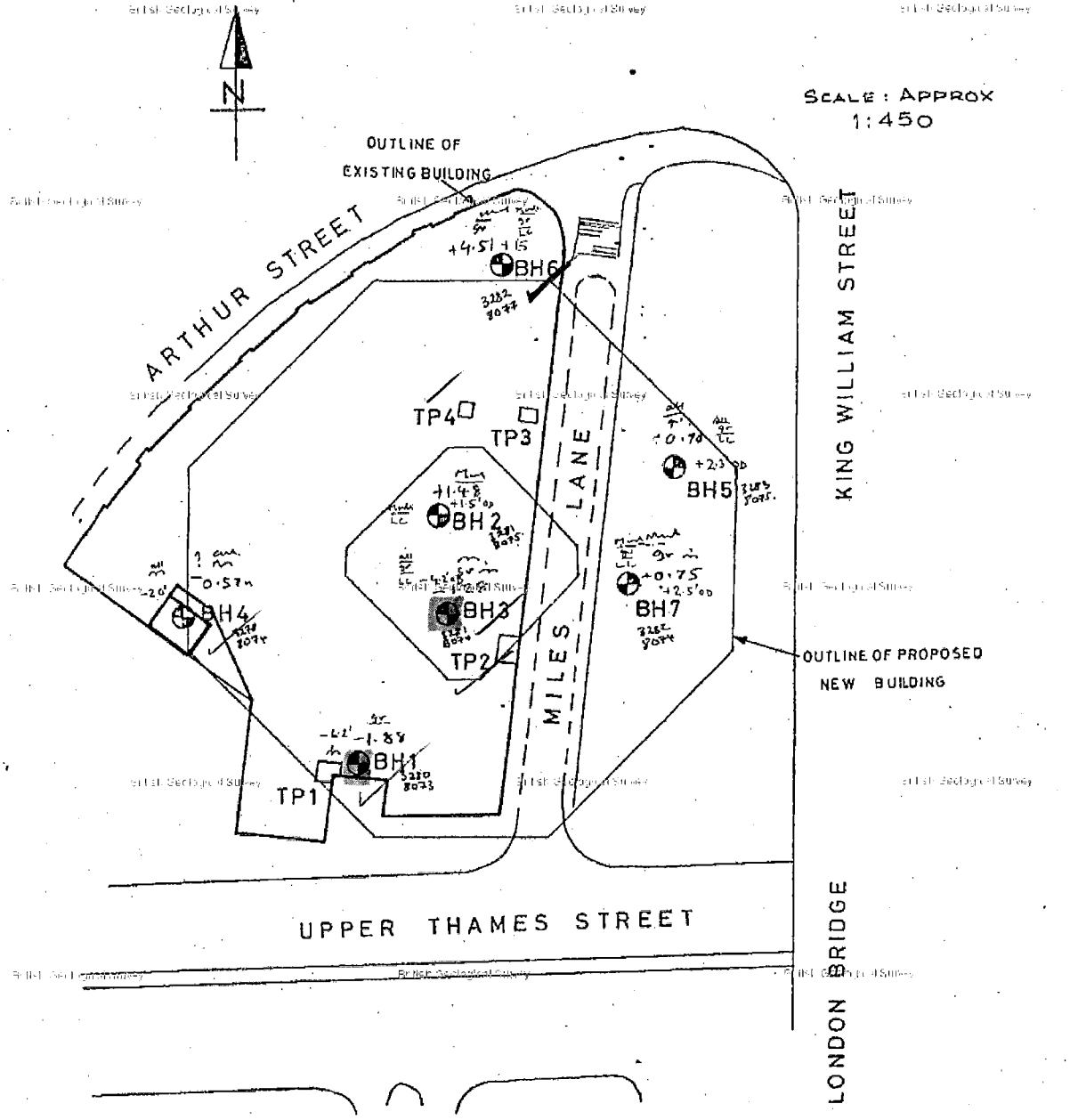

KING WILLIAM STREET HOUSE
SITE PLAN
&
SITE INVESTIGATION LOCATIONS

SCOTT WILSON KIRKPATRICK & PARTNERS
Consulting Civil & Structural Engineers
Transportation & Environmental Planners

DATE		DRAWN
APR '79	FIG 1	PG

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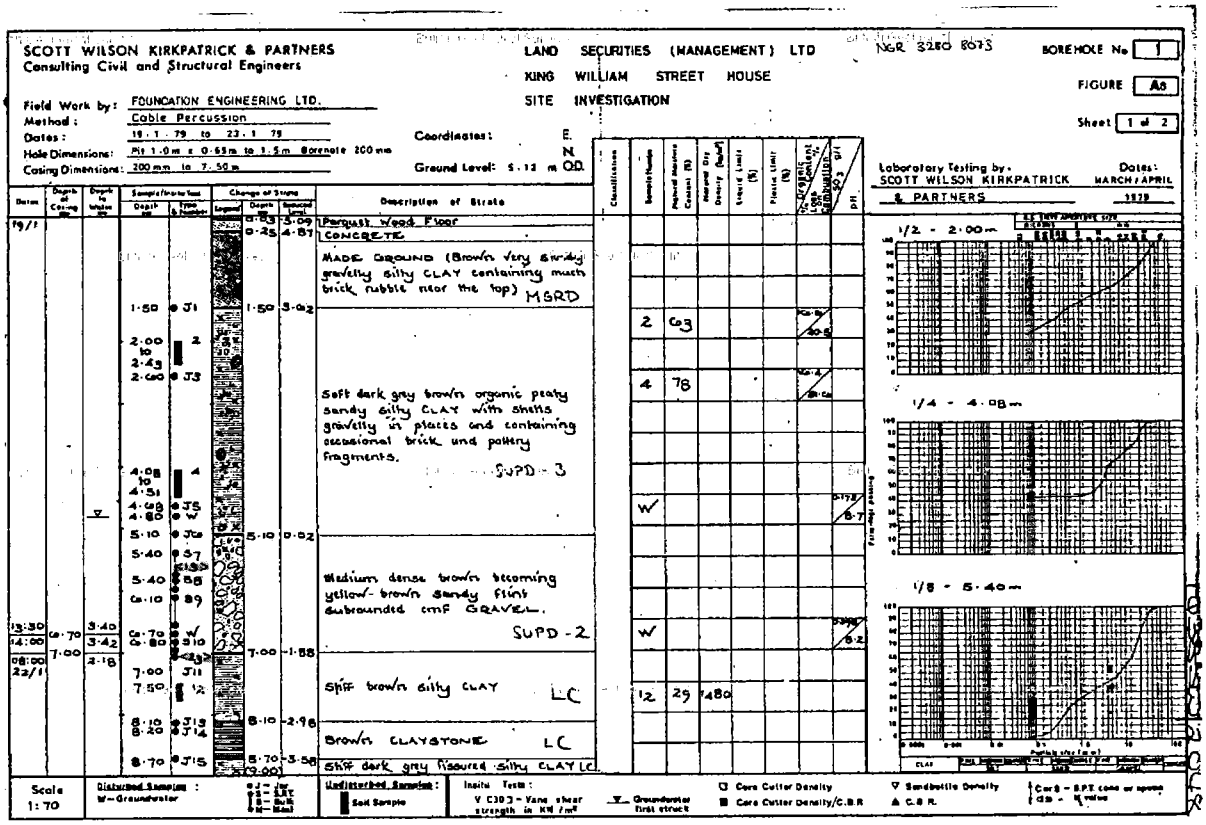

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Consulting Civil and Structural Engineers

LAND SECURITIES (MANAGEMENT) LTD
KING WILLIAM STREET HOUSE
SITE INVESTIGATION

NGR 3285 8093

BOREHOLE No 1
FIGURE A8
Sheet 2 of 2

Field Work by: FOUNDATION ENGINEERING LTD.
Method: Cable Percussion
Dates: 19.1.79 to 23.1.79
Hole Dimensions: Pit 1.0m x 0.65m to 1.5m Borehole 200mm
Casing Dimensions: 200mm to 7.50m

Coordinates: E. N.
Ground Level: 5.12 m OD

Laboratory Testing by: SCOTT WILSON KIRKPATRICK & PARTNERS
Dates: MARCH/APRIL 1979

Dates	Depth of Casing	Depth to Water	Sample Depth	Type & Number	Strata Depth	Reduced Level	Classification	Sample Number	Natural Moisture Content (%)	Natural Dry Density (Mg/m³)	Liquid Limit (%)	Plastic Limit (%)
22/1			9.00	J16	(9.00)							
			9.50	J17				17	31		71	22
			9.65	J18								
			10.00	J19								
18:00 / 09:00 23/1	7.50	3.16 / 2.18	10.50	J20								
			11.00	J21								
			12.50 to 12.95	22				22	27	150		
			13.00	J23								
			13.50 to 13.80	24								
			14.00	J25	14.00	-8.88						

Description of Strata:

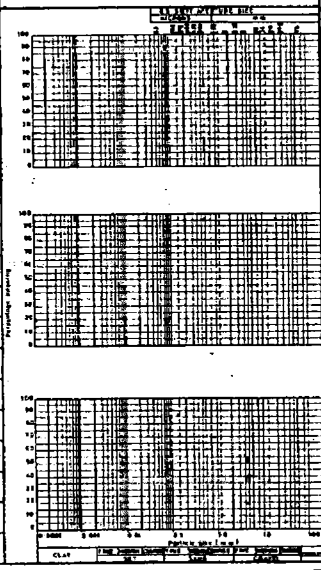
Stiff dark grey fissured silty CLAY

LC

End of Borehole

NOTE:- Chiselling from 11.00m to 12.60m depth for 1 hour.

NOTE:- Undisturbed samples attempted at 9.00m, 9.50m, 9.65, 10.00m, 10.50m and 11.00m, but were obstructed, possibly by claystone fragment.



Scale 1:70

Disturbed Samples: W - Groundwater; J = Jar; S = SPT; B = Bulk; M = Mud

Undisturbed Samples: Soil Sample

Insitu Tests: V [30] - Vane shear strength in KN/m²; Groundwater first struck; Core Cutter Density; Core Cutter Density/C.B.R; Sandbottle Density; C.B.R.; C or S - S.P.T. cone or open; 03 - N value

Report an issue with this borehole

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SCOTT WILSON KIRKPATRICK & PARTNERS
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Laboratory Testing by: SCOTT WILSON KIRKPATRICK and PARTNERS

Dates: MARCH – APRIL

LAND SECURITIES (MANAGEMENT) LTD
KING WILLIAM STREET HOUSE
SITE INVESTIGATION

BOREHOLE No 1
FIGURE B9
Sheet 1 of 1

Sample Depth (m)	Sample Type & Number	Initial Moisture Content (%)	Initial Dry Density (kg/m³)		Consolidation									Notes
				Pressure Range (kN/m²)	0–53.5	53.5–107	107–214	214–428	428–856	856–107	107–214	214–428	428–856	
7.50 to 7.80	U12	29	1480	m_v	0.0062	0.030	0.119	0.112	0.070	-0.0060	0.075	0.082	0.054	SG = 2.66
				c_v	6.0	18.1	0.5	0.3	0.3	-0.2	0.4	0.3	0.3	
				e_0	0.797									
				Pressure Range (kN/m²)	0–160.5	160.5–321	321–642	642–1284	1284–160.5	160.5–321	321–642	642–1284		
12.50 to 12.95	U22	27	1560	m_v	0.019	0.087	0.078	0.068	-0.064	0.090	0.064	0.036		SG = 2.64
				c_v	8.2	0.4	0.3	0.3	-0.5	0.3	0.3	0.4		
				e_0	0.094									

Other columns (Compaction: Type of Test, Optimum Moisture Content (%), Maximum Dry Density (kg/m³); Shear Strength: Stress at Failure σ_3 (kN/m²), $\frac{\sigma_1-\sigma_3}{2}$ (kN/m²), Strain at Failure (%), Moisture Content (%), Dry Density (kg/m³), c (kN/m²), φ (Degrees), Type of Shear Test) are blank.

For Sample Type see Sheet A

S = BS Standard; H = BS Heavy; M = BS Measured

UU = Unconsolidated Undrained; $\overline{UU}$ = Ditto with p.w.p measurement; CD = Consolidated Drained; $\overline{CD}$ = Ditto with p.w.p measurement; CU = Consolidated Undrained; $\overline{CU}$ = Ditto with p.w.p measurement; V = Vane Shear; S = Shear Box

m_v = m²/MN; c_v = m²/yr; k = m/s × 10⁻⁶; e = void ratio at U 100% for each increment

3

Report an issue with this borehole

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LAND SECURITIES (MANAGEMENT) LTD
KING WILLIAM STREET HOUSE
SITE INVESTIGATION

NGR 5281 8074

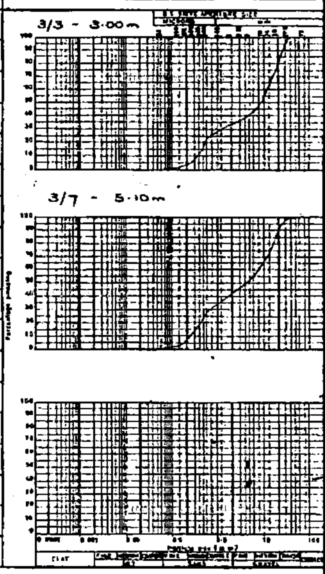
BOREHOLE No 3
FIGURE A12
Sheet 1 of 2

Field Work by: FOUNDATION ENGINEERING LTD.
Method: Cable Percussion
Dates: 16.1.79 to 17.1.79
Hole Dimensions: Pit 1.05 m x 0.70 m to 1.5 m Borehole 200 mm
Casing Dimensions: 200 mm to 6.60 m

Coordinates: E N
Ground Level: 5.12 m O.D.

Laboratory Testing by: SCOTT WILSON KIRKPATRICK & PARTNERS
Dates: MARCH / APRIL 1979

Dates	Depth of Casing (m)	Depth to Water (m)	Sample Depth (m)	Sample Type & Number	Strata Depth (m)	Reduced Level	Description of Strata	Classification	Sample Number	Natural Moisture Content (%)	Natural Dry Density	Liquid Limit (%)	Plastic Limit (%)	% Organic Content Loss on Combustion
16/1					0.03	5.09	Parquet Wood Floor							
					0.25	4.87	CONCRETE							
			1.50	J1	1.50	3.62	MADE GROUND (Substantially brick and concrete rubble and gravel with some sand and clay) MGRD							
			2.00	S2 <25>										
18:00	2.85	2.05												
08:00 17/1		1.95	3.00	S3										
				W										
			3.98	S4 <8>	4.05	1.07	Soft grey brown becoming dark grey gravelly sandy silty CLAY, very gravelly in places, peaty in places and containing brick, wood, bone and shell fragments. SUPD 3							
			4.50	5					5	35				0.9 / 10.0
			5.00	J6										
			5.10	S7 <47>	5.10	0.02	Soft to firm mottled grey and brown silty CLAY SUPD 2							
					6.40	-1.28	Dense yellow brown sandy flint GRAVEL (cmf) generally subrounded. SUPD 2							
13:00	6.60	6.25												
13:30		5.10	6.63	8					8	37	1320			
			7.23	J9										
					8.35	-3.23	Firm mottled grey and brown fissured silty CLAY with traces of root fibres. LC							
			8.65	10	(9.00)		Stiff dark grey fissured silty CLAY LC							



Scale 1:70

Disturbed Sampling: W - Groundwater; J - Jar; S - S.P.T.; B - Bulk; M - Mazi

Undisturbed Sampling: Soil Sample

Insitu Tests: V [30] - Vane shear strength in KN/m²

Groundwater first struck

Core Cutter Density
Core Cutter Density/C.B.R.

Sandbottle Density
C.B.R.

C or S - S.P.T. cone or spoon
CS - N value

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KING WILLIAM STREET HOUSE
SITE INVESTIGATION

NGR 3281 8074

BOREHOLE No 3
FIGURE A12
Sheet 2 of 2

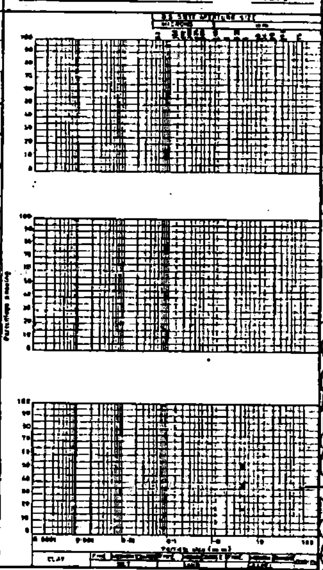
Field Work by: FOUNDATION ENGINEERING LTD.
Method: Cable Percussion
Dates: 16.1.79 to 17.1.79
Hole Dimensions: Pit 1.05m x 0.70m to 1.5m Borehole 200mm
Casing Dimensions: 200 mm to 6.80 m

Coordinates: E. N.
Ground Level: 5.12 m O.D.

Laboratory Testing by: SCOTT WILSON KIRKPATRICK & PARTNERS
Dates: MARCH / APRIL 1979

Dates	Depth of Casing	Depth to Water	Sample/Insitu Test Depth	Type & Number	Legend	Change of Strata Depth	Reduced Level	Description of Strata
17/1						(9.00)		
			9.25	J11				Stiff dark grey fissured silty CLAY
			10.00	12				LC
15:00	6.80	Dry	11.10	J13 W		11.10	-5.98	End of Borehole

Classification	Sample Number	Natural Moisture Content (%)	Natural Dry Density (kg/m³)	Liquid Limit (%)	Plastic Limit (%)		SO_3 g/l / pH
	11	27		70	25		
	12	28	1540				
	W						[illegible] / 8.7



Scale 1:70

Disturbed Sampling: W – Groundwater; J – Jar; S – S.P.T.; B – Bulk; M – Mould

Undisturbed Samples: Bolt Sample

Insitu Tests: V [20.] – Vane shear strength in KN/m²; ▽ Groundwater first struck

□ Core Cutter Density; ■ Core Cutter Density/C.B.R; ▽ Sandbottle Density; ▲ C.B.R; C or S – S.P.T. cone or spoon; (3) – N value

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LAND SECURITIES (MANAGEMENT) LTD
KING WILLIAM STREET HOUSE
SITE INVESTIGATION

NGR 3275 8074

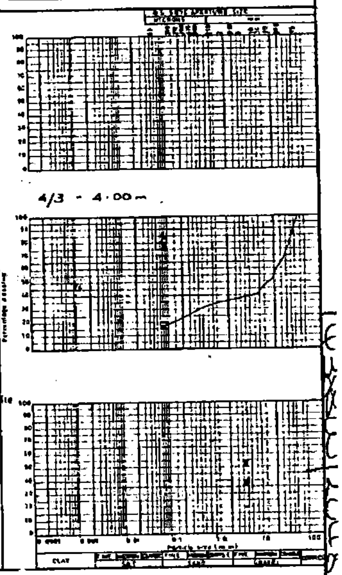
BOREHOLE No. 4
FIGURE A13
Sheet 1 of 4

Field Work by: FOUNDATION ENGINEERING LTD.
Method: Cable Percussion
Dates: 8.2.79 to 15.2.79
Hole Dimensions: Pit 1.0m x 0.65m to 1.5m Borehole 200 mm
Casing Dimensions: 200 mm to 6.00 m

Coordinates: E. N.
Ground Level: 5.23 m OD

Laboratory Testing by: SCOTT WILSON KIRKPATRICK & PARTNERS
Dates: MARCH / APRIL 1979

Dates	Depth of Casing	Depth to Water	Sample/Insitu Test Depth	Type & Number	Change of Strata Depth	Reduced Level	Description of Strata	Sample Number	SO_3 g/l / pH	Piezometer
8/2					0.20	5.03	CONCRETE			CONCRETE
			1.50	J1	1.50	3.73	MADE GROUND (Brown gravelly clayey silty SAND (cmf) with brick fragments and bones. MGKD			BENTONITE
		∇	2.00 4.00	S2 <00> W S/B3 <33>	4.45	0.78	MADE GROUND (Grey brown very sandy silty CLAY with brick and chalk fragments and some flint gravel (mF) (rounded to subangular) MGRD	W	0.329 / 8.8	GRAVEL
			4.50 5.50 5.80	B4 <B> B5 J6	5.80	-0.57	Soft to firm yellow brown gravelly very sandy silty CLAY (Possibly Made Ground) MGRD			SAND FILTER
18:00 08:00 9/2	5.80	5.36 4.08	5.90 to 6.30 6.50	7 J8	7.45	-2.22	Firm becoming stiff mottled brown and grey fissured silty CLAY LC			Bentonite
			7.50 to 7.90 8.00	9 J10	(9.00)		Stiff dark grey fissured silty CLAY with traces of shells. Lc			BACKFILL



Scale 1:70

Disturbed Samples: W – Groundwater; J = Jar; S = SPT; B = Bulk; M = Mud

Undisturbed Samples: Soil Sample

Insitu Tests: V [30] – Vane shear strength in KN/m²

▼ Groundwater first struck

□ Core Cutter Density ■ Core Cutter Density/C.B.R

▽ Sandbottle Density ▲ C.B.R.

C or S – SPT cone or spoon; (3) – N value

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KING WILLIAM STREET HOUSE
SITE INVESTIGATION

BOREHOLE No 4
FIGURE A13
Sheet 2 of 4

Field Work by: FOUNDATION ENGINEERING LTD.
Method: Cable Percussion
Dates: 8.2.79 to 15.2.79
Hole Dimensions: Pit 1.0m x 0.65m to 1.5m Borehole 200mm
Casing Dimensions: 200mm to 6.00m

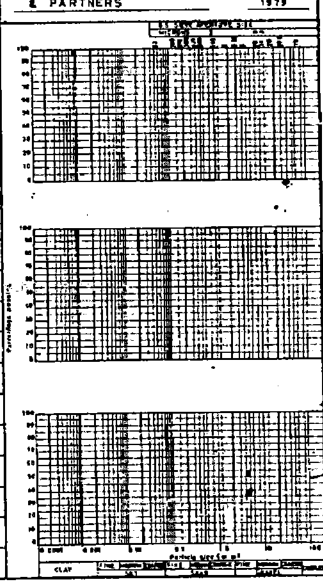
Coordinates: E. N.
Ground Level: 5.23 m OD.

Laboratory Testing by: SCOTT WILSON KIRKPATRICK & PARTNERS
Dates: MARCH / APRIL 1979

Dates	Depth of Casing	Depth to Water	Sample/Insitu Test Depth	Type & Number	Legend	Depth	Reduced Level	Description of Strata
9/2			9.00 to 9.40	11		(9.00)		
			9.50	J 12				
			10.50 to 10.90	13				
			11.00	J 14				
			12.00 to 12.42	15				
			12.50	J 16				Stiff dark grey fissured silty CLAY becoming very stiff.
			15.00 to 15.40	17				
18:00	6.00	Dry	15.50	J 18				
08:00 12/2		Dry						
						(18.00)		

Sample Number	Natural Moisture Content (%)	Natural Dry Density (Mg/m³)	Liquid Limit (%)	Plastic Limit (%)
15	25	15[illegible]		
17	22		70	23

LC



Scale 1:70

Disturbed Samples: W – Groundwater; J – Jar; S – S.P.T.; B – Bulk; M – Mazier

Undisturbed Sampling: Soil Sample

Insitu Tests: V C38] – Vane shear strength in KN/m²; ▼ Groundwater first struck; □ Core Cutter Density; ■ Core Cutter Density/C.B.R.; ▽ Sandbottle Density; ▲ C.B.R.; C or S – S.P.T. cone or spoon; CB – N value

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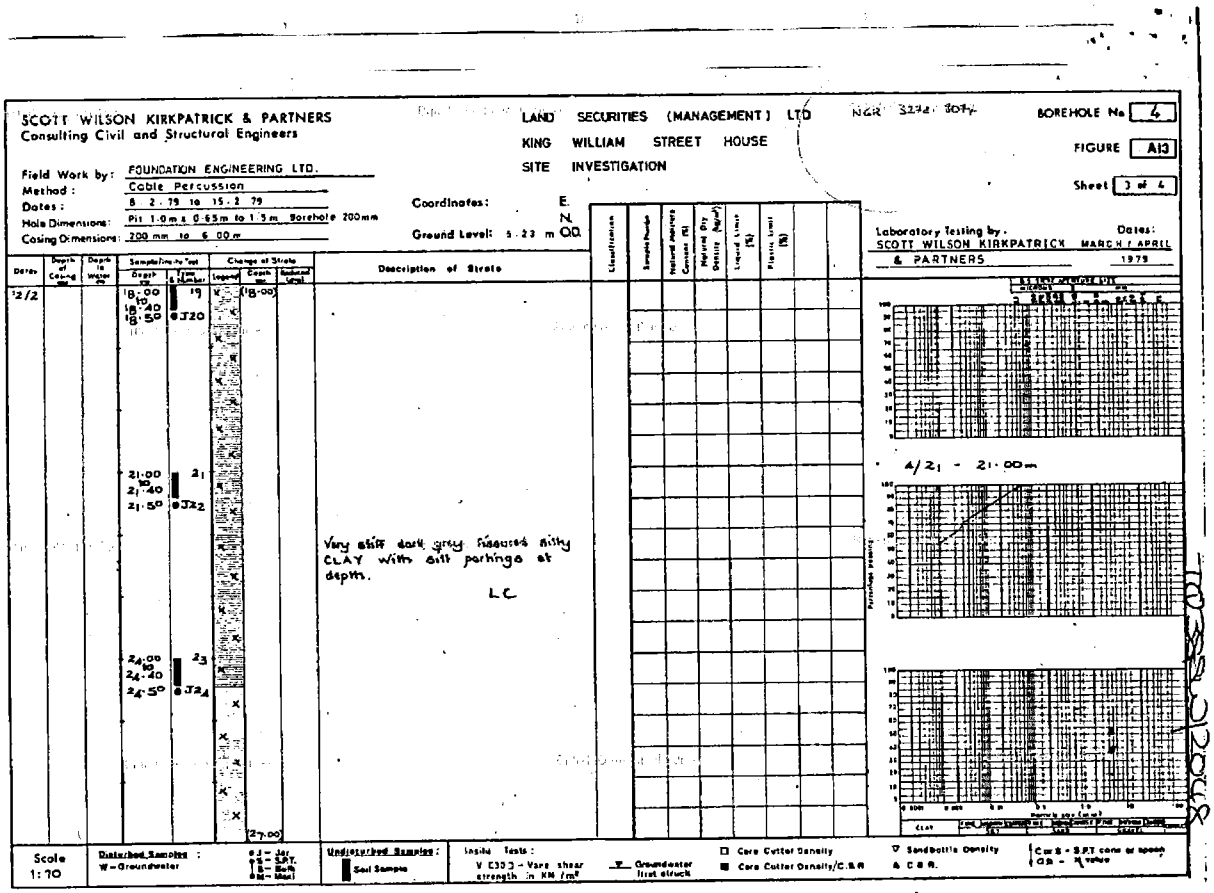

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LAND SECURITIES (MANAGEMENT) LTD
KING WILLIAM STREET HOUSE
SITE INVESTIGATION

NGR 3242 3074

BOREHOLE No 4
FIGURE A13
Sheet 3 of 4

Field Work by: FOUNDATION ENGINEERING LTD.
Method: Cable Percussion
Dates: 8 2 79 to 15 2 79
Hole Dimensions: Pit 1.0m x 0.65m to 1.5m Borehole 200mm
Casing Dimensions: 200 mm to 6.00 m

Coordinates: E. N.
Ground Level: 5.23 m OD

Laboratory Testing by: SCOTT WILSON KIRKPATRICK & PARTNERS
Dates: MARCH / APRIL 1979

Description of Strata

Very stiff dark grey fissured silty CLAY with silt partings at depth.

LC

4/21 - 21.00m

Scale 1:70

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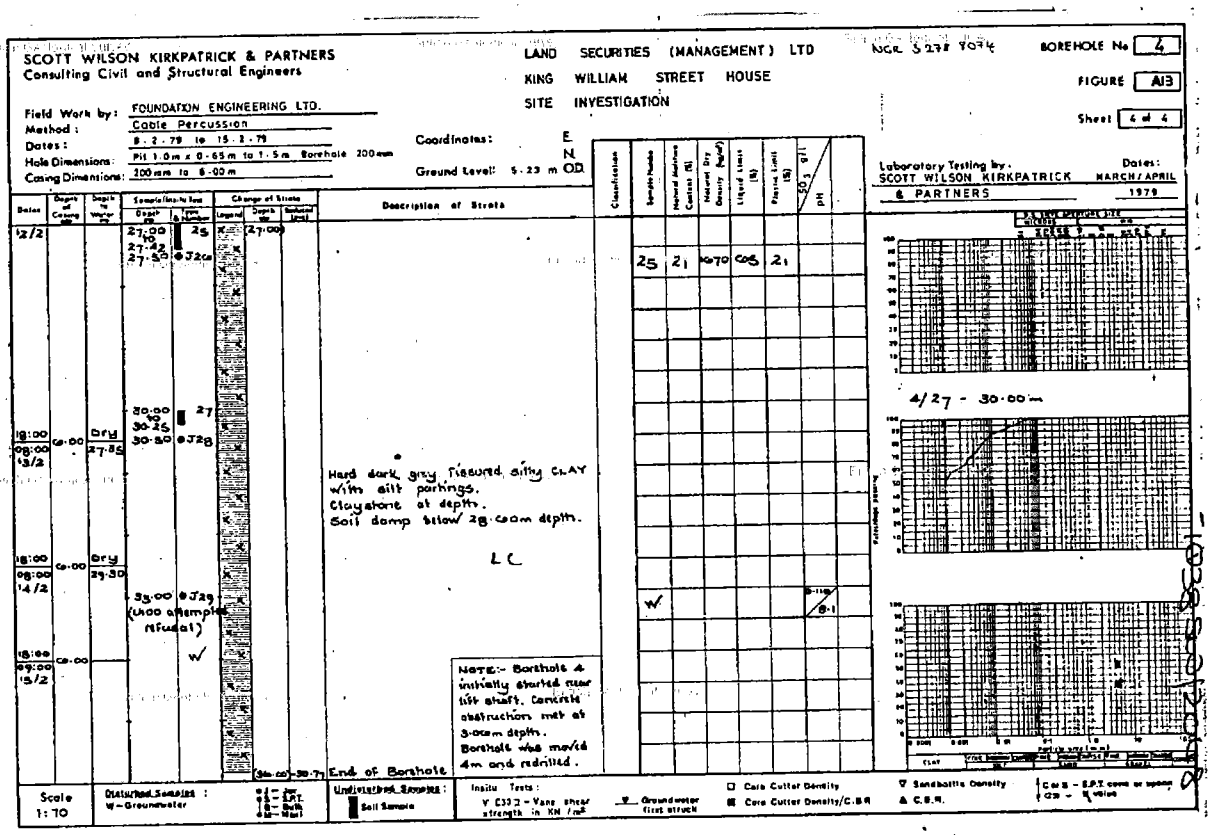

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LAND SECURITIES (MANAGEMENT) LTD
KING WILLIAM STREET HOUSE
SITE INVESTIGATION

NGR S 238 9074

BOREHOLE No 4
FIGURE A13
Sheet 4 of 4

Field Work by: FOUNDATION ENGINEERING LTD.
Method: Cable Percussion
Dates: 8-2-79 to 15-2-79
Hole Dimensions: Pit 1.0m x 0.65m to 1.5m Borehole 200mm
Casing Dimensions: 200mm to 6.00m
Coordinates: E N
Ground Level: 5.23 m OD

Laboratory Testing by: SCOTT WILSON KIRKPATRICK & PARTNERS
Dates: MARCH/APRIL 1979

Description of Strata

Hard dark grey fissured silty CLAY with silt partings. Claystone at depth. Soil damp below 28.00m depth.

LC

Note:- Borehole 4 initially started near tilt shaft. Concrete obstruction met at 3.00m depth. Borehole was moved 4m and redrilled.

End of Borehole

4/27 - 30.00m

Scale 1:70

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KING WILLIAM STREET - HOUSE
SITE INVESTIGATION

BOREHOLE No 4
FIGURE 8/4
Sheet 1 of 1

Laboratory Testing by: SCOTT WILSON KIRKPATRICK and PARTNERS
Dates: MARCH - APRIL

Sample Depth (m)	Sample Type	Compaction Type of Test	Compaction Optimum Moisture Content (%)	Compaction Max. Dry Density (kg/m³)	Shear Strength Stress at Failure σ1 (kN/m²)	Shear Strength σ1 − σ3 (kN/m²)	Shear Strength Strain at Failure (%)	Shear Strength Moisture Content (%)	Shear Strength Dry Density (kg/m³)	Shear Strength c (kN/m²)	Shear Strength φ (Degrees)	Shear Strength Type of Shear Test	Consolidation Moisture Content (%)	Consolidation Dry Density (kg/m³)	Consolidation Pressure Range (kN/m²)	Notes
5·90 to 6·30	U7				100	70·5	12	30	1510			UU			0 563 187·5 375 750 1500	
					200	80·5	Co	30	1440			40				
					400	91·1	Co	30	1490	80						
9·00 to 9·40	U11				100	49·2	8	26	1580			UU				
					200	65·5	Co	25	1570			40				
					400	238·9	Co	26	1590	185						
12·00 to 12·42	U15				100	127·6	Co	26	1590			UU				
					200	130·3	5	27	1570			40				
					400	308·1	7	26	1590	190						
15·00 to 15·40	U17				100	208·3	Co	22	1720			UU			0·037 0·090 0·042 0·047 0·080 0·9 0·4 0·6 0·5 0·4	
					200	292·4	Co	21	1700			40	25	1560		
					400	297·9	Co	22	1700	270					0·699	
21·00 to 21·40	U21				100	271·3	5	25	1640			UU			Pressure Range (kN/m²) 0 707·5 822·5 1645 1290 707·5 822·5 1645 1290 2580	
					200	309·7	Co	25	1640			40				
					400	390·6	5	25	1630	320						
27·00 to 27·42	U25				0	328·6	9	24	1640			UU			0·023 0·020 0·022 0·021 0·020 0·9 0·5 1·4 0·8 1·2	
					200	289·8	9	24	1630			40				
					400	384·2	7	24	1600	359					0·589	
30·00 to 30·25	U27				100	248·2	Co	25	1610			UU				Apparently wet, possibly softened by sampling.
					200	190·9	Co	26	1580			40				
					400	205·4	Co	26	1570	210						

TQ38SW2048

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LAND SECURITIES (MANAGEMENT) LTD
KING WILLIAM STREET HOUSE
SITE INVESTIGATION.

NGR 3243 8075

BOREHOLE No 5
FIGURE A15
Sheet 1 of 2

Field Work by: FOUNDATION ENGINEERING LTD.
Method: Cable Percussion
Dates: 8.2.79
Hole Dimensions: Pit 1.25m x 0.9m to 1.5m Borehole 150 mm
Casing Dimensions: 150mm to 5.30m

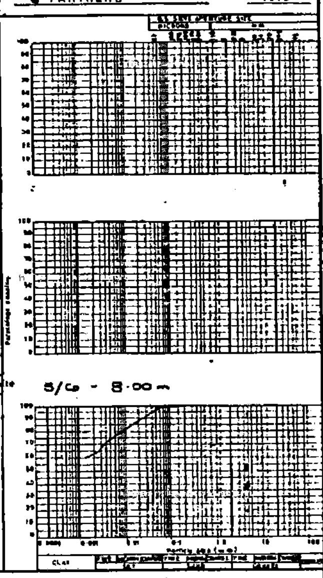
Coordinates: E. N.
Ground Level: 6.00 m OD

Laboratory Testing by: SCOTT WILSON KIRKPATRICK & PARTNERS
Dates: MARCH / APRIL 1979

Dates	Depth of Casing m	Depth to Water m	Sample/Insitu Test Depth m	Type & Number	Change of Strata Depth m	Reduced Level	Description of Strata
8/2					0·20	5·80	CONCRETE
		▽			1·25	4·75	MADE GROUND (Brick rubble and concrete in matrix of clayey silty sand) Possible old floor level.
			2·50	S1 (17)	2·60	3·30	MADE GROUND (Brick and concrete rubble in a matrix of clayey and silty sand) Brickwork footings.
12:00 / 12:30	3·50	Dry / Dry			4·40	1·60	MADE GROUND (Concrete and brick rubble with some sand) MGRD
			5·00 / <50 blows/50	S2	5·30	0·70	Dense flint rounded to subangular GRAVEL (cm) SUPD
			5·30	J3			
			6·00 to 6·45	4			
			6·50	J5			Stiff mottled grey and brown fissured silty CLAY with traces of gypsum in places
			8·00 to 8·45	6			
			8·50	J7	(9·00)		

Classification	Sample Number	Natural Moisture Content (%)	Natural Dry Density (Mg/m³)	Liquid Limit (%)	Plastic Limit (%)
	3	38			
	4	30	·45		
	6	30			

Piezometer Details: CONCRETE, BENTONITE, GRAVEL, CLAY, SAND FILTER, Bentonite, BACKFILL



Scale 1:70

Disturbed Samples: W – Groundwater; J – Jar; S – SPT; B – Bulk; M – Mazl

Undisturbed Samples: Soil Sample

Insitu Tests: V [30] – Vane shear strength in KN/m²; ▽ Groundwater first struck; ☐ Core Cutter Density; ■ Core Cutter Density/C.B.R; ▽ Sandbottle Density; ▲ C.B.R.; C or S – S.P.T. cone or spoon; (3) – N value

TQ38SW2048

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LAND SECURITIES (MANAGEMENT) LTD
KING WILLIAM STREET HOUSE
SITE INVESTIGATION

3283 8075

BOREHOLE No 5
FIGURE A15
Sheet 2 of 2

Field Work by: FOUNDATION ENGINEERING LTD.
Method: Cable Percussion
Dates: 8.2.79
Hole Dimensions: Pit 1.25m x 0.9m to 1.5m Borehole 150mm
Casing Dimensions: 150 mm to 5.30 m

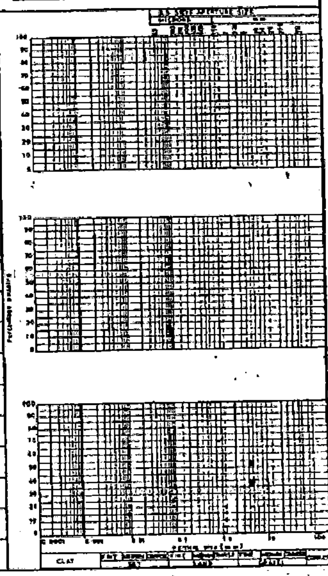
Coordinates: E. N.
Ground Level: 6.00 m OD

Laboratory Testing by: SCOTT WILSON KIRKPATRICK & PARTNERS
Dates: MARCH / APRIL 1979

Dates	Depth of Casing	Depth to Water	Sample Depth	Type & Number	Legend	Depth	Reduced Level	Description of Strata	Classification	Sample Number	Natural Moisture Content (%)	Natural Dry Density	Liquid Limit (%)	Plastic Limit (%)
8/2						(9.00)		Stiff mottled grey and brown fissured silty CLAY LC						
						9.50	-3.50	Stiff mottled brown and dark grey fissured silty CLAY LC						
			10.00 to 10.45	8						8	26	1500	78	25
			10.50	J9		10.30	-4.30							
			11.00 to 11.40	10				Stiff dark grey fissured silty CLAY slightly laminated in places LC						
			11.50	J11										
			13.00 to 13.45	12										
13.00	5.30	Dry	13.50	J13		13.50	-7.50	End of Borehole						

NOTE:- Standing water level at 1.30m depth in pit before commencement of borehole.

NOTE:- Chiselling between 3.10m and 4.40m for 3 hours.



Scale 1:70

Disturbed Samples: W – Groundwater; J – Jar; S – S.P.T.; B – Bulk; M – [illegible]

Undisturbed Samples: Soil Sample

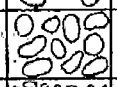
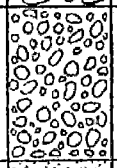
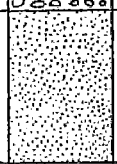
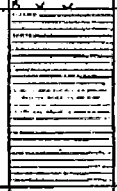
Insitu Tests: V [32] – Vane shear strength in KN/m²; Groundwater first struck; Core Cutter Density; Core Cutter Density/C.B.R; Sandbottle Density; C.B.R.; C or S – S.P.T. cone or spoon; GB – N value.

FIGURE 7.

KEY TO BOREHOLE LOGS

TQ38SW/2048

SOIL CLASSIFICATION

CLASS	TYPE	SYMBOL	GRAIN SIZE
COARSE GRAINED NON-COHESIVE	BOULDERS		LARGER THAN 200mm.
	COBBLES		200 to 60 mm.
	GRAVEL		COARSE 60-20mm. MEDIUM 20-6mm. FINE 6-2mm.
	SAND		COARSE 2-0·6mm. MEDIUM 0·6-0·2mm. FINE 0·2-0·06mm
FINE GRAINED COHESIVE	SILT		0·06 – 0·002mm.
	CLAY		MORE THAN 30% OF PARTICLES FINER THAN 0·002mm.
ORGANIC	PEAT		FIBROUS

STANDARD PENETRATION TEST
SANDS AND COARSE SILTS

No. of BLOWS Per 0.30m (N)	RELATIVE DENSITY	ANGLE of * INT. FRICT.
0 – 4	Very loose	< 30°
4 – 10	Loose	30° – 35°
10 – 30	Med. dense	35° – 40°
30 – 50	Dense	40° – 45°
Over 50	Very dense	> 45°

(*after Meyerhof)

CONSISTENCY of COHESIVE SOIL
CLAYS AND FINE SILTS

CONSISTENCY	FIELD IDENTIFICATION	COHESION kN/m²
Very soft	Can squeeze through fingers easily	< 20
Soft		20 to 35
Firm	Can dent with little finger	35 to 75
Stiff	Can just dent with forefinger	75 to 150
Very stiff		150 to 200
Hard	Can scratch with fingernail	> 200

(F.M.C.) GRAIN SIZE of SAND or GRAVEL
Fine – Medium – Coarse

BOREHOLE LOG SYMBOLS

U	0.10m dia. undisturbed sample
U ( )	Undisturbed sample (diameter)
·	Sample not recovered
D	Small disturbed sample
B	Bulk disturbed sample
¡	Ground water first noted
W	Water sample
N ( )	Standard penetration test (blows per 0.30m)
VN ( )	Vane test (natural shear strength kN/m²)
VR ( )	Vane test (remoulded shear strength kN/m²)
CR	Core recovery

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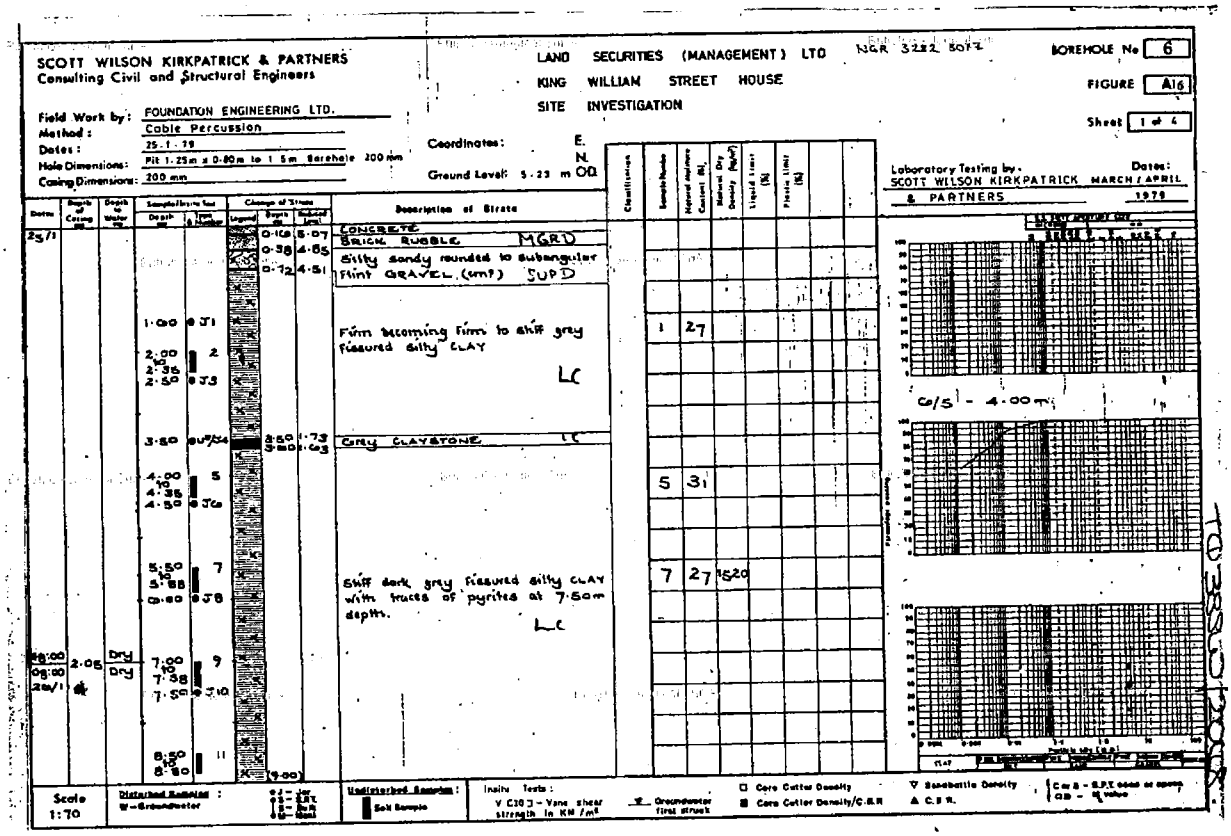

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LAND SECURITIES (MANAGEMENT) LTD
KING WILLIAM STREET HOUSE
SITE INVESTIGATION

NGR 3282 5072

BOREHOLE No 6
FIGURE A16
Sheet 1 of 4

Field Work by: FOUNDATION ENGINEERING LTD.
Method: Cable Percussion
Dates: 25.1.79
Hole Dimensions: Pit 1.25m x 0.80m to 1.5m Borehole 200 mm
Casing Dimensions: 200 mm
Coordinates: E. N.
Ground Level: 5.23 m OD

Laboratory Testing by: SCOTT WILSON KIRKPATRICK & PARTNERS
Dates: MARCH / APRIL 1979

Date	Depth of Casing	Depth to Water	Depth	Type & Number	Legend	Depth m	Reduced Level
25/1						0-10	5.07
						0-38	4.85
						0-72	4.51
			1.00	J1			
			2.00	2			
			2.35				
			2.50	J3			
			3.50	U4/24		3.50	1.73
						3.60	1.63
			4.00	5			
			4.35				
			4.50	J6			
			5.50	7			
			5.88				
			6.00	J8			
28/1	2.05	Dry	7.00	9			
08:00		Dry	7.38				
28/1			7.50	J10			
			8.50	11			
			8.80				
						(9.00)	

Description of Strata

CONCRETE
BRICK RUBBLE MGRD
Silty sandy rounded to subangular Flint GRAVEL (unf) SUPD

Firm becoming firm to stiff grey fissured silty CLAY
LC

Grey CLAYSTONE LC

Stiff dark grey fissured silty CLAY with traces of pyrites at 7.50m depth.
LC

Sample Number	Natural Moisture Content (%)	Natural Dry Density (kg/m³)	Liquid Limit (%)	Plastic Limit (%)
1	27			
5	31			
7	27	1520		

C/S - 4.00m

Scale 1:70

Undisturbed Samples: Soil Sample

Insitu Tests: V (30) - Vane shear strength in kN/m²

Groundwater first struck

Core Cutter Density
Core Cutter Density/C.B.R.

Sandcastle Density
C.B.R.

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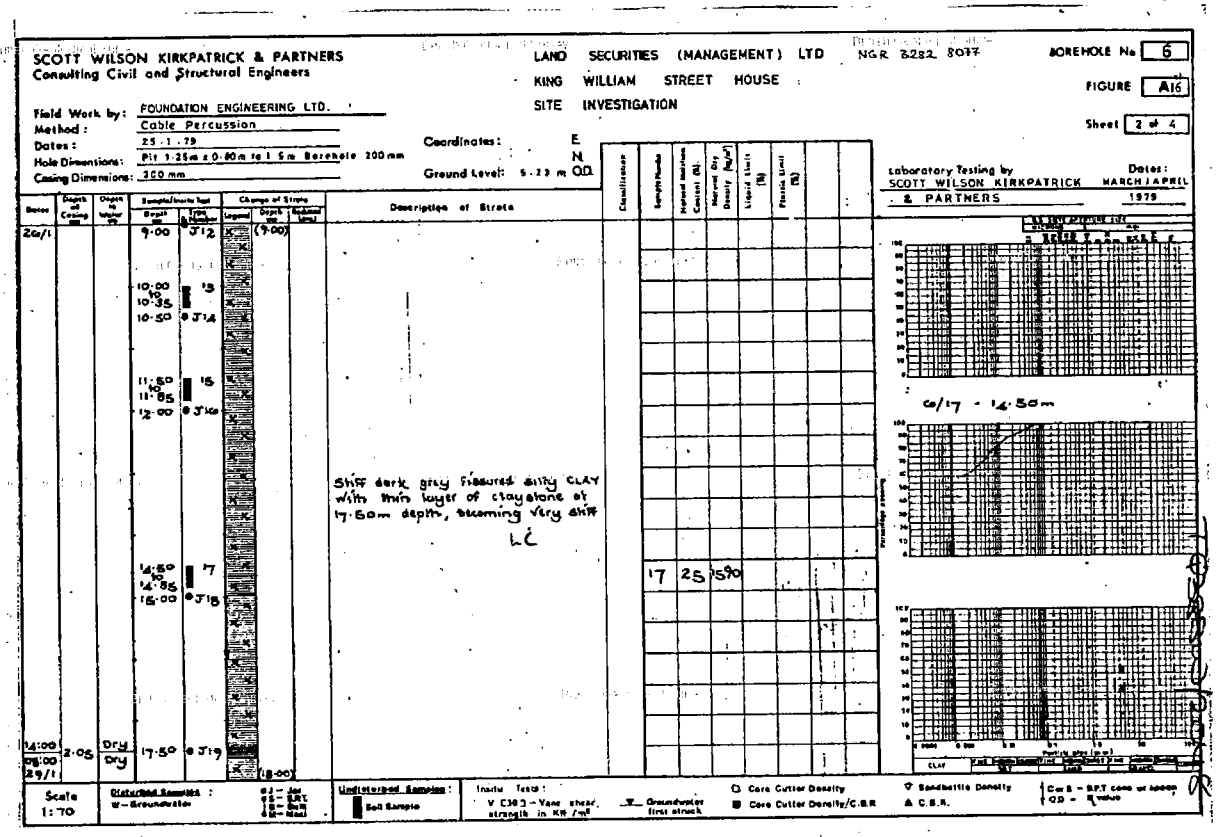

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KING WILLIAM STREET HOUSE
SITE INVESTIGATION

NGR 3282 8037

BOREHOLE No 6
FIGURE A16
Sheet 2 of 4

Field Work by: FOUNDATION ENGINEERING LTD.
Method: Cable Percussion
Dates: 25.1.79
Hole Dimensions: Pit 1.25m x 0.80m to 1.5m Borehole 200mm
Casing Dimensions: 200 mm
Coordinates: E N OD
Ground Level: 5.23 m OD

Laboratory Testing by SCOTT WILSON KIRKPATRICK & PARTNERS
Dates: MARCH/APRIL 1979

Description of Strata

Stiff dark grey fissured silty CLAY with thin layer of claystone at 17.50m depth, becoming very stiff

Cu/17 - 14.50m

Scale 1:70

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KING WILLIAM STREET HOUSE
SITE INVESTIGATION

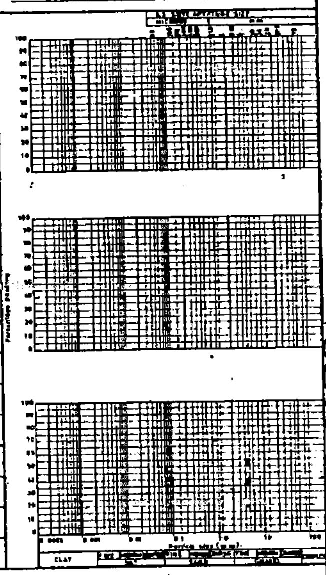
BOREHOLE No 6
FIGURE A16
Sheet 3 of 4

Field Work by: FOUNDATION ENGINEERING LTD.
Method: Cable Percussion
Dates: 25 - 1 - 79
Hole Dimensions: Pit 1·25m x 0·60m to 1·5m Borehole 200mm
Casing Dimensions: 200 mm

Coordinates: E. N.
Ground Level: 5.23 m O.D.

Laboratory Testing by: SCOTT WILSON KIRKPATRICK & PARTNERS
Dates: MARCH / APRIL 1979

Dates	Depth of Casing (m)	Depth to Water (m)	Sample/Insitu Test Depth (m)	Type & Number	Legend	Change of Strata Depth (m)	Reduced Level	Description of Strata	Classification	Sample Number	Natural Moisture Content (%)	Natural Dry Density (kg/m³)	Liquid Limit (%)	Plastic Limit (%)
29/1			18·00 to 18·40	20		(18·00)								
			18·50	J21										
			20·50 to 20·90	22						22	25		68	20
			21·00	J23				Very stiff becoming hard dark grey fissured silty CLAY, slightly laminated in places. LC						
			23·50 to 23·90	24						24	19	1600	57	20
18:00	2·05	Dry	24·00	J25										
08:00 30/1		Dry												
			26·50 to 26·90	26		(27·00)								



Scale 1:70

Disturbed Samples: J – Jar, S – S.P.T., B – Bulk, W – Groundwater

Undisturbed Samples: Soil Sample

Insitu Tests: V [30] – Vane shear strength in KN/m²; Groundwater first struck; Core Cutter Density; Core Cutter Density/C.B.R; Sandbottle Density; C.B.R.; C or S – S.P.T. cone or spoon; OD – N value

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LAND SECURITIES (MANAGEMENT) LTD
KING WILLIAM STREET HOUSE
SITE INVESTIGATION

3282 8077

BOREHOLE No 6
FIGURE A16
Sheet 4 of 4

Field Work by: FOUNDATION ENGINEERING LTD.
Method: Cable Percussion
Dates: 25.1.79
Hole Dimensions: Pit 1.25m x 0.80m to 1.5m Borehole 200mm
Casing Dimensions: 200 mm

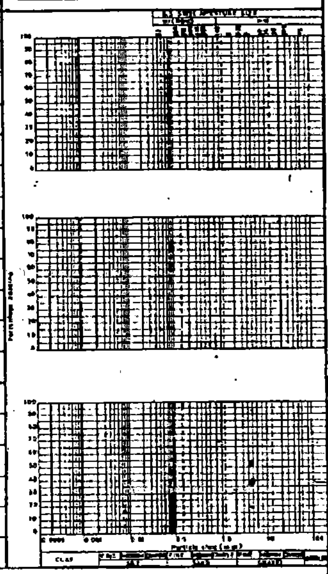
Coordinates: E. N.
Ground Level: 5.23 m OD

Laboratory Testing by: SCOTT WILSON KIRKPATRICK & PARTNERS
Dates: MARCH/APRIL 1979

Dates	Depth of Casing (m)	Depth to Water (m)	Sample/Insitu Test Depth (m)	Type Number	Change of Strata Depth (m)	Reduced Level	Description of Strata	Classification	Sample Number	Natural Moisture Content (%)	Natural Dry Density	Liquid Limit (%)	Plastic Limit (%)
30/1			27.00	J27	(27.00)								
			29.50 to 29.90	28			Hard dark grey fissured silty CLAY, slightly laminated in places.		28	25		68	24
13:00	2.05	Dry	30.00	J29									
08:00 7/2		Dry											
			32.50 to 32.75	30					30	26	1520	75	24
			33.00	J31	33.00	-27.77	End of Borehole						

LC-

NOTE:- Borehole terminated and backfilled when at 30.00m depth and subsequently redrilled from 5.2.79 to 7.2.79 to 83.00m.



Scale 1:70
Disturbed Samples: W - Groundwater; J - Jar; B - Bulk; S.P.T.
Undisturbed Samples: Soil Sample
Insitu Tests: V (35) - Vane shear strength in KN/m²
Groundwater first struck
Core Cutter Density; Core Cutter Density/C.B.R.; Sandbottle Density; C.B.R.
C or S - S.P.T. cone or spoon; CO - Q value

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KING WILLIAM STREET HOUSE
SITE INVESTIGATION

BOREHOLE No 6
FIGURE B17
Sheet 1 of 1

Laboratory Testing by: SCOTT WILSON KIRKPATRICK and PARTNERS
Dates: MARCH - APRIL

Sample Depth (m)	Type & Number	Compaction: Type of Test	Optimum Moisture Content (%)	Maximum Dry Density (Mg/m³)	Stress at Failure σ_3 (kN/m²)	$\frac{\sigma_1-\sigma_3}{2}$ (kN/m²)	Strain at Failure (%)	Moisture Content (%)	Dry Density (kg/m³)	c (kN/m²)	φ (Degrees)	Type of Shear Test	Initial Moisture Content (%)	Initial Dry Density (kg/m³)
2.00 to 2.35	U2				100	115.2	5	28	1540	100		UU 40		
					200	91.0	5	28	1530					
					400	106.8	7	29	1520					
5.50 to 5.88	U7				100	107.7	3	26	1590	150		UU 40	27	1520
					200	147.3	9	26	1580					
					400	207.8	6	26	1580					
8.50 to 8.80	U11				100	179.8	5	24	1580	210		UU 40		
					200	208.0	5	25	1610					
					400	247.0	6	24	1620					
11.50 to 11.85	U15				100	205.2	6	24	1630	240		UU 40	25	1590
					200	316.0	5	24	1660					
					400	200.6	6	23	1660					
18.00 to 18.40	U20				100	135.5	3	25	1640	170		UU 40		
					200	161.6	3	25	1640					
					400	207.0	4	24	1640					
23.50 to 23.90	U24				100	192.9	6	20	1670	260		UU 40	19	1600
					200	300.3	9	21	1700					
					400	296.5	8	21	1710					
26.50 to 26.90	U26				100	313.5	5	23	1680	310		UU 40		
					200	199.1	4	22	1690					
					400	409.8	6	23	1680					
32.50 to 32.75	U30				100	160.6	3	27	1570	130		UU 40		
					200	143.0	3	26	1570					
					400	188.6	3	26	1570					

Consolidation — Pressure Range (kN/m²)

Sample							Notes
(Pressure Range)		0–86	86–172	172–344	344–688		
U2	m_v						
U7	m_v	0.011	0.025	0.063	0.070		SG = 2.64
	c_v	5.8	9.4	0.8	0.4		
	e	0.741					
(Pressure Range)		0–150	150–300	300–600	600–1200		
U15	m_v	0.023	0.022	0.049	0.038		SG = 2.58
	c_v	12.7	22.3	0.5	0.4		
	e	0.627					
(Pressure Range)		0–804	804–268	268–536	536–1072	1072–2144	
U24	m_v	0.022	0.011	0.012	0.014	0.011	SG = 2.65 (Assumed)
	c_v	9.9	5.3	8.4	8.4	6.3	
	e	0.652					
(Pressure Range)		0–1125	1125–375	375–750	750–1500		
U30	m_v	0.018	0.019	0.019	0.021		SG = 2.65 (Assumed) Poor samples cut due to fissuring. Insufficient material for second test.
	c_v	1.2	0.5	0.8	0.6		
	e	0.747					

For Sample Type see Sheet A

S BS Standard
H BS Heavy
M BS Heavy Mod

UU = Unconsolidated Undrained
$\overline{UU}$ = Ditto with p.w.p measurement
CD = Consolidated Drained
$\overline{CD}$ = Ditto with p.w.p measurement
CU = Consolidated Undrained
$\overline{CU}$ = Ditto with p.w.p measurement
V = Vane Shear
S = Shear box

m_v = m²/MN
c_v = m²/yr

TP2

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KING WILLIAM STREET HOUSE
SITE INVESTIGATION

TRIAL PIT No 2
FIGURE A22
Sheet 1 of 1

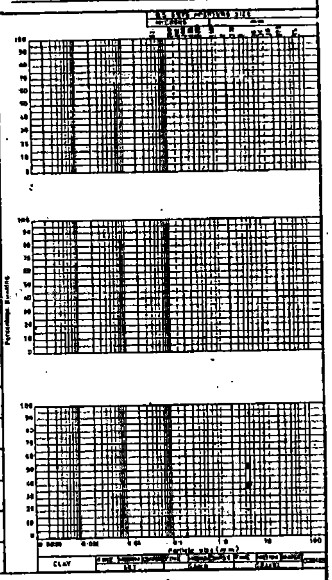
Field Work by: FOUNDATION ENGINEERING LTD.
Method:
Dates:
Hole Dimensions:
Casing Dimensions:

Coordinates: E. N.
Ground Level: m O.D.

Laboratory Testing by: SCOTT WILSON KIRKPATRICK & PARTNERS
Dates: MARCH / APRIL 1979

Dates	Depth of Casing	Depth to Water	Sample/Insitu Test Depth	Sample/Insitu Test Type & Number	Change of Strata Legend	Change of Strata Depth	Change of Strata Reduced Level	Description of Strata
								For description of strata see log.

Classification	Sample Number	Natural Moisture Content (%)	Natural Dry Density (kg/m³)	Liquid Limit (%)	Plastic Limit (%)	SO_3 g/l	pH
	W					0.220	8.3



Scale 1:
Disturbed Samples: W – Groundwater; J – Jar; S – S.P.T.; B – Bulk; M – Mast
Undisturbed Samples: Soil Sample
Insitu Tests: V [30] – Vane shear strength in KN/m²; Groundwater first struck; Core Cutter Density; Core Cutter Density/C.B.R; Sandbottle Density; C.B.R.; C or S – S.P.T. cone or spoon; CS – N value

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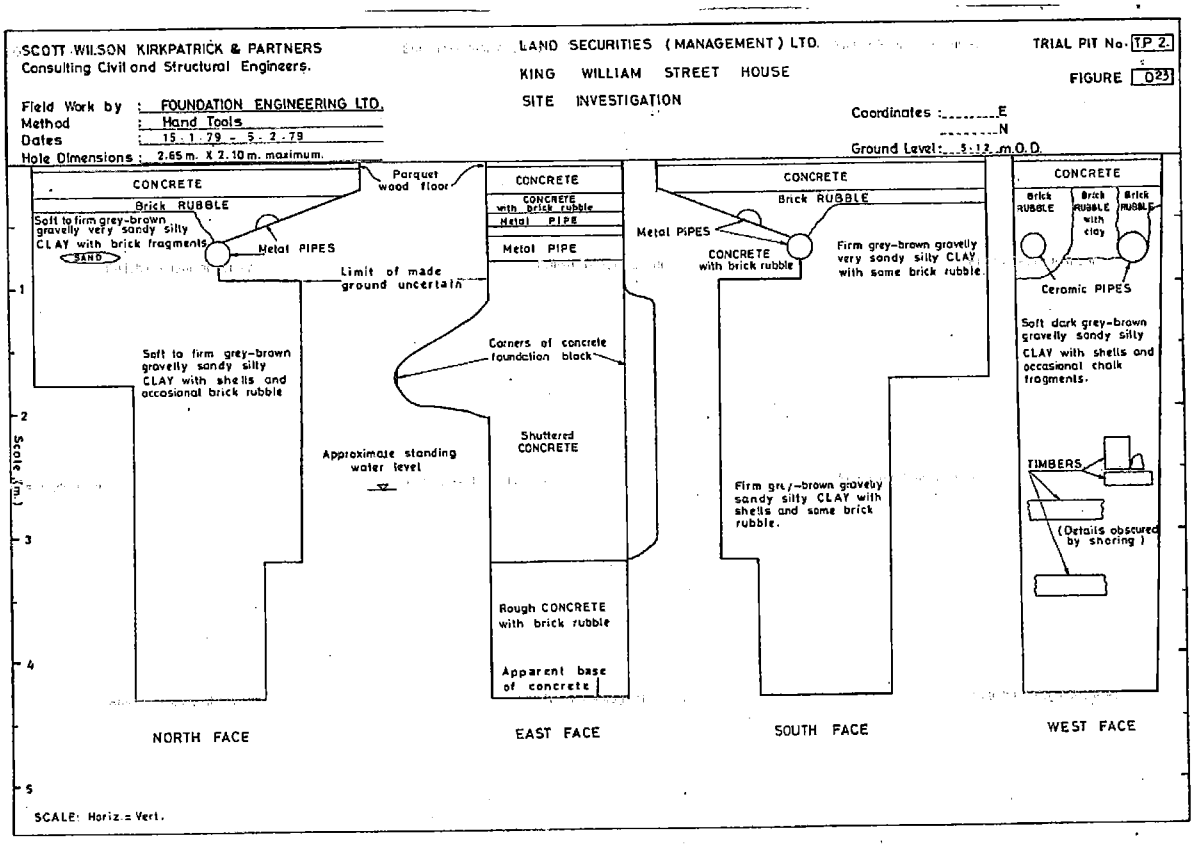

TP4

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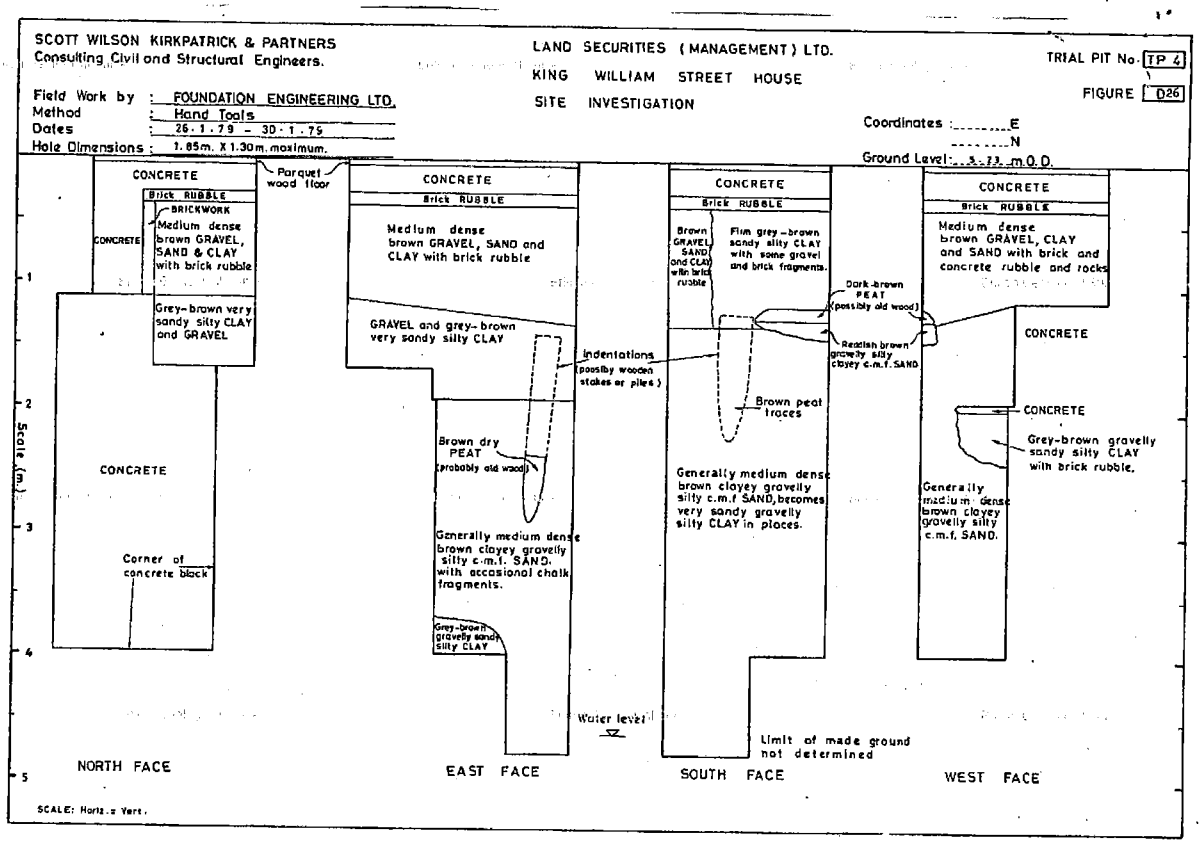

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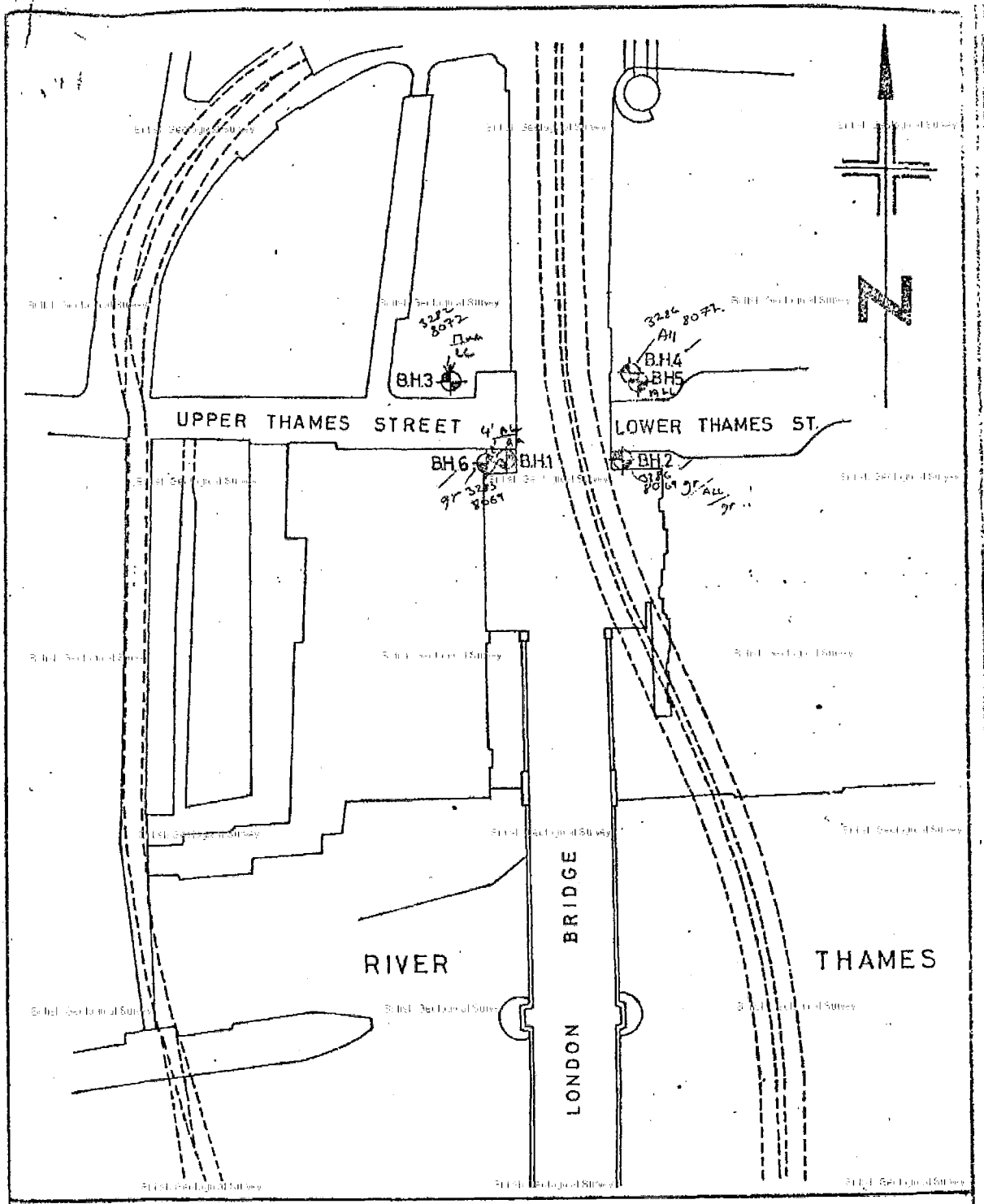


KING WILLIAM STREET - BRIDGE RECONSTRUCTION

Site plan showing approx location of boreholes

FOUNDATION ENGINEERING LTD C.F.669/1045 JAN 1973

C. TQ 38 SW 1233 B

RECORD OF BOREHOLE No: 2

NGR 3286 8069

Location : KING WILLIAM STREET VAULTS LONDON BRIDGE
Contract No. : CP669/1045
Type of Boring : Shell and Auger
Date (started) : 12.10.1972

Borehole Dia : 8" and 6"
Casing : 8" to 10'
6" to 45'
Ground Level :

Sheet 1 of 2

Depth of Casing	Water Level	SAMPLES Depth	Type	No.	STRATA Legend	Depth	Thickness	DESCRIPTION OF STRATA
						0'0"		
		2'6"	D	1			7'3"	MADE GROUND (Paving stone, sandy stony backfill, concrete pieces and brick rubble)
		5'0" (N = 20)	D	2				
		7'6"	B	3		7'3"		
8'0"	9'0" 9'0"	10'0"	D	4			7'9"	(Brickwork atop sandstone - bridge footings?)
		12'6"	B	5				
		15'0"	B	6		15'0"	2'9"	Loose to medium dense black silty gravel with shells and pieces of chalk.
		17'6" (N = 21)	D	7		17'9"		
		20'0"	D	8				
		22'6" (N = 19)	D	9			14'9"	Medium dense coarse medium fine silty angular GRAVEL with large shells.
		25'0"	D	10				
		27'6" (N = 27)	D	11				
		30'0"	D	12				
		32'6" (N = 7)	D	13		32'6"		
							3'3"	Soft to firm dark grey organic SILT
35'0"	29'0" 28'6"	35'0"	D	14		35'9"		
		37'6" (N = 31)	D	15			7'9"	Medium dense sandy coarse medium fine black GRAVEL with flints
		40'0"	D	16		40'0"		(Continued)

REMARKS:
It was necessary to use the chisel between 7'3" and 15'0"
Water was added at 4'0" to assist in shelling

SCALE 1" = 5'

Foundation Engineering Ltd.

TQ 38 SW | 1233 B

RECORD OF BOREHOLE No: 2

Location : KING WILLIAM STREET VAULTS LONDON BRIDGE

Contract No. : CF669/1045

Type of Boring : Shell and Auger

Date (started) : 12.10.1972

Borehole Dia : 8" and 6"

Casing : 8" to 10'
6" to 45'

Ground Level :

Sheet 2 of 2

Depth of Casing	Water Level	SAMPLES Depth	Type	No.	STRATA Legend	Depth	Thickness	DESCRIPTION OF STRATA
		40'0"	D	16		40'0"		
							7'9"	Medium dense sandy coarse medium fine black GRAVEL with flints
		42'6" (N = 25)	D	17		43'6"		
45.0	DRY / DRY	45'0" - 46'4"	U	18				
		47'6"	D	19			12'4"	Stiff to very stiff brown fissured silty CLAY
		50'0" - 51'0"	U	20				
		52'6"	D	21				
		55'0" - 55'10"	U	22		55'10"		
		36'0"	W			End of Borehole		

REMARKS:

c. 3285 . 8070 TQ-38SW/1233 A

RECORD OF BOREHOLE No: 1

Location : KING WILLIAM STREET VAULTS LONDON BRIDGE
Contract No. : CP669/1045
Type of Boring : Shell and Auger
Date (started) : 25.10.1972

Borehole Dia : 8"
Casing : 8" to 50'0"
Ground Level :

Sheet 1 of 2

Depth of Casing	Water Level	SAMPLES Depth	Type	No.	STRATA Legend	Depth	Thickness	DESCRIPTION OF STRATA
						0' 0"		
		2' 6"	D	1			6' 6"	MADE GROUND (Granite pieces, paving slab, clay stones, brick rubble and soil backfill)
		5' 0"	D	2		6' 6"		
		7' 6"	D	3			5' 6"	(Brickwork)
		10' 0"	D	4		12' 0"		
		12' 6"	D	5				
		15' 0" (N = 24)	D	6			7' 6"	(Firm black SILT and stony backfill)
		17' 6"	D	7		19' 6"		
		20' 0" (N = 14)	D	8				
		22' 6"	D	9				
		25' 0" (N = 25)	D	10			12' 9"	Black coarse medium fine GRAVEL with silt, timber, tiles and animal bones
		27' 6"	D	11				
		30' 0" (N = 26)	D	12				
		32' 6"	D	13		32' 3"		
35' 0"	19' 0" / 19' 0"	35' 0" - 36' 6"	B	14			4' 3"	Brown mottled organic SILT
		37' 6"	D	15		36' 6"	4' 9"	Medium dense dark coarse medium fine silty sandy GRAVEL
		40' 0" (N = 37)	B	16		40' 0"		contd..

REMARKS:

TQ 38 SW | 1233 A

RECORD OF BOREHOLE No: 1

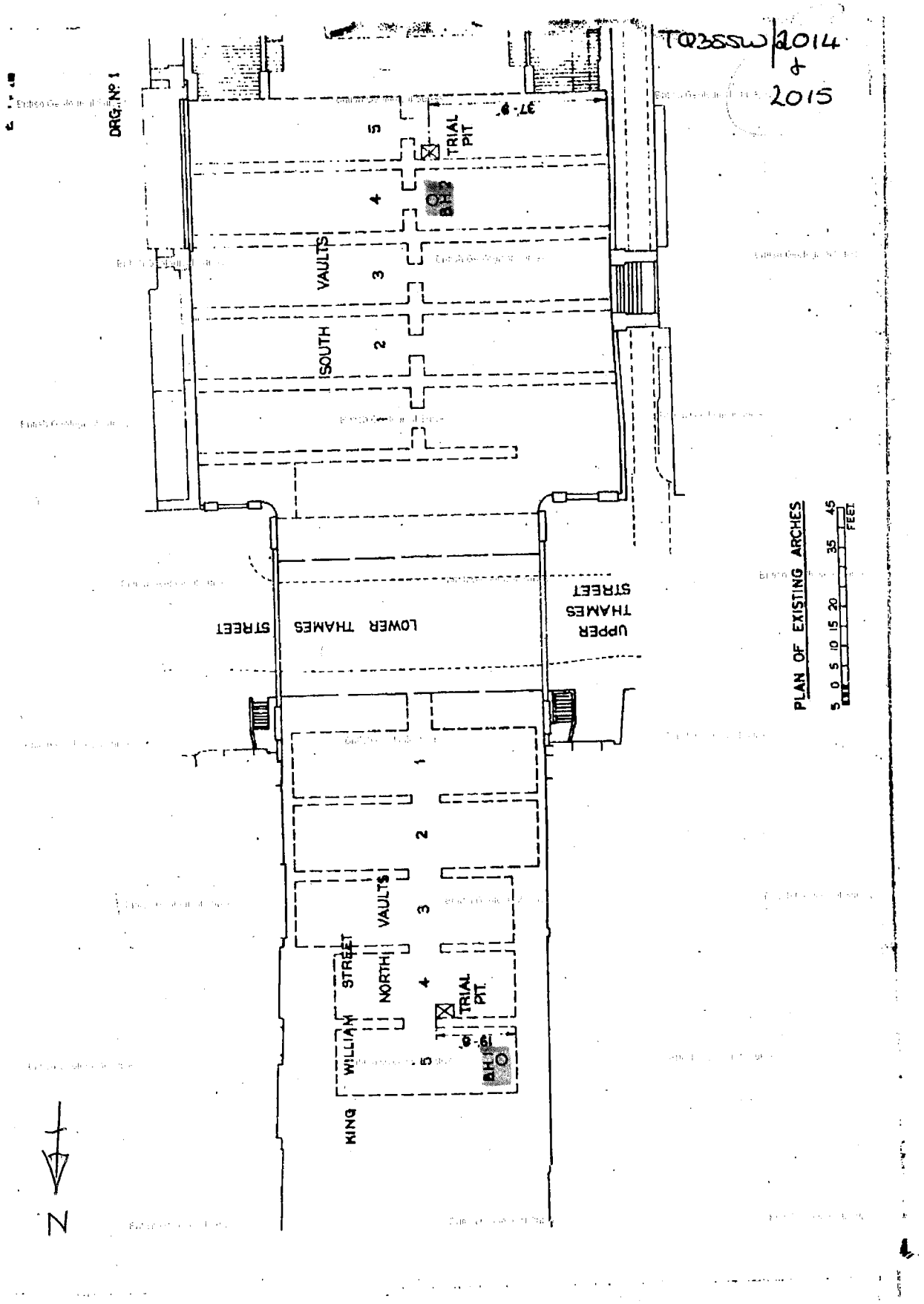
Location : KING WILLIAM STREET VAULTS LONDON BRIDGE
Contract No. : CF669/1045
Type of Boring : Shell and Auger
Date (started) : 25.10.1972

Borehole Dia : 8"
Casing : 8" to 50' 0"
Ground Level :

Sheet 2 of 2

Depth of Casing	Water Level	SAMPLES Depth	Type	No.	STRATA Legend	Depth	Thickness	DESCRIPTION OF STRATA
		40' 0" (N = 37)	B	16		40' 0"	4' 9"	Medium dense dark coarse medium fine silty sandy GRAVEL
						41' 3"		
		42' 6"	D	17				
		45' 0" – 46' 4"	U	18				
		47' 6"	D	19			15' 1"	Stiff grey brown fissured silty CLAY
		50' 0" – 51' 1"	U	20				
		52' 6"	D	21				
		55' 0" – 56' 4"	U	22				
50' 0"	25' 0"					56' 4"		End of borehole

REMARKS:
The casing was not able to prevent seepages from above the clay


TQ38SW 2014 & 2015
DRG. No 1
TRIAL PIT
BH 2
VAULTS
SOUTH
LOWER THAMES STREET
UPPER THAMES STREET
PLAN OF EXISTING ARCHES
5 0 5 10 15 20 35 45 FEET
WILLIAM STREET
NORTH
VAULTS
TRIAL PIT
BH 1
KING
N

DRIFT USED.

Institute of Geological Sciences

TQ38SW/2014 + 2015

6-in or 1:10 000 Map Registration No.

Page

Name and Number of Shaft or Borehole:

King William Street Vaults.
(junction of London Bdge & King William St). Ex City Corporation.
Mott Hay & Anderson. 1972.

National Grid Reference

Geological Classification	Description of Strata	Thickness metres	Depth metres
	Brought Forward		
TQ38SW/2014 3285.8075	BH 1 +14.0 (17.8) 'AOD (from sewer levels).		
HGRD	Fill of Brick Rubble. (? +22.5' OD.)	5'–0"	5'–0"
Fill / alluv / gr / LC SUPD-3	Very soft br. clay & a little med gr. & some organic debris, becoming more gravelly with depth	13'–0"	18'–0"
SUPD-2	Coarse Sand & coarse med + fine gr. ∫ +8' AOD.	4'–0"	22'–0"
LC	Stiff brown grey silty clay (≈ 6.0).		(6.7m)
TQ38SW/2015 3284.8067	BH2. +17.5' AOD (? +22.5' OD)		
HGRD	Made Ground - bricks, silt, bones, carbonaceous material etc.	18'–0"	18'–0"
	Peaty Silt with Oyster Shells & coarse sand.	6'–0"	24'–0"
alluv / gr / LC SUPD	Coarse grey sand with crushed shell particles & some flinty gravel.	6'–0"	30'–0"
	Soft blue clay with white flecks & peaty band	2'–6"	32'–6"
	Coarse grey sand with crushed & flinty gravel	1'–0"	33'–6"
	Fine med & coarse sand & gravel. ∫ −25.5' OD.	9'–6"	43'–0"
LC.	Firm brown silty clay ≈ −21	3'–0"	46'–0"
47.0 / 17.5 / 25.5	43 / 22 / 21		(14.02m)

IGS 1805 8000 12/76

c. 3285.8070 TQ38SW 1233 D

RECORD OF BOREHOLE No: 4

Location : KING WILLIAM STREET VAULTS, LONDON BRIDGE
Contract No. : CF669/1045
Type of Boring : Shell and Auger
Date (started) : 11.10.1972

Borehole Dia : 8" and 6"
Casing : 8" to 38' 0"
Ground Level : c. +21

Sheet 1 of 2

Depth of Casing	Water Level	SAMPLES Depth	Type	No.	STRATA Legend	Depth	Thickness	DESCRIPTION OF STRATA
						0' 0"		
							8' 6"	MADE GROUND (Hardcore, pieces of iron and occasional pieces of timber)
						8' 6"		
		10' 0" (N = 4)	D	1				
		12' 6"	D	2			7' 9"	(Dark brown silt, sand and gravel, stones, pieces of bricks and shells)
		15' 0" (N = 4)	D	3				
						16' 3"		
		17' 6"	D	4				
							6' 3"	Soft black and brown sandy SILT with frequent large shells and stones) ALL
		20' 0" (N = 4)	D	5				
22' 6"	17' 0" / 17' 0"	22' 6"	D	6		22' 6"		
		25' 0" - 26' 6"	U	7			5' 6"	Firm to stiff buff CLAY
		27' 6"	D	8		28' 0"		
							3' 0"	Firm to stiff grey brown sandy silty CLAY
		30' 0" - 31' 6"	U	9		31' 0"		
		32' 6"	D	10				
							6' 3"	Firm (medium dense) brown very sandy very gravelly silty CLAY
		35' 0" (N = 23)	D	11				
		37' 6" - 39' 0"	U	12		37' 3"	17' 9"	Stiff to very stiff brown fissured silty CLAY LL contd..
		40' 0"	D	13		40' 0"		

REMARKS: Water was added at 3' 6" to assist in shelling

TQ 38 SW 1233 D

RECORD OF BOREHOLE No: 4

ocation : KING WILLIAM STREET VAULTS LONDON BRIDGE

ontract No. : CF669/1045

ype of Boring : Shell and Auger

ate (started) : 11.10.1972

Borehole Dia : 8" and 6"

Casing : 8" to 30' 0"

Ground Level :

Sheet 2 of 2

Depth of Casing	Water Level	SAMPLES Depth	Type	No.	STRATA Legend	Depth	Thickness	DESCRIPTION OF STRATA
		40' 0"	D	13		40' 0"		
		42' 6" - 43' 8"	U	14				
		45' 0"	D	15				
		47' 6" - 49' 0"	U	16			17' 9"	Stiff to very stiff brown fissured silty CLAY
		50' 0"	D	17				
		52' 6" - 54' 0"	U	18				
38' 0"	DRY	55' 0"	D	19		55' 0" End of borehole		

RKS:

TQ 38 SW | 1233 E

RECORD OF BOREHOLE No: 5

NGR 3286 8072

Location : KING WILLIAM STREET VAULTS LONDON BRIDGE

Contract No. : CP669/1045

Type of Boring : Shell and Auger

Date (started) : 6.12.1972

Borehole Dia : 8"

Casing : 8" to 45'0"

Ground Level :

Sheet 1 of 2

Depth of Casing	Water Level	SAMPLES Depth	Type	No.	STRATA Legend	Depth	Thickness	DESCRIPTION OF STRATA
						0' 0"		
							7' 6"	MADE GROUND (Hoggin and hardcore)
						7' 6"	9"	CONCRETE
						8' 3"		
		10' 0" (N = 6)	D	1			4' 9"	Loose shells with chalk, nodules of black silt, hardcore and brick rubble
		12' 6"	D	2		13' 0"		
		15' 0" (N = 5)	D	3				
		17' 6"	D	4			9' 9"	Loose-medium dense black shelly SILT with gravel
		20' 0" (N = 12)	D	5				ALL
22' 9"	DRY	22' 6"	D	6		22' 9"		
	DRY	25' 0" - 26' 5"	U	7			7' 3"	Firm to stiff grey brown slightly stony silty CLAY
		27' 6"	D	8				ALL
		30' 0" - 30' 8"	U	9		30' 0"		
		32' 6"	D	10			6' 6"	Dense yellow and grey silty sandy coarse medium fine GRAVEL
		35' 0" (N = 31)	D	11		36' 6"		
		37' 6"	D	12			39'11"	Stiff to very stiff grey silty CLAY (London Clay)
						40' 0"		LC

contd....

REMARKS:

Water added to assist in shelling between ground level and 22'9" and 30' 0" and 36' 6".
Water sample taken at 30' 0"
No ground water observed in London Clay

TQ38SW 1233 E

RECORD OF BOREHOLE No: 5

Location : KING WILLIAM STREET VAULTS, LONDON BRIDGE

Contract No. : CP669/1045

Type of Boring : Shell and Auger

Date (started) : 6.12.1972

Borehole Dia : 8"

Casing : 8" to 45' 0"

Ground Level :

Sheet 2 of 2

Depth of Casing	Water Level	SAMPLES Depth	Type	No.	STRATA Legend	Depth	Thickness	DESCRIPTION OF STRATA
		40' 0" - 41' 7"	U	13		40' 0"		
		42' 6"	D	14				
		45' 0" - 46' 5"	U	15				
		47' 6"	D	16				
		50' 0" - 51' 0"	U	17				
		52' 6"	D	18				
		55' 0" - 56' 5"	U	19				
		57' 6"	D	20			39'11"	Stiff to very stiff grey silty CLAY (London Clay)
		60' 0" - 61' 5"	U	21				
		62' 6"	D	22				
		65' 0" - 66' 5"	U	23				
		67' 6"	D	24				
		70' 0" - 71' 5"	U	25				
		72' 6"	D	26				
		75' 0" - 76' 5"	U	27				
						76' 5"		End of borehole

REMARKS:

No ground water observed in London Clay

TQ 38SW/1233 F

RECORD OF BOREHOLE No: 6

NGR 3283 8069.

Location : KING WILLIAM STREET VAULTS, LONDON BRIDGE

Contract No. : CF669/1045

Type of Boring : Shell and Auger

Date (started) : 8.12.1972

Borehole Dia : 8" and 6"

Casing : 8" to 45' 0", 6" to 55' 0"

Ground Level :

Sheet 1 of 2

Depth of Casing	Water Level	SAMPLES Depth	Type	No.	STRATA Legend	Depth	Thickness	DESCRIPTION OF STRATA
						0' 0"		
		5' 0" (N = 28)	D	1				
							13' 6"	MADE GROUND (Sandstone pavement, hardcore fill) Chalk pieces, timber, gravel.
		7' 6"	D	2				
		10' 0" (N = 34)	D	3				
		12' 6"	D	4		13' 6"		
		15' 0" (N = 23)	D	5				
		17' 6"	D	6				
		20' 0" (N = 25)	D	7				
		22' 6"	D	8			18' 3"	Black very silty coarse medium fine GRAVEL with soft nodules of silt, pieces of sandstone, occasional bits of brick and odd bones
		25' 0" (N = 27)	D	9				
		27' 6"	D	10				
		30' 0" (N = 26)	D	11				
						31' 9"		
		32' 6"	D	12			3' 3"	Stiff dark grey organic SILT with sandy gravel inclusions.
		35' 0" (N = 35)	D	13		35' 0"		
							3' 6"	Dense black coarse medium fine angular sandy GRAVEL
		37' 6"	B	14				
						38' 6"	37'10"	Stiff to very stiff grey silty CLAY
						40' 0"		contd...

REMARKS:

Water seepage observed through the casing joints

TQ 38SW/1233 F

RECORD OF BOREHOLE No: 6

Location : KING WILLIAM STREET VAULTS LONDON BRIDGE

Contract No. : CP669/1045

Type of Boring : Shell and Auger

Date (started) : 8.12.1972

Borehole Dia : 8" and 6"

Casing : 8" to 45' 0"
6" to 55' 0"

Ground Level :

Sheet 2of 2

Depth of Casing	Water Level	SAMPLES Depth	Type	No.	STRATA Legend	Depth	Thickness	DESCRIPTION OF STRATA
		40' 0" – 41' 5"	U	15		40' 0"		
		42' 6"	D	16				
		45' 0" – 46' 4"	U	17				
		47' 6"	D	18				
		50' 0" – 51' 1"	U	19				
		52' 6"	D	20				
45' 0"	45' 0" / 30' 0"	55' 0" – 56' 4"	U	21				
							37'10"	Stiff to very stiff grey silty CLAY
		57' 6"	D	22				
		60' 0" – 61' 4"	U	23				
		62' 6"	D	24				
		65' 0" – 66' 4"	U	25				
		67' 6"	D	26				
		70' 0" – 71' 5"	U	27				
		72' 6"	D	28				
		75' 0" – 76' 4"	U	29				
						76' 4"		End of borehole

REMARKS:

Water seepages observed through the casing joints

Water sample taken

SCALE 1" = 5'

Foundation Engineering Ltd.

FIG.1.

GR 3284 8067

BOREHOLE LOG

TQ 38 SW 787

LOCATION S.M.1200. LONDON BRIDGE.

CARRIED OUT FOR Messrs. Mott, Hay and Anderson, Consulting Engineers.

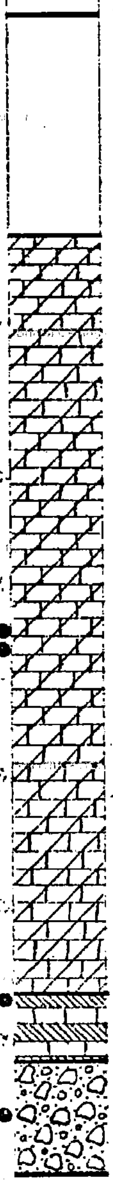
BOREHOLE No. 1 page 1.

DIAMETER: 9in. 8in. and 6in.

... LEVEL:

DATE: 23rd - 2?th June, 1964. 2nd - ?th July, 1964.

DESCRIPTION OF STRATA	Sample	LEGEND	DEPTH	THICK-NESS	
			STAGE LEVEL	-	
SCAFFOLDING.				7'4"	
			7'4"		
BRICKWORK.	100, 200, 1/01, 1, 2, 100, 200			25'0"	
			32'4"		
TIMBER and BRICKWORK.	3A, 100			2'4"	
			34'6"		
CHALK fragments with some mixed clean SAND and flint GRAVEL.	34, 3			3'2"	
			37'4"		
	CONTINUED ON PAGE 2.				



C. K. N. REINFORCEMENTS LTD.
... MECHANICS LABORATORY

SCALE: 1 in. to 5ft.

● DISTURBED SAMPLE
▮ UNDISTURBED SAMPLE

FIG. 2.

X

G.R. 3284.8067 **BOREHOLE LOG** TQ38SW/787

LOCATION S.E.1200. LONDON BRIDGE.

CARRIED OUT FOR Messrs. Mott, Hay and Anderson, Consulting Engineers.

BOREHOLE No. (1) page 2 continued. DIAMETER: 9in. 8in. and 6in.

DATE: 23rd - 26th June, 1964. 2nd - 8th July, 1964.

LEVEL: [illegible] +19'00

DESCRIPTION OF STRATA	Sample	LEGEND	DEPTH	THICKNESS	INDEX PROPERTIES. M.C.	L.L.	P.I.
	5A		38'4"				
..MPACT to very COMPACT mixed rown SAND and mixed flint and alk GRAVEL, few CHALK COBBLES rick rubble and pot traces.	1			8'8"			
	3						
	2		47'0"				
..MPACT mixed grey brown SAND ..d mixed flint GRAVEL.	4			3'6"			
	5		50'6"				
..IFF greyish brown laminated ilty CLAY.	6			4'6"	30		
	7		55'0"		29		
	8				32		
	9				27		
	10				28	35	27
	11			23'6"	28		
..ND grey poorly laminated ..lty CLAY, few fissures, ..rite traces.	12				28		
	13				26		
	14				28	37	29
	15				27		
	16				25		
	17				29		
			78'6"				

CONTINUED ON FIG. 3.

SCALE: 1 in. to 5ft.

● DISTURBED SAMPLE
▮ UNDISTURBED SAMPLE.

G[illegible] N REINFORCEMENTS LTD.
[illegible] MECHANICS LABORATORY

FIG.3.

CR 3284·8067

BOREHOLE LOG TQ38SW/787

LOCATION S.E.1200. LONDON BRIDGE.

CARRIED OUT FOR Messrs. Mott, Hay and Anderson, Consulting Engineers.

BOREHOLE No. (1) continued. 3. DIAMETER: 9in., 8in. and 6in.

DATE LEVEL: DATE: 23rd - 28th June, 1964. 2nd - 5th July, 1964.

DESCRIPTION OF STRATA	Sample	LEGEND	DEPTH	THICKNESS	INDEX PROPERTIES. W.C. %	L.L.	P.I.
			79'6"				
	18				24		
	19				23		
HARD grey brown laminated silty CLAY, some thin light brown SILT partings and pockets.	20			15'0"	25		
	21				23		
	22				23	59	26
	23				22		
			93'6"				
	24				23		
	25				29		
HARD grey laminated silty CLAY.				14'0" penetrated.			
	26				27		
	27				25		
	28		107'6"		23	67	25
			END OF BOREHOLE.				

WATER was sealed off by casing tubes at 80ft.6in. below stage level.

During boring to the London Clay water level varied between 14ft.4in. and 22ft.6in. below stage level, dependent on the state of the tide.

N REINFORCEMENTS LTD.
MECHANICS LABORATORY

SCALE: 1 in. to 1 ft.

● DISTURBED SAMPLE
▮ UNDISTURBED SAMPLE