UNIVERSITY OF KENT

PROPOSED SITE AT CANTERBURY for the UNIVERSITY OF KENT.

Investigation of Site to find out its suitability for building and other university uses.

Maps Nos. 1 - 3

Sections

Auger hole logs.

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1. SUMMARY OF THE REPORT.

In February 1962 Ove Arup and Partners were asked to investigate the proposed site of the University of Kent to make sure that the area is suitable for the buildings, playing fields and landscaping of a university before steps are taken to purchase the land.

The geology of the underlying strata was found by the study of geological maps and previous boreholes, and by putting down four new boreholes. A large number of shallow holes were also drilled with a hand auger. Sandpits and other excavations in the area were examined and the levels of the various strata were taken throughout the area. The physical nature of the soils, the drainage and general characteristics of the surface were examined during these operations and a broader knowledge was gained by walking over the whole area on a number of occasions.

Giles' Lane runs through the middle of the area and roughly divides it into a flat plateau about 200 ft. O.D. to the north and the steady slope of St. Thomas Hill to the south. These features are caused by the underlying geology.

The strata are virtually level and the plateau is formed of London Clay, the base of which is about halfway down the slope at 150 feet O.D. Continuing down the hill the succeeding strata outcrop and change the nature of the soil.

The Oldhaven beds of light sands, ironstone bands, pebble beds and thin clay layers lie under the London clay and are followed by the Woolwich and Reading beds of sand and Thanet sands.

These underlying strata have been considerably modified at the surface by the vast rivers flowing from the melting of the glaciers of the Ice Ages which have deposited a mixture of gravel, sand and clay, often called "hoggin" over much of the area, particularly the plateau to the north of Giles' Lane.

The slopes of St. Thomas Hill are the old banks of the Stour Valley and considerable areas of brickearth and other recent deposits cover most of the Mounts Orchards and the lower portions of the site. A very clear

picture of the underlying strata is given at Brett's Sandpit, near the Broad Oak level crossing.

The physical nature of the area follows from the underlying geology. The London Clay is impermeable and rain water is therefore held at its top surface. The hoggin on the plateau is dry and forms good farming land but water is never far from the surface and in the development of the university, drainage must be given very careful consideration. There are many existing ditches some of which need improvement. To the north they drain down into a stream which runs in a east north-easterly direction through the Hackington area. The slopes of St. Thomas Hill drain eventually into surface water sewers or are absorbed into the sands underneath the London Clay.

The lower part of the university site which lies below the London Clay is dry and there should not be any major drainage problems.

Turning now to the use of the site, most of it can be built on with normal foundations, but the area below the crest of the hill presents certain problems. This south facing slope commands magnificent views of the City and seems to be a natural site for many of the university buildings. It is unfortunate that it is an area in which foundation problems are most likely to arise and particular attention has therefore been devoted to it. It is found to consist of a series of ridges running at right angles to the general slope with intervening hollows containing drainage ditches. It is suggested that buildings should be carefully sited on these ridges and not in the hollows. Furthermore, the clay slopes are generally below the 8° limit for long-term stability of London Clay and they are best left alone. Any attempt to increase the slopes, to make terraces with retaining walls or to alter the ground any more than is necessary for building may create major problems whereas skilful planning can avoid them and keep the cost of building within sensible limits.

There are many areas suitable for playing fields. The lower parts of the site are flat and on permeable subsoils and there should be no difficulty with drainage. The plateau to the north of Giles' Lane is

generally level and under cultivation. Some of the playing fields of St. Edmunds School are in this area and it is understood that occasionally they are too wet to play but it is considered that if adequate drainage is provided, suitable fields can be made.

To sum up, it is our opinion that the site is generally suitable for development as a university area. Technical problems do exist particularly in surface drainage and clay slopes, but skilful planning can avoid major difficulties.

In comparison with a number of other universities costs and foundation difficulties should be about average.

2. SCOPE OF THE INVESTIGATION.

The topography and physical features were studied by observation on the site, by looking at Ordnance Survey maps and by taking levels.

The general drainage and positions of water tables were found by examining ponds and ditches, and drains under construction. Agricultural land and growing crops were studied for patches of waterlogged soil and soggy areas.

Information on the geology was obtained by various means. Records of borings and geological maps were studied at the Geological Museum, South Kensington, where permission was given to make a copy of the recently completed 6" scale map of the area which has not yet been published. George Wimpey and Company Limited were engaged to make deep borings at suitable positions. Four borings were put down, two 120 feet, and two 60 ft. deep. Samples were taken at relevant depths and tested by Wimpeys laboratories.

To give more detailed knowledge of the strat particularly at the transition from oneto another, numerous hand augered holes were drilled and identification samples taken.

Sandpits, deep ditches, foundation of work under construction and any other exposed earthworks were examined and sampled. Bretts sandpit at the Broad Oak level crossing give an excellent exposure of all the main strata found in the area and although situated about half a mile from the eastern

View looking south on Beverley Farm

edge of the site, investigations confirm that the general characteristics exhibited at these pits are representative of the whole area.

It is emphasized that this investigation is of a general nature and not intended to be a site investigation for purposes of foundation design.

Normal procedures should be followed when buildings have been sited to obtain detailed knowledge of subsoil conditions.

2.2.1. General Topography.

The 6" to 1 mile contoured Ordnance Survey map shows the site to be divided by Giles' Lane into two parts. The division continues east of Hackington Road on a line continuing the direction of Giles' Lane.

The part north of Giles' Lane consists of the flat top of the ridge running from Kent College towards the Park and the northern part of the valley between Giles' Lane and Tyler Hill Road. This portion is partly covered by Park Wood and Brotherhood Wood and elsewhere of farmland. It slopes gently towards the stream which crosses the Whitstable Road just south of the "Hare and Hounds" in Blean under Hackington Road south of Tyler Hill. This stream appears to collect the drainage from the area via numerous ditches.

The area south of Giles' Lane is on the upper slopes of the Stour Valley and is subdivided in three belts running south-west - north-east.

The upper belt between Giles' Lane and Mount's Orchards (but excluding the houses and gardens south of the Lane) is farmland with a few small wooded enclosures. The Ordnance Survey map indicates by the shape of the 200 ft. contour that there are local valleys on the lines of the ditches and water courses running north-north-west - south-south-east. An almost circular pit is shown next to the north-east corner of the orchard and several small ponds are indicated.

The second belt is covered almost entirely by the main features of the orchards which constitute the orchards and includes two sandpits in the north-east corner.

View from pond north of Beverley Farm

Showing steep edges of gravel ridges and standing water on the underlying clay. (Cathedral tower in the distance to the left, Beverley Farm at right hand edgs.)

The lowest belt shown as open fields between the orchards and the nursery glasshouses is much flatter than the remainder.

The area is crossed by the tunnel of the now dismantled Canterbury - Whitstable Railway. Unfortunately no records of the strata encountered during construction could be found.

2.1.2. Local Topography.

A reconnaissance on foot confirms the general topography deduced from the Ordnance Survey and reveals several important local features.

In the area north of Giles' Lane and in the northern part of the area east of Hackington Road the fields are stony, and appear generally well drained. This applies to the woodland as well. The ditches are in reasonable condition and carry a fair amount of water to the stream mentioned before. There is a strip just north of Giles' Lane where there are not only ponds but where a few soggy patches are found after rain.

Just south of Brotherhood Farm the "plateau" continues for a short distance terminating in irregular ridges running from north-north-west to south-south-east which overlay the general slope below and have fairly steep sides. The ridges and their sides are dry and hard while the hollows in between tend to be wet and mushy. There is a fair amount of ponding some of which may have been encouraged by farmers.

The western part of the even slope which is indicated by the Ordnance Survey contours is found in fact to consist of large rounded ridges running at right angles to the general slope. The ridges which command magnificent views of the City and the Cathedral are separated by valleys in which a stream fed from "Monks' Well", a spring near Giles' Lane, and several ditches are running in a south-easterly direction into the orchards. The area surrounding Beverley Farm to the west, north and east is inadequately drained and some of the ditches need attention. The bottom of the round pit near the orchard is dry whilst stagnant water is present quite near to its edges.

View looking south on Beverley Farm

In the orchards both the general slope and the transverse undulations become more gentle. The sandpit in the orchard shows a distinct succession of different layers whereas the large pit north of "Hillmead" is overgrown and partly used as a rubbish dump. Both pits have dry bottomss Immediately adjacent to this portion of the site in the grounds of the Archbishop's School the old railway cutting next to the entrance to the tunnel exposes several distinctly different strata. This part of the site as well as the school's playing fields next to it appear perfectly drained.

The fields between the orchards and the nursery glasshouses appear to be practically flat, but do in fact have a slight slope. They are somewhat stony and well drained.

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In connection with the taking of levels of borings and of augerholes levels were taken to selected points in the fields. From these spot levels intermediate contours have been deduced and are shown on map No. 1 which has also been marked to show areas which appeared particularly wet or dry during the period of investigation.

2.2.1. Overall Geology - Geological Survey.

The new 6" to the mile Geological Survey map of the area has not yet been published, the Geological Museum allowed a tracing of the draft survey plan to be made. This varies considerably from the old 1" edition but the general pattern remains as follows:-

The plateau north of Giles' Lane consists of a capping of hoggin overlying London Clay. On the slope towards the City occur the successive out-crops of London Clay, Oldhaven sands, Woolwich and Reading beds and finally Thanet Sand. Lower down the slope this succession is overlaid

by gravels and sands and brickearth from the river valley.

The tracing of the outcrops from the geological survey is shown on map No. 2.

2.2.2. Overall Geology - Geological Survey.

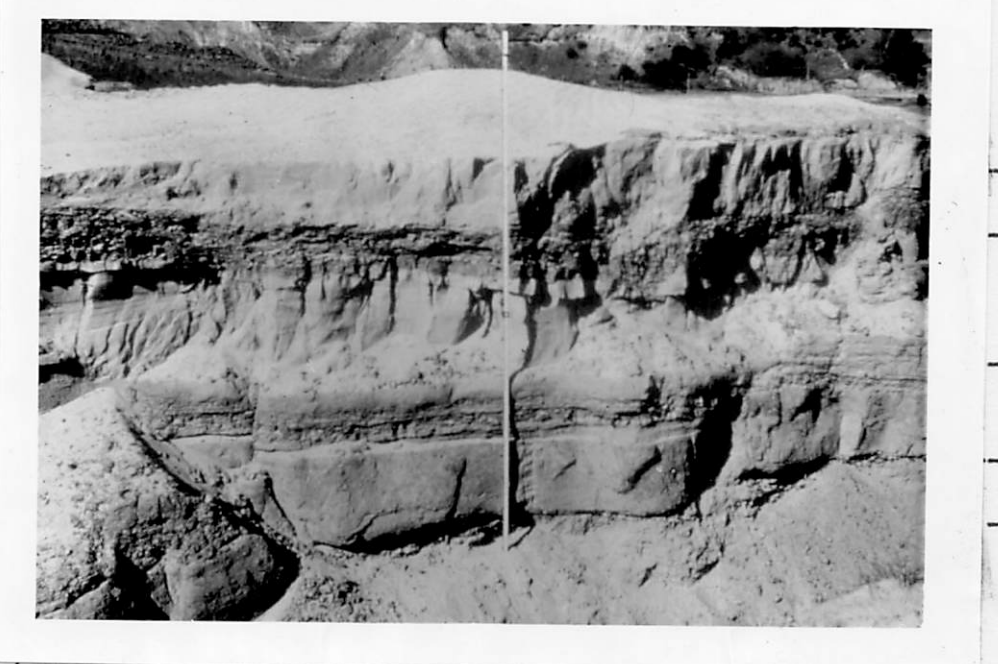
At Messrs Roberts Brett's sandpit at the Broad Oak level crossing the whole succession of strata from the London Clay to the bottom of the Woolwich and Reading beds can be seen.

During the survey teams visit, clay was being stripped from a fresh portion of the overburden and it was found that near the bottom of the London Clay there were patches which were extremely soft and plastic such as would call for extreme caution on a building site. Small areas of this soft clay were subsequently found on the south slopes below Giles' Lane and special vigilance is necessary when building there.

The Oldhaven beds were found to consist of light brown fine, very well bedded sands about 2 feet thick terminating in multicoloured clays with traces of purple sandstone in some places and in others with a thin layer of black pebbles. Underneath this is a great thickness of light grey medium to coarse sands which on the northern return of the face are interveined with a network of cemented material with strong iron staining half-way down.

Working Face at Brett's Sandpit.

1) - London Clay
2) - Oldhaven beds - fine sand.
3) - Oldhaven beds - clay bands, sandstone.
4) - Oldhaven beds - fine sand.
5) - Pebble band.
6) - Woolwich and Reading Beds - coarse grey sand.



Working Face at Brett's Sandpit

All these sands would provide adequate foundations for normal buildings. The clay bands were so thin that if they were found in foundation excavations they could easily be removed.

2.2.3. Overall Geology - Deep Boreholes.

To confirm the general succession of strata on the site four deep boreholes were sunk in the positions marked A to D on map No. 3.

These boreholes confirmed the general succession of strata;- Hoggin, London Clay, Oldhaven sands, Woolwich and Reading sand, Thanet Sand and in addition established the level of the top of the clay well back from the outcrop so that the direction of slope of the clay surface could be checked with a view to establishing the natural direction of drainage (if any) of the hoggin cap. It was found that generally there is a very slight slope of all the strata towards the north-north-east.

The results obtained from these boreholes were corroborated by information at the Geological Museum from existing boreholes put down at the following points: St. Dunstan's Brewery, The Monastery, near St. Thomas Hill and St. Edmund's School.

2.2.4. Local Geology - H and Augerholes etc.

In order to confirm the outline of the different outcrops and ascertain the consistency of the upper strata numerous holes were put down with a hand auger in the positions marked on map N o. 3. In addition the faces of the sandpits within the area were closely examined as well as the face adjacent to the railway tunnel in the grounds of the Archbishop's School. Where necessary a strip of weathered material was removed by trowel to expose the virgin material.

The auger holes revealed great variations in strata within very small areas, so much so in fact that at first it was very difficult to establish any regular succession of strata. With an increasing number of holes supplemented with information from the deep boreholes and from the sandpits a broad pattern did however emerge.

On map No. 3 are shown the various outcrops as found by the survey team, and on plates 4, 5, 6, and 7 are shown sections through the site.

Slight difference from the new Geological Survey were found, but for the purposes of this report they are of little consequence.

The most important findings from the surface explorations are set out below:

a) The small "finger" ridges running south from Giles' Lane are extensions of the hoggin "cap" and immediately at the base of their end and side slopes clay occurs which has been considerably softened by the water percolating through the gravel.

b) The London Clay was found to outcrop in a belt stretching from the gravel ridges south of Giles' Lane to a line running approximately through Beverley Farm in a north-easterly direction to and along the wall separating the "prefab" estate at Downs Road from the fields above.

c) Within the belt of London Clay there are patches where the clay was found to be very soft down to a considerable depth. The area where the auger holes proved this soft layer is marked on map No. 3.

- 1)

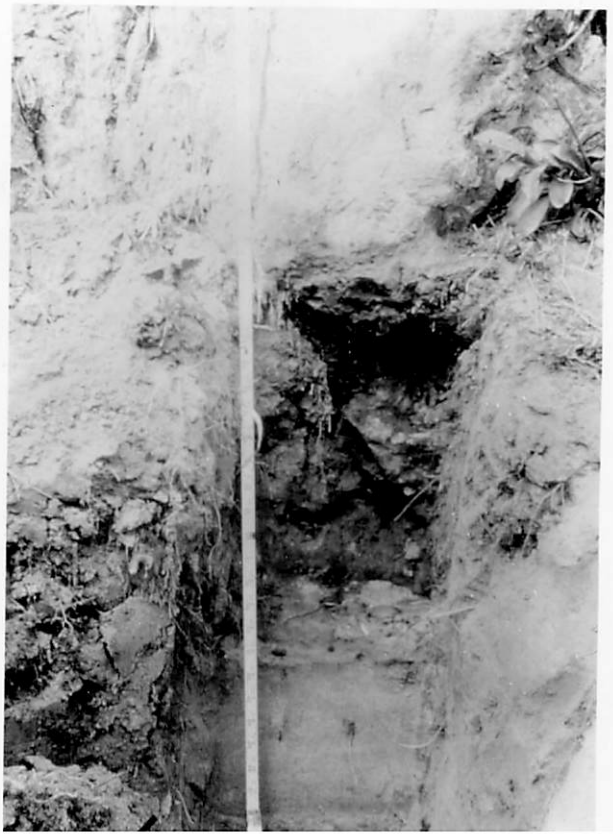
- 2)

3)

4)

Sandpit in Orchard

1) - Ironstone and black pebbles (Oldhaven beds)
2) - Grey and brown streaky sands (Woolwich and Reading Beds)
3) - Coarse light grey sand (Woolwich and Reading Beds)
4) - Augerhole No. 18



-- Ironstone (Oldhaven beds.)

-- Pebble band (Oldhaven beds)

-- Coarse light grey greenish sand.

--- Fine Sand (Oldhaven beds)

--- Clay bands (Oldhaven beds)

-- Mudstone (Oldhaven beds)

-- Ironstone (Oldhaven beds)

-- Coarse light grey sand. (Woolwich and Reading beds)

Face of pit at Archbishop's School

3. DESCRIPTION OF FINDINGS.

In summing up the findings of the investigation it is convenient to divide the proposed site into the following separate areas:-

1) The Area north of Giles' Lane and west of Hackington Road.

2) The Area between Giles' Lane and the Orchards.

3) The Area east of St. Stephen's Hill and Hackington Road.

4) The Orchards and the adjacent derelict Sandpit.

5) The Fields between the orchards and the Nursery.

In the following each of these areas is reviewed with regard to its possible use.

3.1. The Area north of Giles' Lane, West of Hackington Road.

This area is fairly level with the exception of the north-west corner of Park Wood.

The subsoil is gravel and sand except in the north-west corner where London Clay comes to the surface.

As long as buildings are not sited on or near the boundary between gravel and clay this area is very well suited for building purposes. As the drainage is good the flat portions could also with advantage be levelled to make playing fields. This would seem particularly suitable if the woods are retained as an amenity.

3.2. The Area between Giles' Lane and the Orchards.

This area generally slopes towards the Stour and has local ridges and valleys running from north-west to south-east.

The subsoil is generally London Clay. Just south of Giles' Lane the clay is overlaid by gravel terminating in an irregular ridged edge. In a belt just north of the Orchards the clay gives way to fine sands.

This area has great attraction as a site for the University buildings which if positioned here would enjoy magnificent views over the City. Unfortunately it is somewhat less than ideal from the point of providing safe economical foundations.

The ground is not too well drained and there are patches where the clay remains soft to a considerable depth.

These disadvantages are not serious enough to advise against building on this area but they are serious enough to warrant extreme care in the siting of the buildings and in landscaping, and the advice of the civil engineers should be sought before anything is decided.

Whilst the existing slopes only in very few places exceed the 8^{o} limit for long-term stability of London Clay any attempt at terracing will require extremely heavy retaining walls and may provoke slip-failures of excavations.

If buildings have to be sited where soft clay is present below 6 to 8 feet from the surface, piling may have to be resorted to. Unless the buildings are very tall (over 10 storeys) this is not likely to involve prohibitively high extra costs.

Buildings in this area should be put on the ridges and not on the side slopes nor in the hollows. The existing slopes are mostly below the 8^{o} which is the critical slope for permanent stability of London Clay and we strongly advise against any changing of the ground which is not necessary for purposes of building construction. Terracing roadworks and landscaping which involve excavation and retaining walls should be avoided but grass, trees and bushes be encouraged.

If these precautions are observed the cost of buildings in this area should not be excessive.

3.3. The Area east of Hackington Road.

This area is divided into two different properties and permission for access to the northern portion had not been obtained. Nevertheless observation from the surrounding roads indicated that it is generally

similar to the area west of Hackington Road north of Giles' Lane: well drained agricultural land.

The southern portion however is London Clay without any hoggin capping and the general condition is poor. There are ponds at the top and evidence of bad drainage over much of the area. There are patches of the soft plastic clay.

Building on this land is likely to be expensive and the slope is too steep to be reshaped for playing fields.

3.4. The Orchards and the derelict Sandpit.

This area is on a gentle slope and is covered almost entirely with orchards. The drainage is good.

The subsoil varies considerably ffom place to place, sands from the Oldhaven beds and the Woolwich and Reading beds alternating with Brickearth and Clay with Flints, and Ironstone appears in the sandpits below the Oldhaven sand. There should be no difficulty in providing foundations for normal buildings.

The small sandpit in the orchard is modest enough in size to permit infilling, should this be desired. The large pit north of "Hillmead" is used as a rubbish dump and may present a problem of landscaping.

3.5. The Fields North of the Nursery.

The area is almost level and well drained. The subsoil is partly Brickearth, partly clay-with-flints.

Buildings of three to four storeys should not pose any problems. Tall buildings may need piled foundations.

Being nearly flat, and well drained the fields can nearly be converted into playing fields.


HACKINGTON
The Park
Little Hall Farm
Brickhouse Wood
The Square
Barton Down
Sand & Gravel Pit
Folly Farm
Oak Pollard
Brotherhood Wood
Brotherhood Farm
Park Wood
standing water.
Standing water
standing water
Bottom of basin dr
Stream enters manhole
Bottom of basin dr
HALES PLACE
St Stephen's Church
King's School Playing Field
St Edmund's School
KENT COLLEGE
Beverley Farm
Beverley Farm Dairy
ST STEPHEN'S
CATTLE MARKET
Great Stour
WEMYSS BARRACKS
BARRACKS
Victoria Married Quarters
CHAUCER BARRACKS
Neal's Place
The Grove
CEMETERY
Harbledown
Recreation Ground
Allotment Gardens
KING'S SCHOOL
CATHEDRAL
CANTERBURY
(DVROVERNVM)
UNIVERSITY OF KENT, CANTERBURY.
Preliminary Site Investigation.
1
TOPOGRAPHY.
Contours at 10' intervals.
Soggy ground.
Ove Arup and Partners
June 1962

UNIVERSITY OF KENT, CANTERBURY.

Preliminary Site Investigation. (2)

GEOLOGY OF THE SITE, Tracing of outcrops according to Geological Survey.

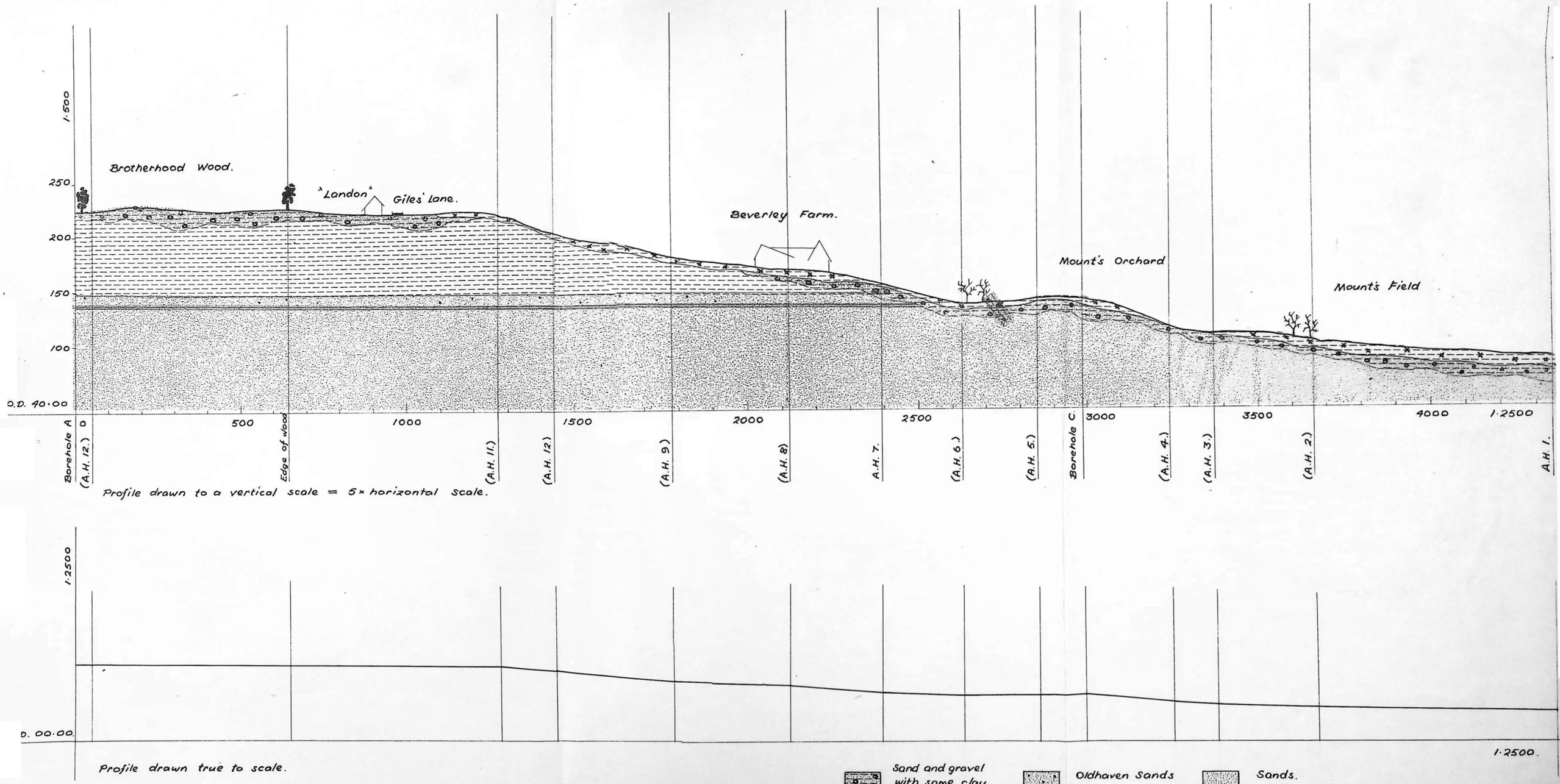
Ove Arup and Partners. June 1962. BB AsW

UNIVERSITY OF KENT, CANTERBURY.
Preliminary Site Investigation. (3)

PLAN OF BOREHOLES, AUGERHOLES and FOUNDATION STRATA.

very soft clay.

Ove Arup and Partners June 1962. 28 AJW.



1-1. DIAGRAMMATIC SECTION ACROSS SITE OF PROPOSED UNIVERSITY OF KENT, CANTERBURY.

For position of section see Drg. N°. 3.

UNIVERSITY OF KENT. CANTERBURY.
Preliminary Site Investigation Ove Arup and Partners June 1962

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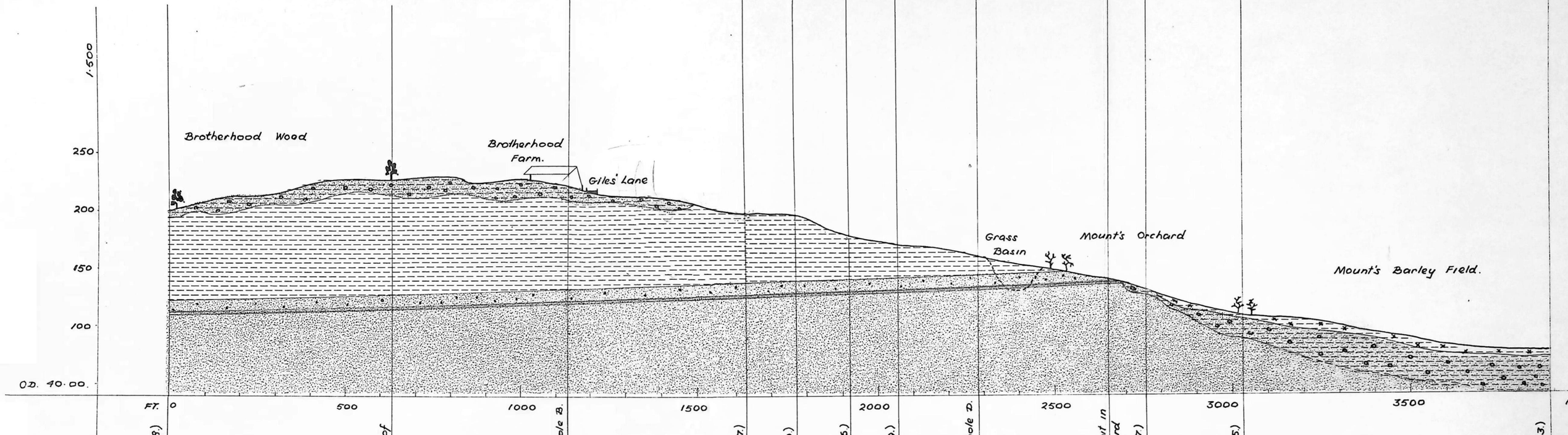

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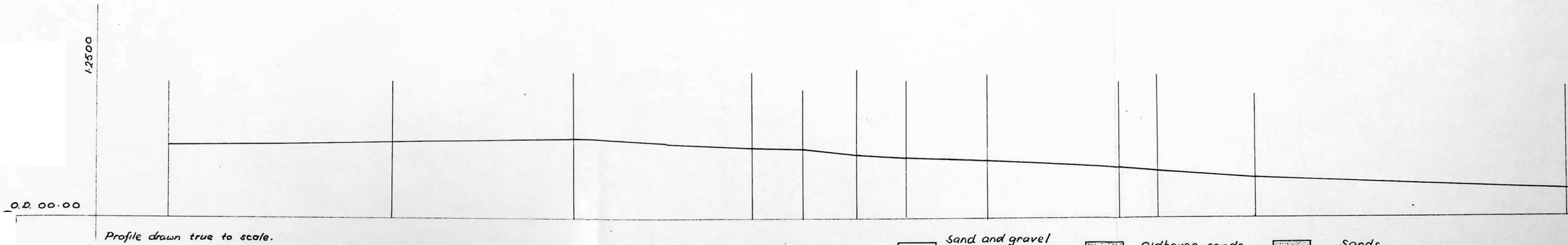

Profile drawn true to scale.

Sand and gravel with some clay

London clay

Oldhaven sands.

Pebble layer.

Sands.

Brickearth.

2-2. DIAGRAMMATIC SECTION ACROSS SITE OF PROPOSED UNIVERSITY OF KENT, CANTERBURY.

For position of section see Drg. No. 3

UNIVERSITY OF KENT, CANTERBURY.
Preliminary Site Investigation. Ove Arup and Partners June 1962

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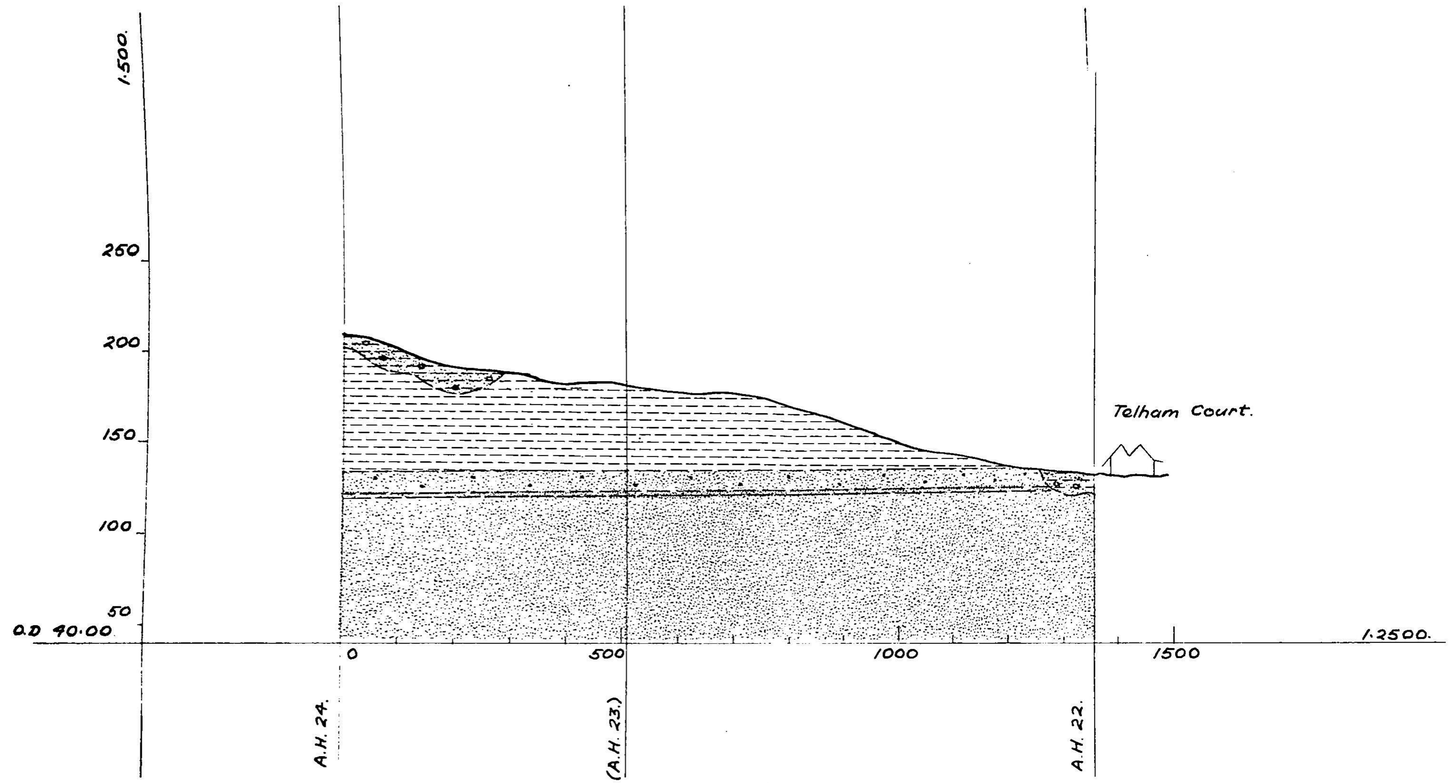

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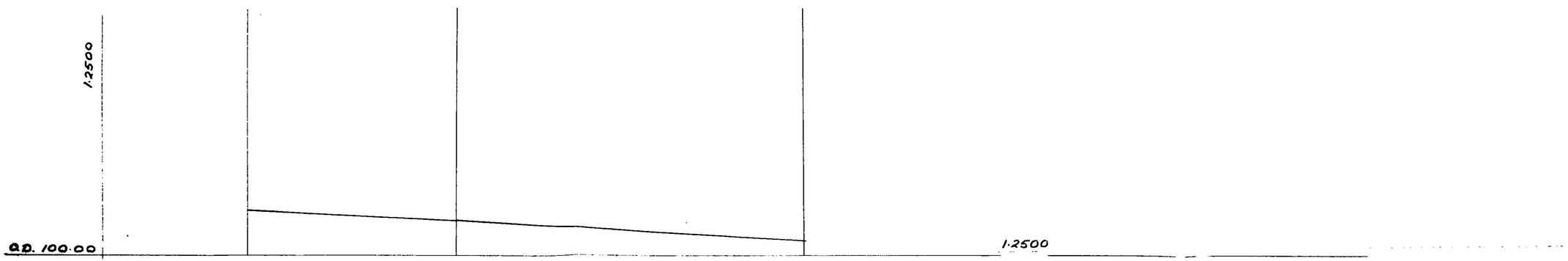

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3-3. DIAGRAMMATIC SECTION ACROSS SITE OF PROPOSED UNIVERSITY OF KENT, CANTERBURY.
For position of section see Drg Nº 3.

Sand and gravel with some clay.
Oldhaven sands.
Sands.
London clay.
Pebble layer.
Brickearth.

UNIVERSITY OF KENT, CANTERBURY:
Preliminary Site Investigation.

Ove Arup and Partners June 1962 AJW.

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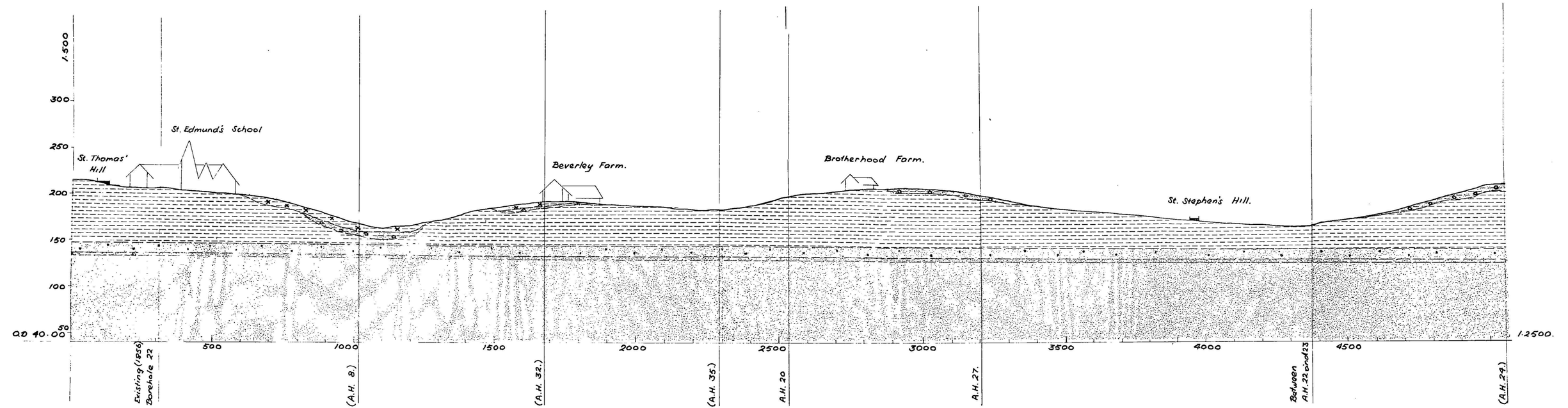

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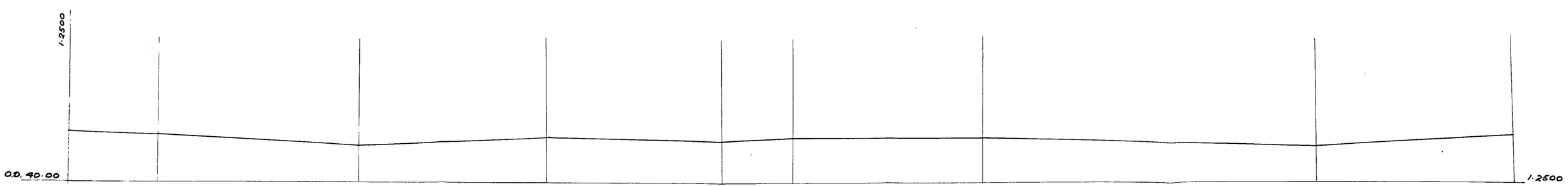

Profile drawn true to scale.

Sand and gravel with some clay. | Oldhaven Sands. | Sands.

London clay | Pebble layer | Brickearth.

UNIVERSITY OF KENT, CANTERBURY.
Preliminary Site Investigation. Ove Arup and Partners June 1962 (7) ASW

4-4. DIAGRAMMATIC SECTION ACROSS SITE OF PROPOSED UNIVERSITY OF KENT, CANTERBURY.
For position of section see Drg. No 3.

Site Investigation for proposed

UNIVERSITY OF KENT, CANTERBURY.

OVE ARUP & PARTNERS

Job No.: 1658	Page: A.H./1
Made by:	Date:

RECORD OF AUGER HOLE NO. 1.

Ground level 83.98 Dia. of hole 4".

SAMPLES		CHANGE OF STRATA			DESCRIPTION OF STRATA
Depth	Type	Legend	Depth	O.D.level.	
			2' 0"	81.98	Topsoil.
3' 0"	D				Brickearth (soft, crumbly light brown clay.)
5' 0"	U				
11' 0"	D		11' 0"	72.98	
					Remarks: (observations on ground water, flint beds etc.) Becoming moist and plastic from 8' 0", onwards.

RECORD OF AUGER HOLE NO. 2.

Ground Level. 98.15 Dia. of hole 4".

			1' 6"	96.65	Topsoil
					Brickearth (soft crumbly, light brown clay, becoming silty and losing cohesion at 6' 0")
6' 6"	D		7' 0"	91.15	
			7' 0"	91.15	Gravel.
					Remarks: (observations on ground water, flint beds etc.) occasional flint encountered at 6' 0".

D - Disturbed sample

U - undisturbed sample, core $1\frac{1}{2}$" diameter.

Site Investigation for proposed

UNIVERSITY OF KENT, CANTERBURY.

OVE ARUP & PARTNERS

Job No.: 1658	Page: A.H./2
Made by:	Date:

RECORD OF AUGER HOLE NO. 3.

Ground level 106.29 Dia. of hole 4"

SAMPLES		CHANGE OF STRATA			DESCRIPTION OF STRATA
Depth	Type	Legend	Depth	O.D.level.	
			2' 0"	104.29	Topsoil (with occasional clay and gravel)
3' 0"	D		4' 6"	101.79	Brickearth (light brown silty clay.)
			4' 6"	101.79	Gravel. (with clay and sand.)
					Remarks: (observations on ground water, flint beds etc.) occasional flint encountered at 2' 0".

RECORD OF AUGER HOLE NO. 4.

Ground Level. 112.05 Dia. of hole 4"

			1' 0"	111.05	Topsoil (with occasional flint)
3' 0"	D		3' 0"	109'.05	Brickearth (soft silty brown clay.)
			3' 0"	109'.05	Gravel.
					Remarks: (observations on ground water, flint beds etc.) occasional flint encountered at all depths.

D - disturbed sample

U - undisturbed sample, core 1½" diameter.

Site Investigation for proposed

UNIVERSITY OF KENT, CANTERBURY.

OVE ARUP & PARTNERS

Job No.: 1658	Page: A.H./3
Made by:	Date:

RECORD OF AUGER HOLE NO. 5.

Ground level 138.16 Dia. of hole 4"

SAMPLES		CHANGE OF STRATA			DESCRIPTION OF STRATA
Depth	Type	Legend	Depth	O.D.level.	
			1' 0"	137.16	Topsoil.
			2' 0"	136.16	Brickearth (light brown silty clay.)
3' 6"	D				Gravel (with light brown clayey silt.)
3' 0" }	Flints				
5' 0" }			5' 0"	133.16	
					Remarks: (observations on ground water, flint beds etc.)

RECORD OF AUGER HOLE NO. 6.

Ground level 135.56 Dia. of hole 4"

			1' 0"	134.56	Topsoil.
			6' 0"	129.56	Brickearth (grey brown silty clay)
			8' 0"	127.56	Gravel (with sand and clay)
					Remarks: (observation on ground water, flint beds etc.) Water first encountered at 4' 0" free water level at 5' 0".

D - Disturbed sample

U - Undisturbed sample, core 1½" diameter.

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RECORD OF AUGER HOLE NO. 7.

Ground level 153.12. Dia. of hole 6".

Samples		Change of strata			Description of strata
Depth	Type	Legend	Depth	O.D. level.	
			1' 0"	152.12	Topsoil.
			3' 0"	150.12	Brickearth (light brown, clay with organic material.)
			10' 0"	143.12	Light brown sandy clay with pebbles.
					Remarks: (observations on ground water, flint beds etc.) Ground water encountered at 6' 0". heavy flints at 10' 0".

RECORD OF AUGER HOLE NO. 8.

Ground level 165.93 Dia. of hole 6"

			1' 0"	164.93	Topsoil.
2' 6"	D				Brickearth (soft dark brown clay with light brown silt.)
4' 0"	D				
7' 0"	D				
			8' 6"	157.43	
			9' 0"	156.93	Gravel.
					Remarks. (observations on ground water, flint beds etc.) Flint First encountered at 2' 6". Organic material at 2' 6" - 8' 6". Ground water from 4' 0" - 4' 6".

D - disturbed sample.
U - undisturbed sample, core 1½" diameter.

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RECORD OF AUGER HOLE NO. 9.

Ground level 175.27 Diam. of hole 6"

SAMPLES		CHANGE OF STRATA			DESCRIPTION OF STRATA.
Depth	Type	Legend	Depth	O.D.level.	
			1' 0"	174.27	Topsoil.
4' 0"	D				Brickearth (light brown silty clay, soft.)
5' 0"	D		5' 0"	170.27	
					London clay (soft grey-blue clay.)
			12' 0"	163.27	
					Remarks: (observations on ground water, flint beds etc.) Ground water at 4' 0" Free standing level at 2' 6" 15 hours later.

RECORD OF AUGER HOLE NO. 10.

Ground level 200.89 Diam. of hole 6"

			1' 0"	199.89	Topsoil.
6' 0"	D				Brickearth (light brown soft silty clay.) becoming soft and grey streaked at 7' 0".
			7' 0"	193.89	
8' 6"	D		8' 6"	192.39	London clay (blue brown very stiff clay.)
					Remarks. (observations on ground water, flint beds etc.) Water at 7' 0" with free water level at 3' 0" - 15 hours later. Flints at 7' 6".

D - disturbed sample.

U - undisturbed sample, core 1½" diameter.

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RECORD OF AUGER HOLE NO. 11.

Ground level 216.92 Dia. of hole 6"

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SAMPLES		CHANGE OF STRATA			DESCRIPTION OF STRATA.
Depth	Type	Legend	Depth	O.D.level	
			1' 0"	215.92	Topsoil.
			3' 0"	213.92	Brickearth (light brown silty clay.)
3' 0"	D				London clay (grey brown soft clay, becoming dark blue brown.)
5' 0"	D		7' 0"	209.92	
					Remarks: (observations on ground water, flint beds etc.)

RECORD OF AUGER HOLE NO. 12.

Ground level 223.18 Dia. of hole 6"

			0' 9"	222.43	Topsoil.
					Sandy clay (light brown clay with layers of lightgrey sand.)
			6' 0"	217.18	(light brown sandy clay.)
					Remarks: (observations on ground water, flint beds etc.) large flints ⩽ 4" encountered at 3' 0" - 6' 0". Free water surface at 4' 0".

D - Disturbed sample

U - undisturbed sample, core 1½" diameter.

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RECORD OF AUGER HOLE NO. 13

Ground level 75.77 Dia. of hole 4"

SAMPLES		CHANGE OF STRATA			DESCRIPTION OF STRATA
Depth	Type	Legend	Depth	O.D.level.	Description of strata
			1' 0"	74.77	Topsoil.
			5' 0"	70.77	Brickearth (clayey topsoil and brown clay)
			5' 6"	70.27	Gravel.
					Remarks: (observation on ground water, flint beds etc.) Water located at 5' 0" level with water in ditch.

RECORD OF AUGER HOLE NO. 14

Ground level 101.15 Dia. of hole 4"

			1' 0"	100.15	Topsoil.
			2' 6"	98.65	Brickearth (light brown silty clay.)
			3' 0"	98.15	Gravel (with saturated clay.)
					Remarks. (observations on ground water, flint beds etc.) Water at 2' 6".

D - disturbed sample

U - undisturbed sample, core $1\frac{1}{2}$" diameter.

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Job No.: 1658	Page: A.H./8
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RECORD OF AUGER HOLE NO. 15

Ground level 106.88 Dia. of hole 4"

SAMPLES		CHANGE OF STRATA			DESCRIPTION OF STRATA
Depth	Type	Legend	Depth	O.D.level	
			1' 0"	105.88	Topsoil.
			4' 3"	102.63	Brickearth (brown soil)
					Silty clay with flints.
13' 0"	D				
17' 6"	D				becoming sandy
21' 0"	D		21' 6"	85.38	
					Remarks: (observations on ground water, flint beds etc.)
					Fully saturated at 20' 0"
					Free water level at 21' 0"
					Large flints at 3' 0" - 4' 3"

D - disturbed sample.

U - undisturbed sample, core 1½" diameter.

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Job No.: 1658	Page: A.H./9
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RECORD OF AUGER HOLE NO. 16.

Ground level 128.24 Dia. of hole 4".

SAMPLES		CHANGE OF STRATA			DESCRIPTION OF STRATA
Depth	Type	Legend	Depth	O.D.level	
			1' 0"	127.24	Topsoil.
			3' 0"	125.24	Brickearth (light brown clay sand.)
					Remarks: (observations on ground water, flint beds etc.) Small quantity of flint found at all depths.

RECORD OF AUGER HOLE NO. 17

Ground level 129.24 Dia. of hole 4"

			1' 0"	128.24	Topsoil.
			3' 0"	126.24	Brickearth (light brown clay)
			3' 6"	125.74	Sand (light grey, compact.)
					Remarks: (observations on ground water, flint beds etc.) Small flints found at 1' 0" to 3' 0".

D - disturbed sample

U - undisturbed sample, core 1½" diameter.

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Job No.: 1658	Page: A.H./10
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RECORD OF AUGER HOLE NO. 18

Ground level 121.66 Dia. of hole 4"

SAMPLES		CHARGE OF STRATA			DESCRIPTION OF STRATA
Depth	Type	Legend	Depth	O.D.level	
5' 6"	D				Sands (greeny-grey becoming greeny-brown and finally becoming yellow.)
7' 6"	D				
11' 6"	D				
			14' 6"	107.16	
					Remarks: (observation of ground water, flint beds etc.) Auger hole drilled at bottom of orchard sand pit.

RECORD OF AUGER HOLE NO. 19

Ground level 178.15 Dia. of hole 4"

			1' 0"	177.15	Topsoil.
					London clay (soft medium-brown clay becoming dark brown with grey veins and course medium brown veins.)
			12' 6"	165.65	
					Remarks: (observations on ground water, flint beds etc.) Water found between clay & topsoil.

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Job No.: 1658	Page: A.H./11
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RECORD OF AUGER HOLE NO. 20

Ground level 195.12 Dia. of hole 4"

SAMPLES		CHANGE OF STRATA			DESCRIPTION OF STRATA
Depth	Type	Legend	Depth	O.D.level	
			0' 6"	194.62	Topsoil.
			2' 0"	193.12	Gravel(with med brown course clay.)
3' 0"	D				London clay (medium brown clay with grey veins becoming grey brown and darker brown.) Soft clay.
7' 0"	D				
			14' 0"	181.12	
15' 0"	D				Remarks: (observations on ground water, flint beds etc.) Saturated clay at 2' 0" free water level falling with depth of hole. Flint bed 0' 6" - 2' 0".

RECORD OF AUGER HOLE NO. 21.

Ground level 202.31 Dia. of hole 4"

			0' 6"	201.81	Topsoil.
2' 6"	D				Gravel (with medium brown sandy course clay.)
			4' 0"	198.31	
			5' 0"	197.31	London clay (dark brown heavy stiff clay with grey veins.)
					Remarks: (observations on ground water, flint beds etc.) Gravel clay becoming more cohesive.

D -disturbed sample.

U - undisturbed sample, core 1½" diameter.

Site Investigation for proposed

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RECORD OF AUGER HOLE NO. 22

Ground level 131.83 Dia. of hole 6"

Job No.: 1358	Page: A.H./1
Made by:	Date:

SAMPLES		CHANGE OF STRATA			DESCRIPTION OF STRATA
Depth	Type	Legend	Depth	O.D.level	
			3' 0"	128.83	Topsoil.
8' 6"	D		8' 9"	123.08	Gravel (with medium brown clay, becoming firm light grey cla
10' 0"	D		13' 6"	118.33	Sand (silver grey compact.)
			18' 0"	113.83	Sand (green compact.)
					Remarks: (observations on ground water, flint beds, etc.) flints found between 3' 0" and 8' 0".

RECORD OF AUGER HOLE NO. 23

Ground level 181.18 Dia. of hole 4"

			0' 9"	180.43	Topsoil.
			7' 0"	174.18	London clay (mottled medium brown and grey clay, becoming dark dark brown with grey veins.)
					Remarks. (observations on ground water, flint beds etc.)

D - disturbed sample
U - undisturbed sample, core 1½" diameter.

Site Investigation for proposed

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OVE ARUP & PARTNERS

Job No.: 1658	Page: A.H./13
Made by:	Date:

RECORD OF AUGER HOLE NO. 24

Ground level 208.75 Dia. of hole 4"

SAMPLES		CHANGE OF STRATA			DESCRIPTION OF STRATA
Depth	Type	Legend	Depth	O.D.level	
			1' 6"	207.25	Topsoil.
			7' 6"	201.25	Gravel (with medium brown course sandy clay. Grey clay veins appearing.)
			9' 0"	199.75	London clay (dark brown clay with blue veins.)
					Remarks: (observations on ground water, flint beds etc.) large flint content between 1' 6" and 4' 6". Ground saturated from 3' 0" - 4' 6". Free water level at 6' 6".

D - disturbed sample.

U - undisturbed sample, core 1½" diameter.

Site investigation for proposed

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OVE ARUP & PARTNERS

Job No.: 1653	Page: A.H./14
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RECORD OF AUGER HOLE NO. 25

Ground level 171.28 Dia. of hole 4"

SAMPLES		CHANGE OF STRATA			DESCRIPTION OF STRATA
Depth	Type	Legend	Depth	O.D.level	
			1' 6"	169.78	Topsoil.
8' 0"	D				London clay (light brown firm clay becoming dark brown with grey veins, occasional course medium brown vein
					Becoming soft medium grey clay.
13'0"	D		13' 0"	158.28	
					Remarks: (observations on ground water, flint beds etc.)
					Ground water located at 11'0".

RECORD OF AUGER HOLE NO. 26

Ground level 177.43 Dia. of hole 4"

1' 6"	D		1' 0"	176.43	Topsoil.
					London clay (stiff medium brown clay, becoming heavy with grey and light brown veins.)
6' 0"	D				
7' 6"	U		7' 0"	170.43	
8' 0"	U				Remarks: (observation on ground water, flint beds etc.)
					Occasional flints found in topsoil.
					Surface of ground broken.

D - disturbed sample

U - undisturbed sample, core 1½" diameter.

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Job No.: 1658	Page: A.H./15
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RECORD OF AUGER HOLE NO. 27

Ground level 197.41 Dia. of hole 4"

SAMPLES		CHANGE OF STRATA			DESCRIPTION OF STRATA
Depth	Type	Legend	Depth	O.D. level	
			1' 6"	195.91	Topsoil.
			4' 0"	193.41	Gravel (with medium brown sand and clay)
6' 0"	D				London clay (firm brown clay with grey veins becoming heavy dark brown or grey.)
13' 0"	D		14' 0"	183.41	
					Remarks: (observations on ground water, flint beds etc.) Boring suspended at 6' 6". Continued 15 hrs. later when free water surface at 5' 6".

RECORD OF AUGER HOLE NO. 28.

Ground level 214.00 Dia. of hole 4"

			2' 0"	212.00	Topsoil.
3' 6"	D				Medium brown sand with clay in veins. Sand becoming a light brown, with pebbles.
4' 0"	D				
5' 0"	D				
			7' 0"	207.00	
			8' 6"	205.50	London clay (heavy brown clay with dark grey streaks.)
					Remarks (observations on ground water, flint beds etc.) Ground water encountered at 6'0". Free water surface at 8' 0".

D - disturbed sample.
U - undisturbed sample, core 1" diameter.

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Job No.: 1658	Page: A.H./16
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RECORD OF AUGER HOLE NO. 29

Ground level 211.62 Dia. of hole 6"

SAMPLES		CHANGE OF STRATA			DESCRIPTION OF STRATA
Depth	Type	Legend	Depth	O.D. level	
			1' 6"	210.12	Topsoil.
			3' 0"	208.62	Light brown sandy clay with grey streaks, and flints.
			10' 0"	201.62	London clay (medium brown clay with grey veins, becoming dark grey brown clay)
					Remarks: (observations on ground water, flint beds etc.) Scatter of flints in topsoil lower strata of London clay in crumbled, dry state.

RECORD OF AUGER HOLE NO. 30

Ground level 133.26 Dia. of hole 6"

			2' 0"	131.26	Topsoil (with clay)
4' 0"	D		5' 6"	127.76	Brickearth (mediumbrown silty clay.)
			7' 6"	125.76	Gravel.
					Remarks: (observations on ground water, flint beds etc.) Scattered flints in topsoil flints encountered at 3' 6" Large flint bed at 5' 6" Water at 5' 0". Free standing water at 7' 6".

D - disturbed sample
U - undisturbed sample, core 1½" diameter.

Site Investigation for proposed

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Job No.: 1658	Page: A.H./17
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RECORD OF AUGER HOLE NO. 31

Ground level 171.04 Dia. of hole 4"

SAMPLES		CHANGE OF STRATA			DESCRIPTION OF STRATA
Depth	Type	Legend	Depth	O.D. level	
			1' 0"	170.04	Topsoil.
					Brickearth (light brown stiff clay) Very soft.
7' 0"	D				
8' 6"	D		8' 0"	163.04	
			9' 0"	162.04	London clay (grey)
					Remarks: (observations on ground water, flint beds etc.) Occasional flint at 7' 0". Water encountered at 7' 0".

RECORD OF AUGER HOLE NO. 32

Ground Revel 191.45 Dia. of hole 4"

			1' 0"	190.45	Topsoil.
2' 0"	D				Brickearth (soft medium brown clay.)
			5' 6"	185.95	
			7' 0"	184.45	London clay (grey veins appear and clay becomes grey.)
					Remarks: (observations on ground water, flint beds etc.) Flint encountered at 3'6" ⩽ 4". Moisture content increasing ground water visible at 4'6".

D - disturbed sample

U - undisturbed sample, core 1½" diameter.

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RECORD OF AUGER HOLE NO. 33

Ground level 202.92 Dia. of hole 4"

Job No.: 1658	Page: A.H./18
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SAMPLES		CHARGE OF STRATA			DESCRIPTION OF STRATA
Depth	Type	Legend	Depth	O.D.level	
			1' 6"	201.42	Topsoil.
			4' 0"	198.92	Gravel (with med. brown stiff clay)
5' 0"	D		4' 0"	198.92	London clay (grey brown firm clay.)
					Remarks: (observations on ground water, flint beds etc.) Flints ⩽ 4" encountered between 1'6" and 4' 0"

RECORD OF AUGER HOLE NO. 34

Ground level 165.13 Dia. of hole 6"

			1' 0"	164.13	Topsoil.
2' 6"	D				London clay (firm medium brown clay becoming grey brow
6' 6"	D				becoming blue-grey with dark brown sand.
14' 6"	D				With small amount light brown sand.
			17' 0"	148.13	
					Remarks: (observations on ground water level, flint beds etc.)

D - disturbed sample
U - undisturbed sample, core 1½" diameter.

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RECORD OF AUGER HOLE NO. 35

Ground level 180.84 Dia. of hole 6"

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Made by:	Date:

SAMPLES		CHANGE OF STRATA			DESCRIPTION OF STRATA
Depth	Type	Legend	Depth	O.D.level	
			1' 6"	179.34	Topsoil.
			10' 0"	170.84	London clay (medium brown course clay with grey speckles, becoming dark brown with grey veins.) Firm.
					Remarks: (observations on ground water, flint beds etc.) Scatter of flints in topsoil.

RECORD OF AUGER HOLE NO. 36

Ground level 212.71 Dia. of hole 6".

			1' 6"	211.21	Topsoil.
			5' 0"	207.71	Gravel (with medium brown course clay)
			6' 0"	206.71	London clay (dark brown firm clay with grey veins.)
					Remarks: (observations on ground water, flint beds etc.) Large flints ⩽ 6" from 1'6" - 5' 0". Water at 5' 0".

D - disturbed sample

U - undisturbed sample, core 1½" diameter.

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RECORD OF AUGER HOLE NO. 37

Ground level 131.32 Dia. of hole 4"

SAMPLES		CHANGE OF STRATA			DESCRIPTION OF STRATA
Depth	Type	Legend	Depth	O.D.level	
			1' 0"	130.32	Topsoil.
					Oldhaven bed (light brown sand fine.)
					Becoming dark brown clay.
			10' 0"	121.32	
			13' 0"	118.32	Sands (clayey green sand from 10' 0" to 11' 0" becoming med. green sand with red-brown sand layers.)
					Remarks: (observations on ground water, flint beds etc.) Organic material found from 8' 0" - 10' 0".

D - disturbed sample.

U - undisturbed sample, core $1\frac{1}{2}$" diameter.

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RECORD OF AUGER HOLE NO. 38

Ground level 202.00 Dia. of hole 4"

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SAMPLES		CHANGE OF STRATA			DESCRIPTION OF STRATA
Depth	Type	Legend	Depth	O.B.level	
			0' 6"	201.50	Topsoil.
4' 0"	D		5' 6"	196.50	Gravel (course sand with silt becoming medium brown course sand)
					Remarks: (observations on ground water, flint beds etc.) Large flint content at all depths. Ground water located at 3' 0" Free water surface at 4' 0".

D - disturbed sample.

U - undisturbed sample, core 1½" diameter.

TABLE 1

RESULTS OF LABORATORY TESTS

Borehole No.	Sample		Natural Moisture Content	Natural Wet Density	Index Properties			Strength Test				Description of Sample
	Depth	Diameter			Liquid Limit	Plastic Limit	Plasticity Index	Type of Test	Shear Strength	Apparent Cohesion	Angle of Shearing Resistance	
		in.	%	lb/cu.ft.	%	%	%		lb/sq.ft.	lb/sq.ft.	degrees	
A	8'0" - 9'6"	4	30	162	100	29	71	U($1\frac{1}{2}$)	-	1450	3	Firm mottled brown and grey fissured silty clay
B	11'6" - 13'0"	4	27	167	93	27	66	U($1\frac{1}{2}$)	1700+	-	-	Stiff mottled brown and grey fissured silty clay
C	5'6" - 7'0"	4	21	165	43	19	24	U($1\frac{1}{2}$)	3100+	-	-	Very stiff yellow-brown friable very silty clay
D	4'6" - 6'0"	4	35	157	102	32	70	U($1\frac{1}{2}$)	1500+	-	-	Firm mottled grey and brown silty clay
	8'6" - 10'0"	4	37	157	125	31	94	U($1\frac{1}{2}$)	-	950	3	Firm friable mottled grey and brown silty clay

U($1\frac{1}{2}$) Denotes undrained triaxial compression test on set of three $1\frac{1}{2}$ in. diameter specimens at three different lateral pressures.

\+ Average of three results.

RECORD OF BOREHOLE 4

Ground level: + 223.3ft. O.D. Dia. of boring: 20in., 8in., 6in.
10in. to 10ft.
8in. to 50ft.
Type of boring: Shell and Auger Lining tubes: 6in. to 103ft.

Daily Progress	Samples: Depth	Samples: Type	Change of Strata: Legend	Change of Strata: Depth	Change of Strata: O.D. Level	Description of Strata	
				1'6"	+222.3	TOPSOIL	
	2'0" – 2'6"	C(60)↑				Very dense small to large angular flint GRAVEL and coarse SAND with some sandy clay	'Head' Gravel
	3'6"	BD					
	5'0" – 5'8"	C(60)↑					
	7'0"	BD		7'6"	+216.3		
	7'6"	D					
	8'0" – 9'6"	U(4)					
	9'6"	D					
	10'6" – 12'0"	U(4)					
	13'0"	D					
27.4.62							
	16'0"	D					
	19'0"	D					
	22'0"	D					
	25'0"	D					
	28'0"	D					
	31'0"	D				Very stiff grey-brown silty CLAY	
	34'0"	D					
	37'0"	D					
	40'0"	D					
	43'0"	D					London Clay
	47'0"	D					
28.4.62	50'0"	D					
	53'0"	D					
	56'0"	D		56'0"	+167.8		
	59'0"	D					
	62'0"	D					
	65'0"	D				Hard blue-grey fissured silty CLAY	
	68'0"	D					
	71'0"	D					
	74'0"	D		76'0"	+147.8		
	78'0"	D					
	81'0"	D				Dense brown silty fine SAND	Lidhaven Beds
	84'0"	D					
	87'0" – 88'0"	BD		87'0"	+1 .8		
	89'0"	D		88'0"	+1 5.8	Small to large rounded black flint GRAVEL with interstitial sharp fragments and brown sand	
30.4.62							
	92'0"	D					Woolwich Beds
	95'0"	D				Dense grey slightly silty medium SAND	
	98'0"	D					
	101'0"	D					
1.5.62				103'0"	+120.8		

Key to type of sample:

- U (4) — 4 in. dia. undisturbed sample.
- U (1½) — 1½ in. dia. " "
- D — disturbed sample.
- BD — bulk disturbed sample.
- W — water sample.
- S ( ) — standard penetration test.
- C ( ) — dynamic cone penetration test.

No. in brackets gives No. of blows/12 in. penetration.

Remarks: (Observations on ground-water, etc.)

Borehole dry to a depth of at least 50ft., when water was added to facilitate boring

Full penetration of sampler not attained

C NIL ...Y, UNIVERSITY

Soils No: S/3167

FIG. 1

GEORGE WIMPEY & ... HAYES

RECORD OF BOREHOLE B

Ground level : + 222.0ft.O.D.

Dia. of boring : 10in.,8in.,6in.
10in. to 12ft.6in.
8in. to 60ft.6in.

Type of boring : Shell and Auger

Lining tubes : 6in. to 114ft.6in.

Daily Progress	Samples: Depth	Samples: Type	Change of Strata: Legend	Change of Strata: Depth	Change of Strata: O.D. Level	Description of Strata	
11.4.62	1'6"	D		1'0"	+221.0	TOPSOIL	
	2'0"	W				Small very dense to large sharp angular flint GRAVEL and coarse sand with a little brown clay	'Head' Gravel
12.4.62	2'0" - 2'7"	C(60)†		5'0"	+217.0		
	3'0"	BD					
	5'0" - 5'8"	C(60)†				Very dense small to large sharp angular flint GRAVEL and coarse sand	
	6'0"	BD					
	6'6"	D					
	7'0"	D					
	7'6" - 8'6"	C(60)		11'0"	+211.0		
	10'0"	D					
13.4.62	10'6" - 11'0"	C(10)†		13'0"	+209.0	Stiff reddish-brown fissured CLAY	London Clay
	11'0"	D					
	11'6" - 13'0"	U(4)					
	13'6"	D					
	14'0" - 15'6"	U(4)					
	17'0"	D					
	20'0"	D					
	23'0"	D					
	26'0"	D					
	29'0"	D					
14.4.62	32'0"	D					
	35'0"	D				Hard brown-grey fissured CLAY	
	38'0"	D					
	41'0"	D					
	44'0"	D					
	47'0"	D					
	50'0"	D					
	53'0"	D					
	56'0"	D		56'0"	+166.0		
	58'0"	D					
	62'0"	D					
16.4.62	65'0"	D					
	68'0"	D				Hard grey fissured silty CLAY	
	71'0"	D					
	74'0"	D					
	77'0"	D					
	80'0"	D					
	82'0"	D		82'0"	+140.0		
	82'6" - 84'0"	U(4)				Hard grey-brown mottled clayey SILT	
	85'6"	D		87'0"	+135.0		
	87'6"	D					Oldhaven Beds
17.4.62	90'6"	D				Dense pale brown medium SAND	
	93'6"	D					
	96'6"	D					
				100'0"	+122.0		
	100'6"	D		101'0"	+121.0	Small to large rounded black flint GRAVEL with intestitial sharp fragments and coarse sand	
	101'6"	D					
	103'6"	D				Dense grey medium SAND with sharp flint large sand	Woolwich Beds
	106'6"	D		108'0"	+114.0		
	109'0"	D				Dense grey medium SAND	
	112'0"	D					
18.4.62	115'0"	D		115'0"	+107.0		

Key to type of sample :

- U (4) — 4 in. dia. undisturbed sample.
- U (1½) — 1½ in. dia. " "
- D — disturbed sample.
- BD — bulk disturbed sample.
- W — water sample.
- S ( ) — standard penetration test.
- C ( ) — dynamic cone penetration test.

No. in brackets gives No. of blows/12 in. penetration

Remarks : (Observations on ground-water, etc.)

At a depth of 13ft., ground-water rose overnight (27/28.4.62) to 2ft. below surface, but was sealed off by lining tubes. Subsequently, borehole was dry to a depth of at least 65ft., when water was added to facilitate boring.

† Full penetration of sampler not attained

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FIG. 2

HAYES

RECORD OF BOREHOLE C

Ground level : + 138.7ft.O.D.

Dia. of boring : 10in.,8in.,6in.
10in. to 10ft.
8in. to 33ft.
6in. to 70ft.

Type of boring : Shell and Auger

Lining tubes :

Daily Progress	Samples Depth	Samples Type	Change of Strata Legend	Change of Strata Depth	Change of Strata O.D. Level	Description of Strata	
	1'0"	D		1'0"	+137.7	TOPSOIL	
	1'6" - 3'0"	U(4)				Firm mottled grey-brown fissured clayey SILT	Oldhaven Beds
	4'6"	D					
	5'0"	D					
	5'6" - 7'0"	U(4)		7'0"	-131.7		
4.5.62	8'6"	D				Light brown silty medium SAND with small to large irregular flint gravel	
	11'6"	C		13'0"	+125.7		
	13'6" - 14'0"	S(60)††				Very dense green glauconitic medium SAND	Woolwich Beds
	15'6" - 17'1"	S(60)††					
	18'0" - 18'8"	S(60)††					
	19'6" - 20'0"	S(60)††					
	22'6"	D					
	25'6"	D					
	28'6"	D					
5.5.62	31'6"	D					
	34'6"	D		35'0"	+103.7		
	35'0"	D				Very dense yellow-brown silty medium SAND	Thanet Beds
	38'0"	D					
	41'0"	D					
	44'0"	D					
	47'0"	D					
7.5.62	50'0"	D					
	53'0"	D					
	56'0"	D					
8.5.62	59'0"	D					
	61'0"	D					
	64'0"	D					
9.5.62	67'0"	D					
10.5.62	70'0"	D		70'0"	+68.7		

Key to type of sample :

- U (4) — 4 in. dia. undisturbed sample.
- U (1½) — 1½ in. dia. .. ..
- D — disturbed sample.
- BD — bulk disturbed sample.
- W — water sample
- (S ( ) — standard penetration test.
- C ( ) — dynamic cone penetration test
- No. in brackets gives No. of blows/12 in. penetration.

Remarks : (Observations on ground-water, etc.)

Borehole was dry to a depth of at least 28ft., when water was added to facilitate boring

†† Full penetration of sampler not attained

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FIG. 3

GEORGE WIMPEY & CO., LTD. CENTRAL LABORATORY HAYES

RECORD OF BOREHOLE 5

Ground level : + 159.6ft. O.D.

Dia. of boring : 8in.

Type of boring : Shell and Auger

Lining tubes : 8in. to 50ft.

Daily Progress	Samples Depth	Samples Type	Change of Strata Legend	Change of Strata Depth	Change of Strata O.D. Level	Description of Strata	
	1'0"	D		1'0"	+158.6	TOPSOIL	
	1'6" - 3'0"	U(4)		4'0"	+155.6	Soft brown silty CLAY with small to large flint gravel and root traces	London Clay
	4'0"	D					
	4'6" - 6'0"	U(4)				Firm light grey to brown slightly silty CLAY	
	7'6"	D		8'0"	+151.6		
	8'0"	D					
24.4.62	8'6" - 10'0"	U(4)				Firm mottled grey fissured silty CLAY, with bands of harder consistency and with pockets of yellow sand	
	11'6"	D		16'0"	+143.6		
	14'6"	D				Very dense brown silty fine SAND	Oldhaven Beds
	16'6" - 17'0"	S(60)†					
	19'6" - 20'0"	S(60)†					
	22'6"	D					
	25'6"	D		30'0"	+129.6		
	28'6"	D					
	30'0"	D		30'1"	+129.5	Medium to large rounded black flint GRAVEL	
	33'0"	D		36'0"	+123.6	Very dense brown silty fine SAND	
	36'0"	D					
	39'0"	D				Very dense green medium SAND	Woolwich Beds
	42'0"	D					
	45'0"	D					
	48'0"	D					
25.4.62	50'0"	D		50'0"	+109.6		

Key to type of sample :

- U (4) — 4 in. dia. undisturbed sample.
- U (1½) — 1½ in. dia. "
- D — disturbed sample
- BD — bulk disturbed sample.
- W — water sample
- (S ( ) — standard penetration test.
- C ( ) — dynamic cone penetration test.

No. in brackets gives No. of blows/12 in. penetration.

Remarks : (Observations on ground-water, etc.)

Borehole was dry to a depth of at least 42ft., when it became necessary to add water to facilitate boring

† Full penetration of sampler not attained

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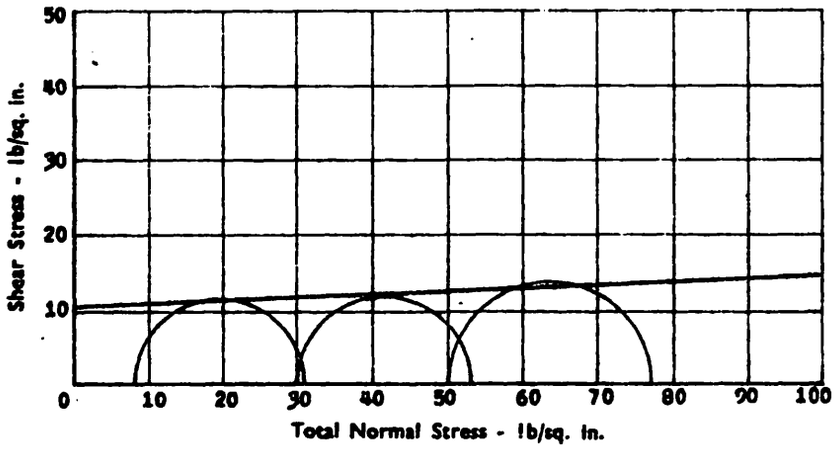
FIG. 4

GEORGE WIMPEY & CO., LTD. CENTRAL LABORATORY HAYES



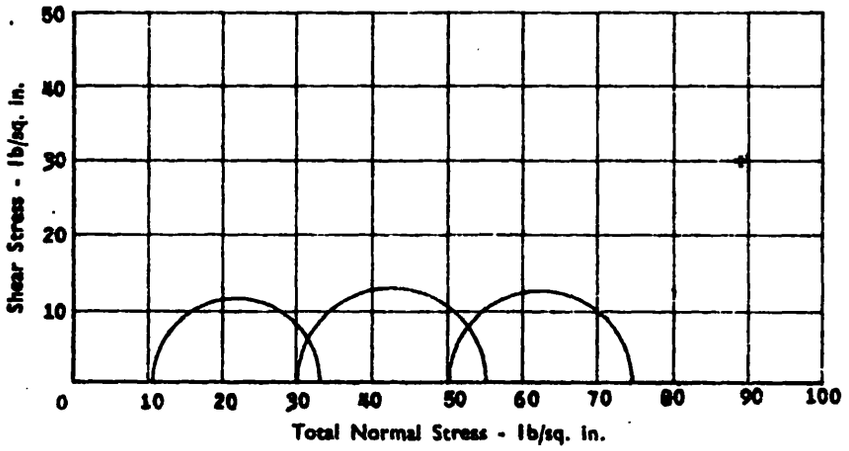
B.H. No. A

Depth: 8'0" - 9'6"

Description: Firm mottled brown and grey fissured silty clay

c' = 1450 lb/sq.ft.

ø = 3°



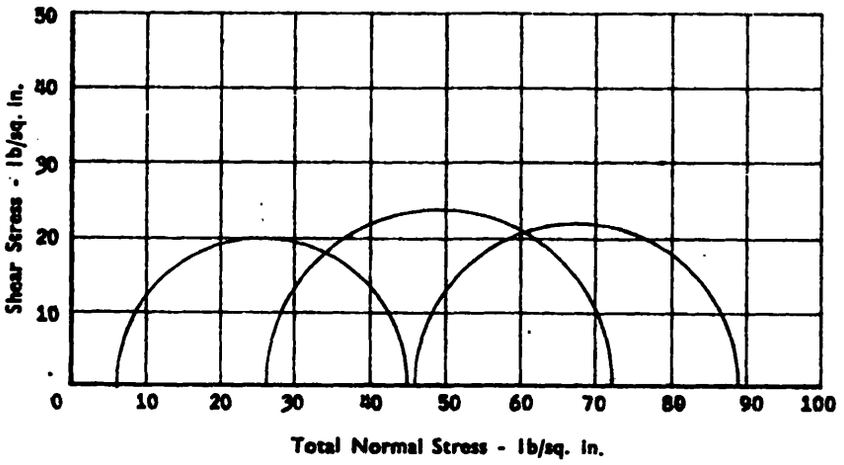
B.H. No. B

Depth: 11'6" - 19'0"

Description: Stiff mottled brown and grey fissured silty clay with pockets of sand and gravel

Average shear strength

= 1700 lb/sq.ft.



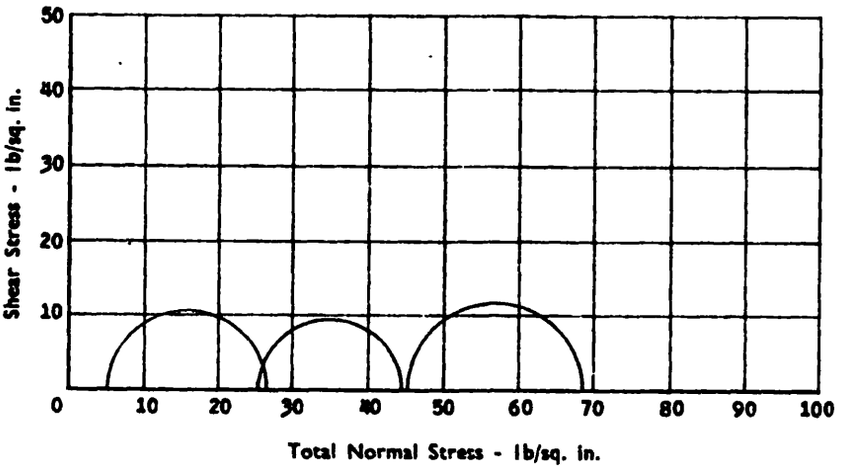
B.H. No. C

Depth: 5'6" - 7'0"

Description: Very stiff yellow-brown friable silty clay

Average shear strength

= 3100 lb/sq.ft.



B.H. No. D

Depth: 4'6" - 6'0"

Description: Firm mottled grey and brown silty clay

Average shear strength

= 1500 lb/sq.ft.

UNDRAINED TRIAXIAL COMPRESSION TESTS

(MOHR'S CIRCLES)

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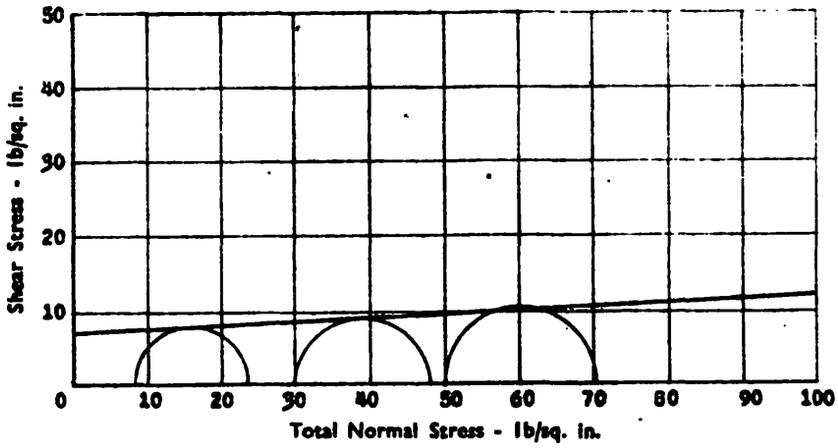
FIG. 5



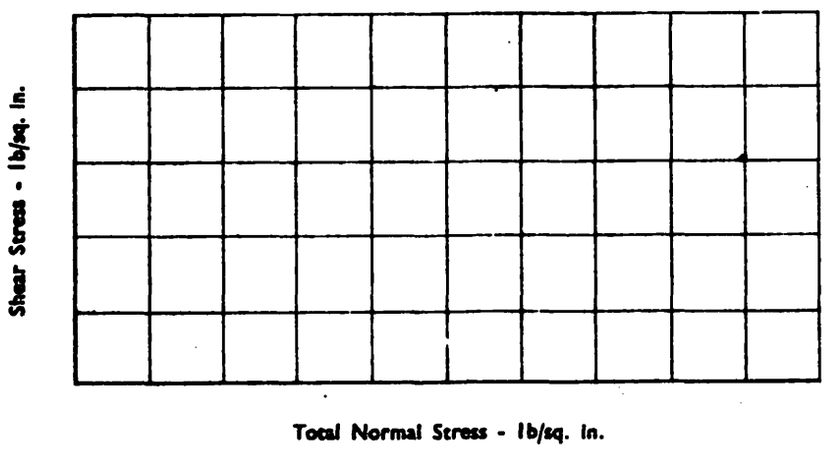
B.H. No. D

Depth : 8'6" - 10'0"

Description : Firm friable mottled grey and brown silty clay

c' = 950 lb/sq.ft.

ϕ = 3°



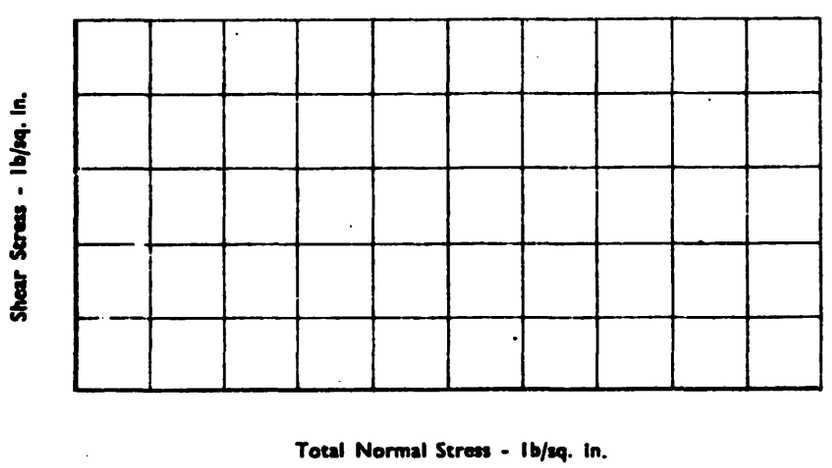
B.H. No.

Depth :

Description :

c =

ϕ =



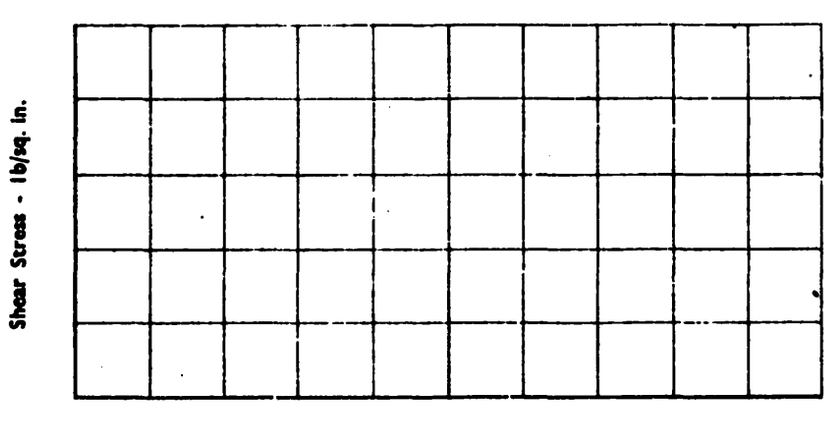
B.H. No.

Depth :

Description :

c =

ϕ =



B.H. No.

Depth :

Description :

c =

ϕ =

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FIG. 6