Appendix A
Borehole Records

Source: British Geological Survey

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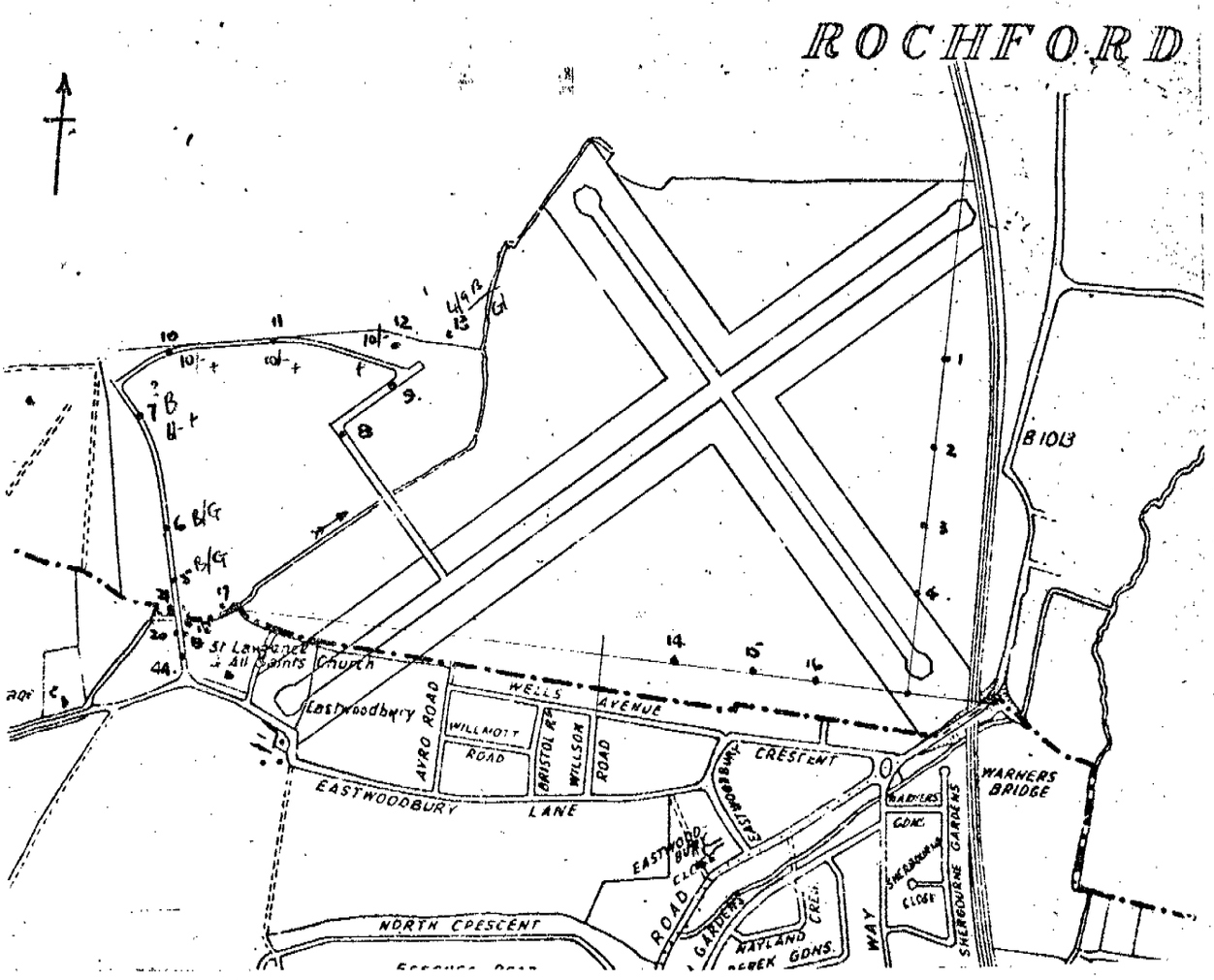
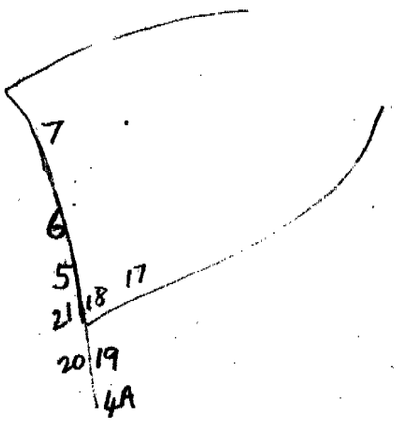
TQ88NE/68-88



N.B. First Terrace channel deposits under gravel layer.



BOREHOLE RECORD No. 28

(p. 495)

Job..... SOUTHEND AIRPORT..... Date of Borehole.... Dec. 64.....

File No.....Date..... Taken by.... A. Bolton.....

Source of Information..... Dia of Boring.....

Ground level.....A.O.D. Newlyn Lining Tubes.....

Type of Boring.....

B.H. No 19

Change of Strata			Description of Strata	Remarks
Depth Ft.	Legend	Level		
0	(0.34m)	W.L. ▼	Topsoil - Clayey Sub-Soil.	B.H. 19 186
5	(2.04m)		Clay - brown/grey mottled, with odd pebbles. Brickearth.	
	(2.38m)		Sand - Gravel with clay. Terrace Boulders.	8604 8888
10	(3.38m)		Clay, brown - grey with pockets of fine sand.	
15				
20				
			Sand - Gravel. Terrace	
25				
30				
35				
40	(12.19m)			
0			Topsoil.	B.H. 20. 187
45 5		W.L. ▼	Clay, brown slightly Sandy. Brickearth	
			Sand - gravel with clay from 6'0 - 7'0. Terrace.	
50 10			Clay - brown with clay patches. Brickearth	
55 15				
			Terrace. Sand - Gravel.	
60 20			at least to 40'0.	
66				
70				
76				

TQ 88NE/218

WEMBLEY LABORATORIES LIMITED — BOREHOLE RECORD

SITE ROCHFORD ROAD - PHASE 4 — BOREHOLE No. SEVEN

REF. No. KWH/CJC — OUR REF. 477/FEH

BOREHOLE STARTED 13.8.1971 — BOREHOLE FINISHED 13.8.1971

O.D. LEVEL — DIAMETER OF BOREHOLE 8 ins.

THICKNESS ft.	THICKNESS in.	DESCRIPTION OF STRATA	LEGEND	DEPTH ft.	DEPTH in.	O.D. A.O.D. LEVELS	SAMPLES	IN-SITU TESTS	WATER OBSERVATIONS Date	Time	Struck	Standing
				0	0	M						–
5	6	MADE GROUND (mainly soft clay fill & hardcore)					43					
							50		13.8	pm		4'0"
				5	6	1·68						–
1	0	Firm brown sandy CLAY		6	6	1·98	44		13.8	am	6'6"	
2	6	Loose GRAVEL with some SAND					45					
				9	0	2·74		N				–
4	6	Firm to stiff brown/grey sandy CLAY with some laminations					46					
							47					
				13	6	4·11	48	N				
5	6	Medium compact brown/green SAND with some clay pockets										–
				19	0	5·79		N				
6	0	Medium compact SAND with traces of silt and some GRAVEL					49					–
				25	0	7·62		N				

STANDARD PENETRATION TESTS CARRIED OUT AT:

FROM 4' TO 5'	N = 11 BLOWS
FROM 9' TO 10'	N = 9 BLOWS
FROM 14' TO 15'	N = 20 BLOWS
FROM 19' TO 20'	N = 27 BLOWS
FROM 24' TO 25'	N = 32 BLOWS
FROM TO	N = BLOWS
FROM TO	N = BLOWS
FROM TO	N = BLOWS
FROM TO	N = BLOWS

SCALE 5 ft. to 1 inch

WATER SAMPLES TAKEN AT: 4'0"

UNDISTURBED SAMPLE — I

DISTURBED SAMPLE — Jar / Bulk

WATER SAMPLE — ▲

STANDARD PENETRATION TEST — N

VANE TEST — +

REMARKS Pit dug to commence borehole

TQ 88 NE 255 8662 8923 Rochford, Essex. Block A

Surface level +12.4 m (+40.5 ft)
Water struck at +7.1 m (+23.5 ft)
Shell, 203 mm diameter
February 1973

Overburden 4.50 m
Mineral 5.50 m
Bedrock 2.80 m+

LOG

Geological Classification	Lithology	Thickness m	Depth m
Soil	Silt, dark yellowish brown	0.25	0.25
Brickearth	Silt, light brown, with roots, (becoming more abundant with depth). Pebbles of race from 1.70 m to base	2.35	2.60
	Sandy clayey silt, moderate yellowish orange	1.90	4.50
Buried Channel Deposits	Gravel Mainly fine gravel, some coarse with medium to coarse sand. Gravel fraction increasing and fines fraction decreasing with depth. Gravel composed of subangular to subrounded flint and rounded quartzite and flint pebbles. Some vein quartz. Coarse sand contains shards of flint patina. Scattered cobbles at base	5.50	10.00
London Clay	Silty clay, stiff, medium yellowish brown (weathered) becoming olive grey (unweathered) at 10.20 m	2.80+	12.80

GRADING

Mean for Deposit				Depth below surface (m)		Bulk Samples Percentages					
	%	mm	%	From	To	Fines -1/16	+1/16-¼	Sand +¼-1	+1-4	Gravel +4-16	+16
Gravel	52	+16	19	4.5	5.5	13	7	32	12	24	12
		-16+4	33	5.5	6.5	5	3	41	9	31	11
				6.5	7.5	6	4	28	10	36	16
Sand	43	-4+1	11	7.5	8.5	1	2	12	8	48	29
		-1+¼	29	8.5	10.0	2	1	28	15	29	25
		-¼+1/16	3								
Fines	5	-1/16	5								

TQ 88 NE 255

87a 586620 189230

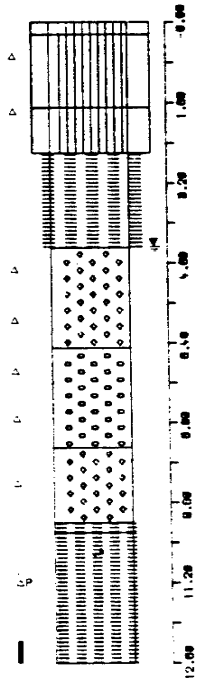
BOREHOLE LOG E.G.U. REF. TQ8689 881 FIELD STAFF REF. TQ88NE255 .

NATIONAL GRID REF. 586620 189230 SURFACE LEVEL 12.48 M. OD.

DRILLED BY FORAKY DRILL TYPE SHELL&AUGER DATE COMPLETED 2 FEB 1973

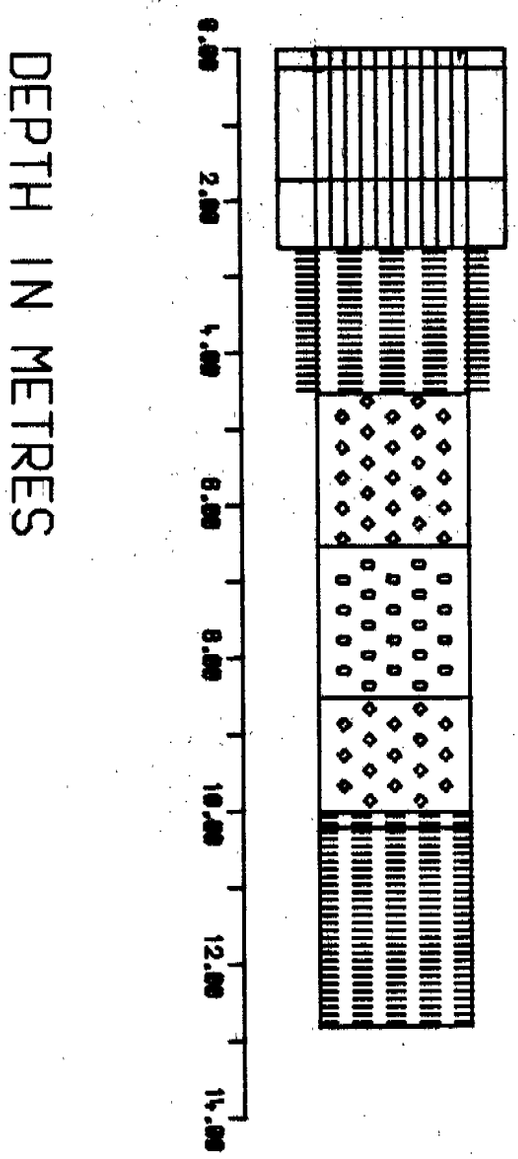
RECORDED BY M.SIMMONS FIRST WATER DEPTH M. REST WATER DEPTH 4.58M.

STRATIGRAPHY	DESCRIPTION	THICKNESS	DEPTH	O.D.L.
TOPSOIL	SILT, 10YR4/3 (MEDIUM YELLOW BROWN).	0.25	0.25	12.15
BRICKEARTH	SILT, SOFT, 5YR5/3 (MEDIUM BROWN). CONTAINING COMMON ROOTS (PRES.DAY)	1.45	1.70	10.78
	SILT, SOFT, 5YR5/3 (MEDIUM BROWN). ..... CONTAINING SCATTERED RACE COMMON ROOTS (PRES.DAY) ... BEDDED.	0.90	2.60	9.88
	SLIGHTLY SANDY, CLAYEY, SILT, SOFT, ... 10YR5/6 (MEDIUM YELLOW BROWN).	1.90	4.50	7.98
TERRACE DEPTS.	SILTY, GRAVELLY(FINE,MED AND CS). ..... FINE TO COARSE SAND, 5YR4/6 (MEDIUM BROWN). ..... SUBANGULAR SUBROUNDED CONTAINING COMMON ..... ROUNDED TERTIARY FLINT BEDDED.	2.00	6.50	5.98
	SANDY(FINE,MED AND CS). FINE TO COARSE GRAVEL. ..... SUBANGULAR SUBROUNDED CONTAINING COMMON ..... TERTIARY REWORKED FLINT SCATTERED VEIN QUARTZ ..... FERRUGINOUS NODULES BEDDED.	2.00	8.50	3.98
	GRAVELLY(COARSE), FINE TO COARSE SAND, SUBANGULAR ... SUBROUNDED	1.50	10.00	2.48
LONDON CLAY	SILTY, CLAY, STIFF, 10YR5/2 (MEDIUM YELLOW BROWN), .. WEATHERED. . FISSURING, HIGH.	2.20	10.20	2.28
	SILTY, CLAY, STIFF, 5Y4/1 (OLIVE GRAY), FRESH. . .... FISSURING, VERY HIGH.	2.60	12.80	-0.60



TQ 88 NE / 255

TQ8689 1



TQ 88NE /255

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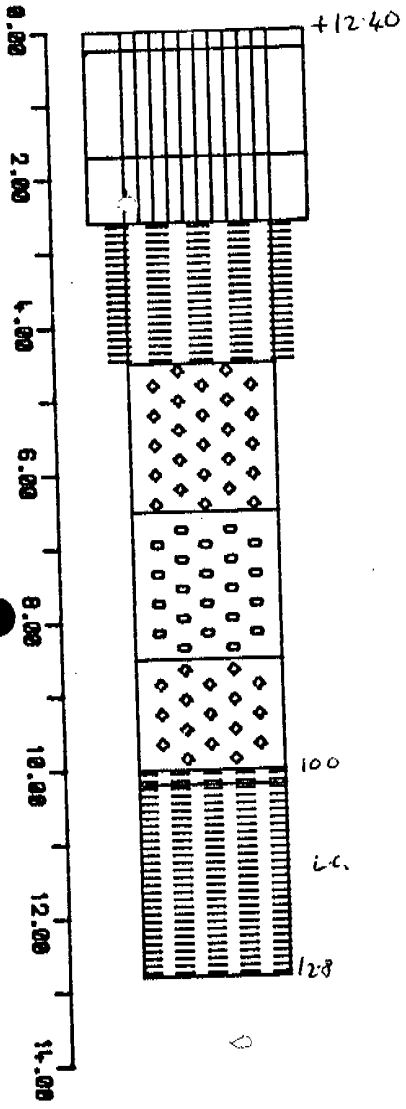
TQ8789 1



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Sheet 1 of 2

Borehole Reg No: TQ58 NE 255
Temp. borehole No: TQ88NEC
Nat Grid Ref: 86628923
Locality:
Surface level: 12.40 m O.D. (40.7 ft O.D.)
Drilled by: Foraky
Drill type: Shell
Hole diameter: 8" (200 mm)
Depth(s) bailed: 2.6m - 11.3m
Date started: 31/1/73 - 2/2/73
Date finished:
Recorded by: MSimmons

Classification of ground	Thickness m	Nature
Overburden	4.5 m	Topsoil, Brickearth Terrace silt.
Mineral	5.5m	Terrace sand + gravel
Bedrock	2.8m +	London Clay

Remarks The 6" baler was used ~~at~~ when the sand rose from 8.50m to 5.6m
A good disturbed sample could not be obtained in London Clay as it tended to crumble along fissure planes, therefore a U4 was taken.

Explanation
- ▽ Groundwater depth first encountered
- a▼ Morning water level
- p▼ Evening water level
- ═══ Casing depth
- ——— Borehole depth
- W Water sample
- U4 sample; solid ornament shows fraction recovered
- • Spot disturbed sample
- } Bulk sample
- S.P.T. Standard Penetration Test

Geological Classification	Description of Strata	Sampling	Sample Nos	Water level	Drilling and Casing progress
Topsoil 0.25	Silt 10YR4/3				
Brickearth	Smooth textured silt with roots which became more abundant with depth 5YR5/5	• 0.6 0.75	88NECD1		
Upper 1.7		• 1.7 1.9	88NECD2		
	As above but with a little race.				
2.0 Lower 2.6	As above but with race				
8.5W	Soft slightly sandy, clayey silt 10YR5/6				
14.8W					
4.5 Terrace Sand + Gravel.	Sandy silty gravel becoming gravelly sand with depth. Sand coarse to fine or top of sample, but medium to fine only towards base Subang - subincluded. Gravel coarse to fine, subangular to subrounded flints + rounded Tertiaries 35 : 60 : 5	4.5	FB N57	a▼4.5	
5.5	Gravelly sand becoming slightly more gravelly with depth 25 : 70 : 5 otherwise as above	5.5	FB N58		
6.5	Sandy gravel 50 : 45 : 5. Gravel coarse to fine, the coarse being mainly subangular to subrounded flints, the fine subrounded flints + reworked Tertiaries. Sand, coarse to fine, the coarse being mainly flakes of patina + flint. Medium to fine sand, subangular to subrounded clear quartz + flint	6.5	FB N59		
7.5	Sandy gravel 75 : 20 : 5 Gravel as above, sand as above contains consolidated nodules ~ 50mm max. diameter with concentric laying 5YR4/6 (Depth uncertain due to rolling sand)	7.5	FB N60		
8.5	Gravelly sand 40 : 55 : 5. Gravel as above, sand as above Gravel becomes coarser with depth. Cobbles at base	8.5	FB N61		
10.0		10.0			

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TQ 88NE/255

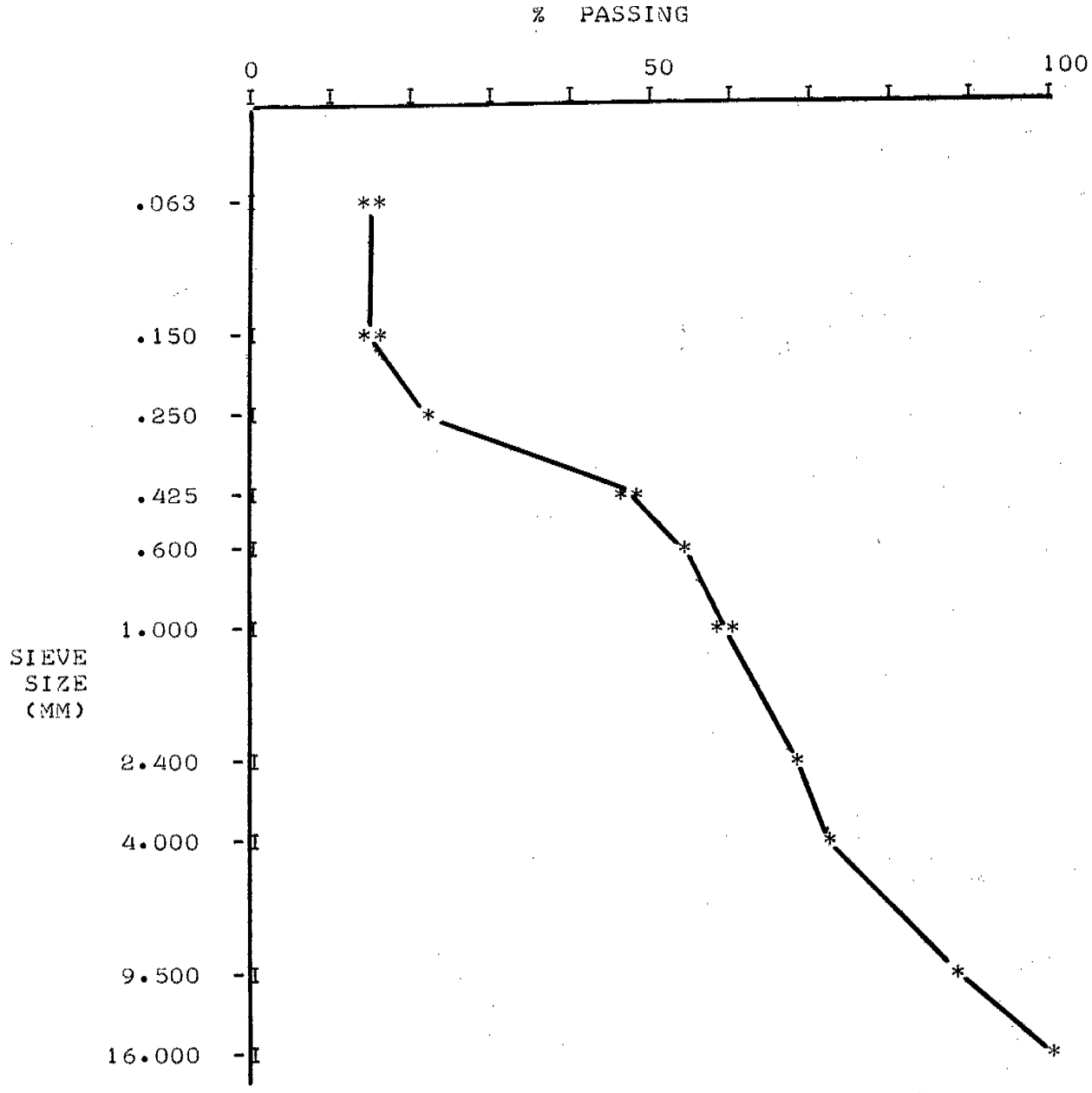
Borehole Reg No TQ88NE C Sheet 2 of 2.

Geological Classification	Description of Strata	Sampling	Sample Nos	Water Level	Drilling and casing progress
Weathered 10·3	Stiff v. highly fissured silty clay ~~5Y 4/1~~ 10YR 5/2	10			
Unweathered	Stiff, v. highly fissured silty clay 5Y 4/1	11 · 11·0 11·3	88NECP3		
London Clay		12 · 12·3 12·35	88NE CU4		
12·3					
12·8	As above	13			

TQ 88 NE(C) 255

26/8 14/2 FB 457

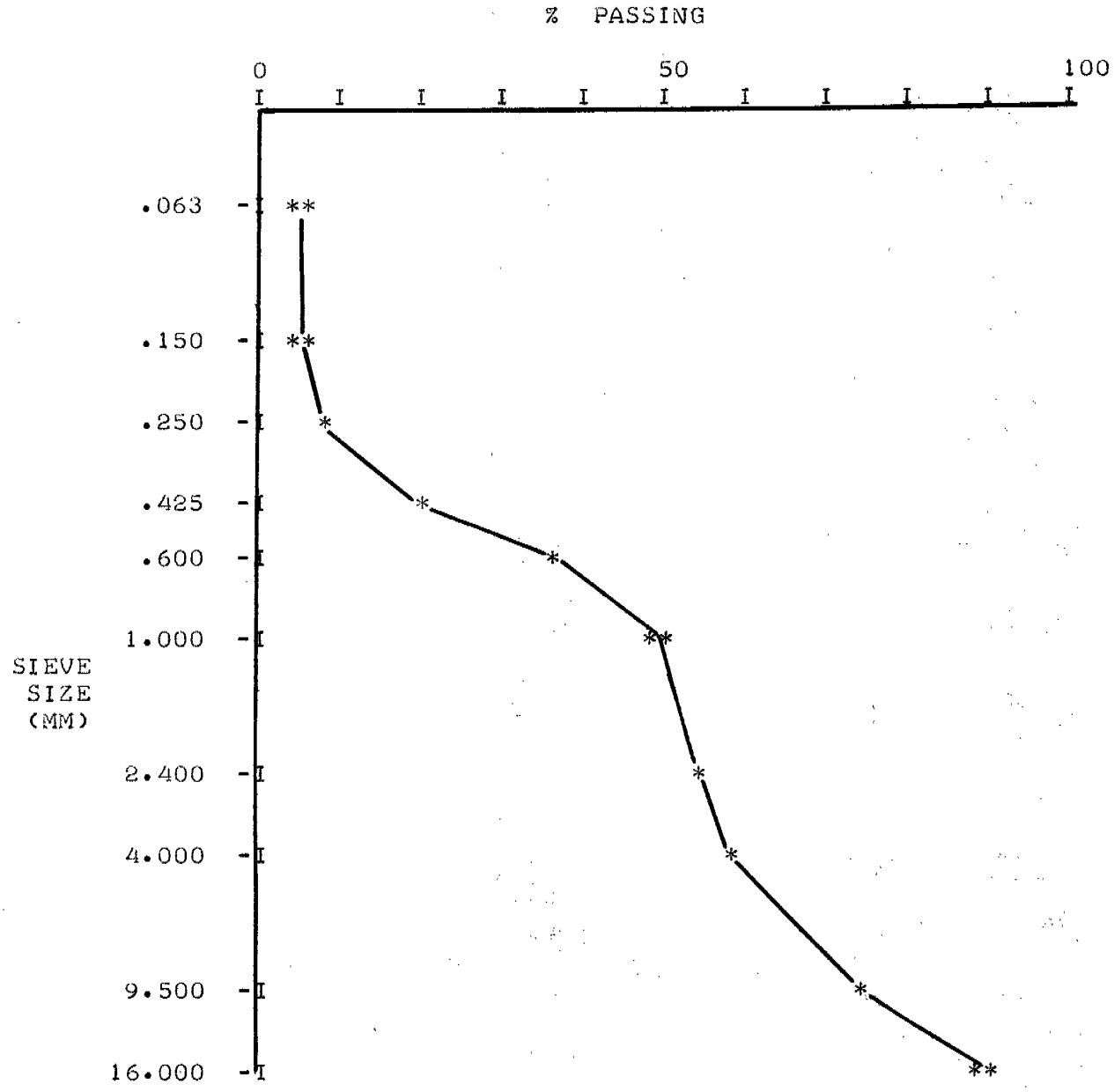
SIEVE	37.5	16	9.5	4	2.4	1	.6	.425	.25	.15	.063
%PASS (-37.5)	100	100	88	72	68	59	54	47	22	15	15
%PASS (TOT)	88	88	77	64	60	52	48	41	20	13	13



TQ 88 NE /255

27/22 15/2 FB 458

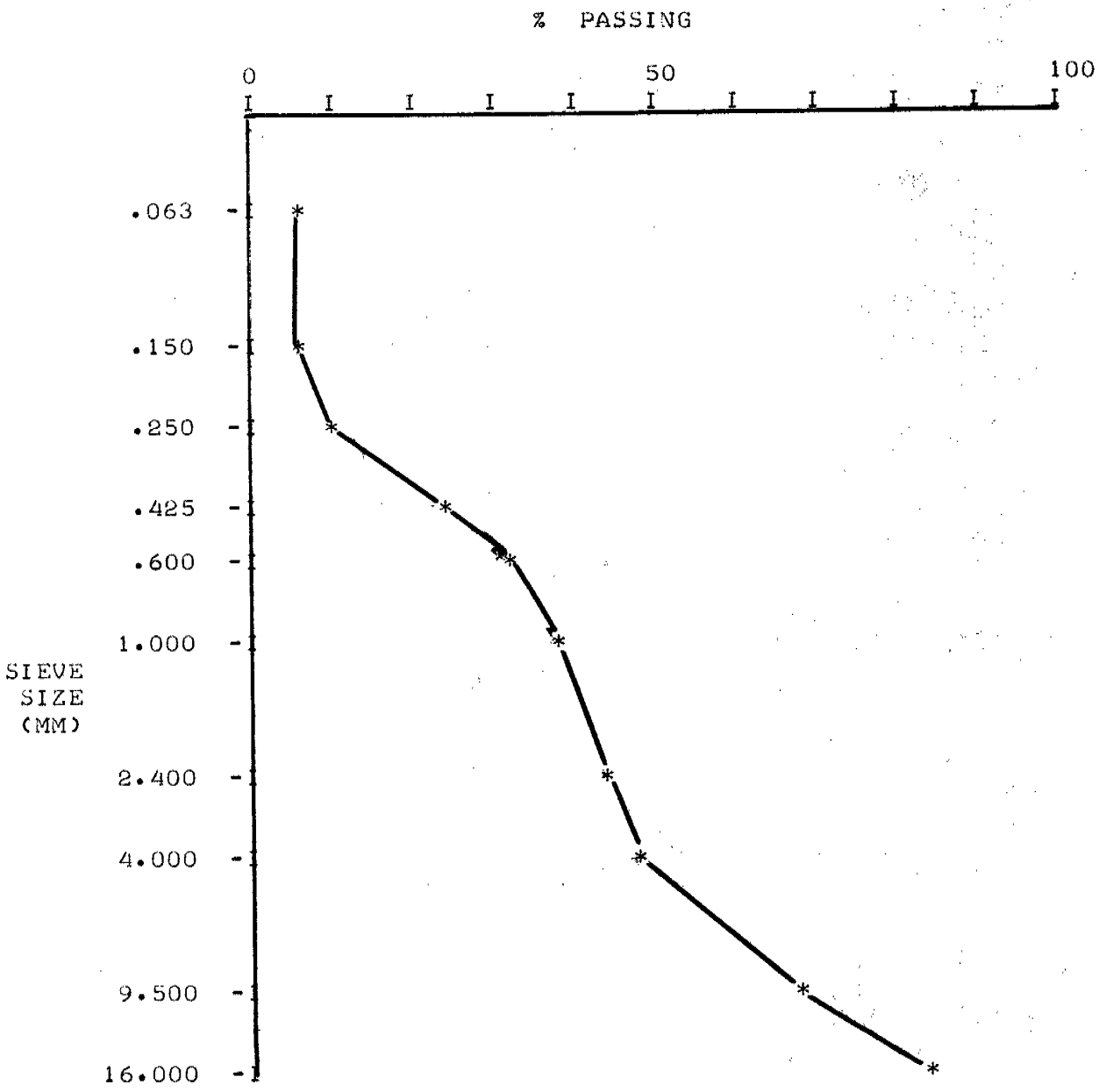
SIEVE	37.5	16	9.5	4	2.4	1	.6	.425	.25	.15	.063
%PASS (-37.5)	100	89	74	58	54	49	36	20	8	5	5
%PASS (TOT)	100	89	74	58	54	49	36	20	8	5	5



TQ 88 NE /255

27/29 15/2 FB 459

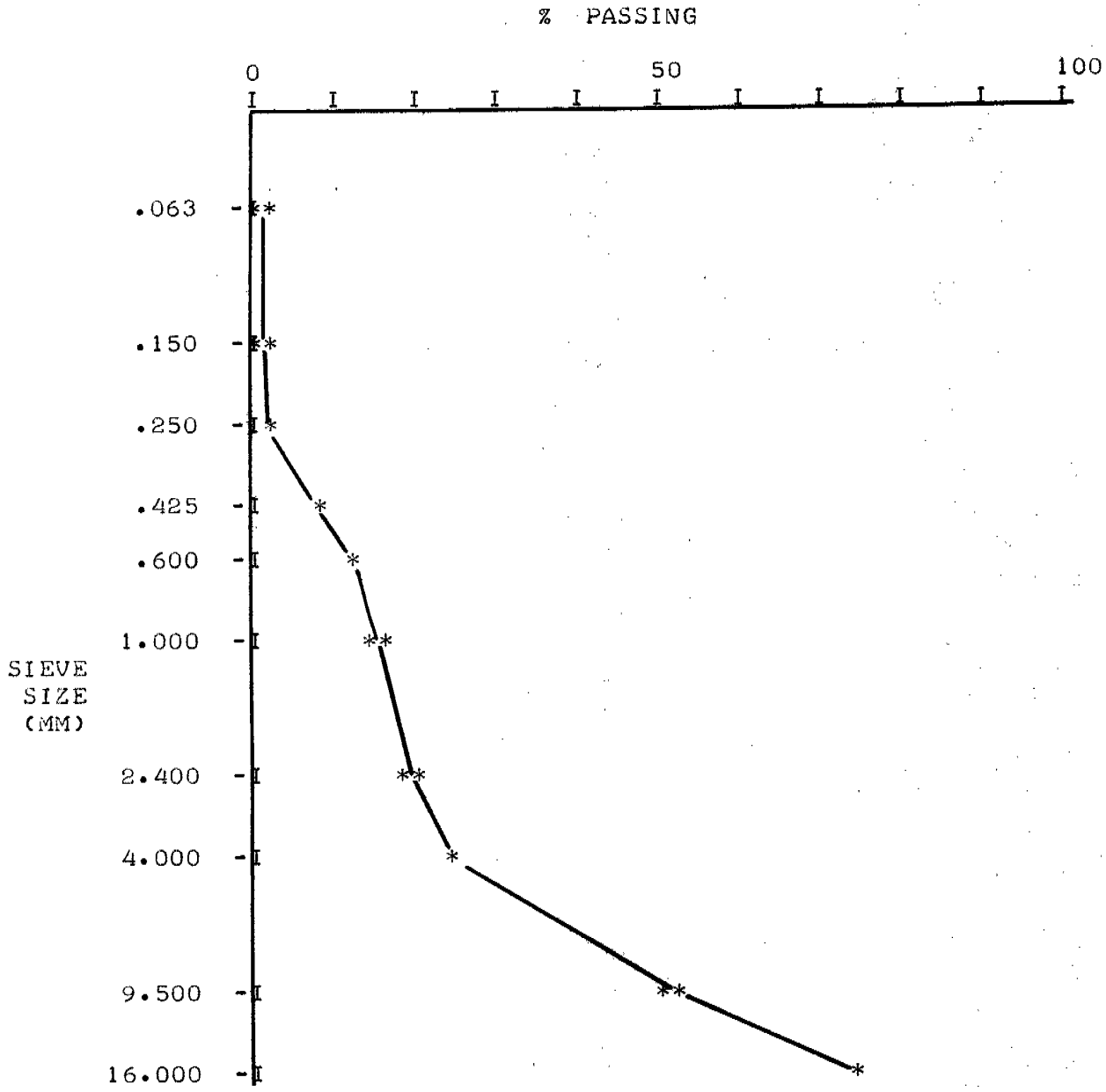
SIEVE	37.5	16	9.5	4	2.4	1	.6	.425	.25	.15	.063
%PASS (-37.5)	100	84	68	48	44	38	32	24	10	6	6
%PASS (TOT)	100	84	68	48	44	38	32	24	10	6	6



TQ 88 NE/255

28/2 15/2 FB 460

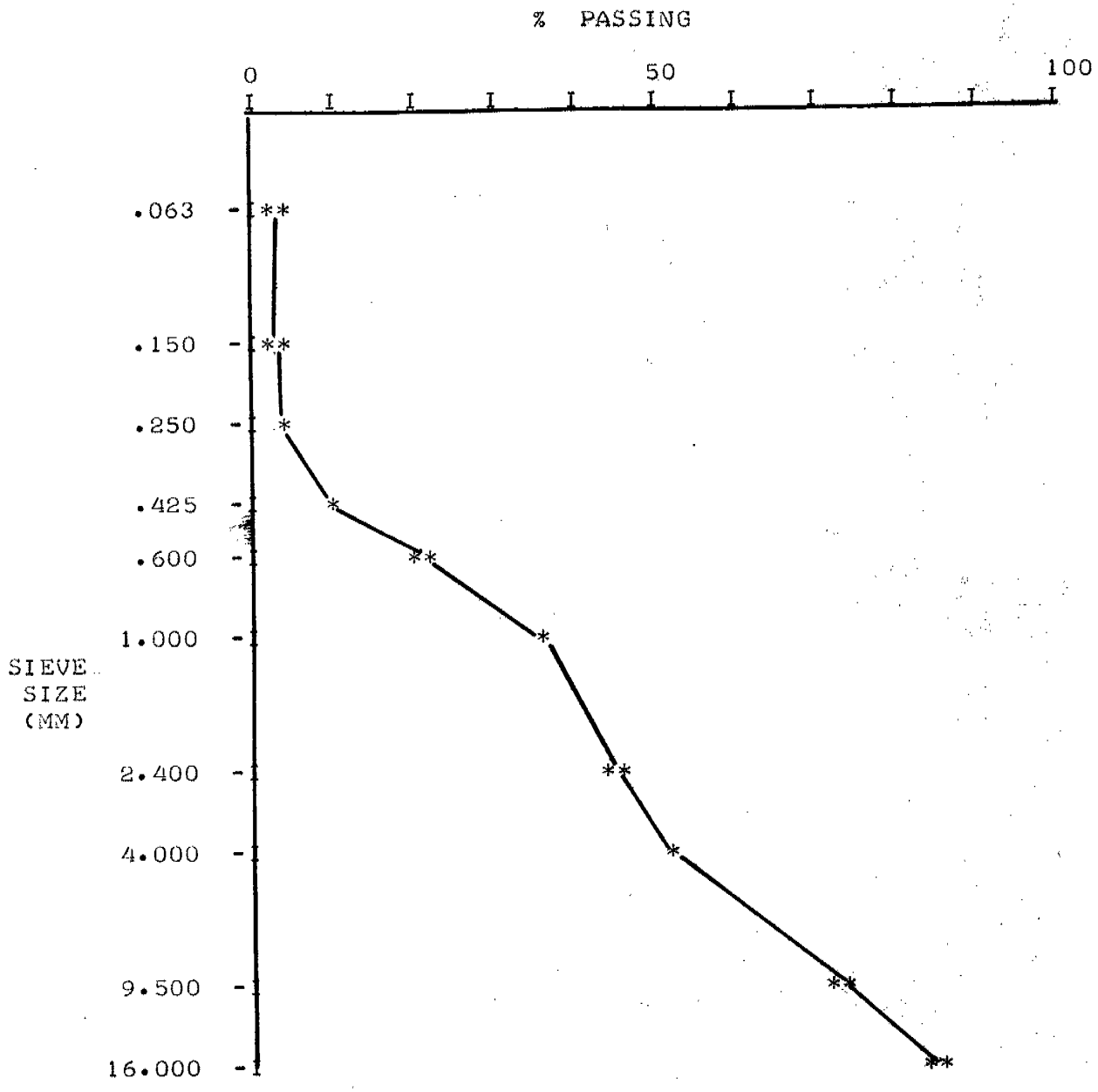
SIEVE	37.5	16	9.5	4	2.4	1	.6	.425	.25	.15	.063
%PASS (-37.5)	100	74	51	24	19	15	12	8	2	1	1
%PASS (TOT)	96	71	50	23	18	15	11	8	3	1	1



TQ 88 NE/255

27/21 15/2 FB 461

SIEVE	37.5	16	9.5	4	2.4	1	.6	.425	.25	.15	.063
%PASS (-37.5)	100	85	73	52	45	36	21	10	4	3	3
%PASS (TOT)	88	75	65	46	39	31	18	9	3	2	2



TQ 89SE /3
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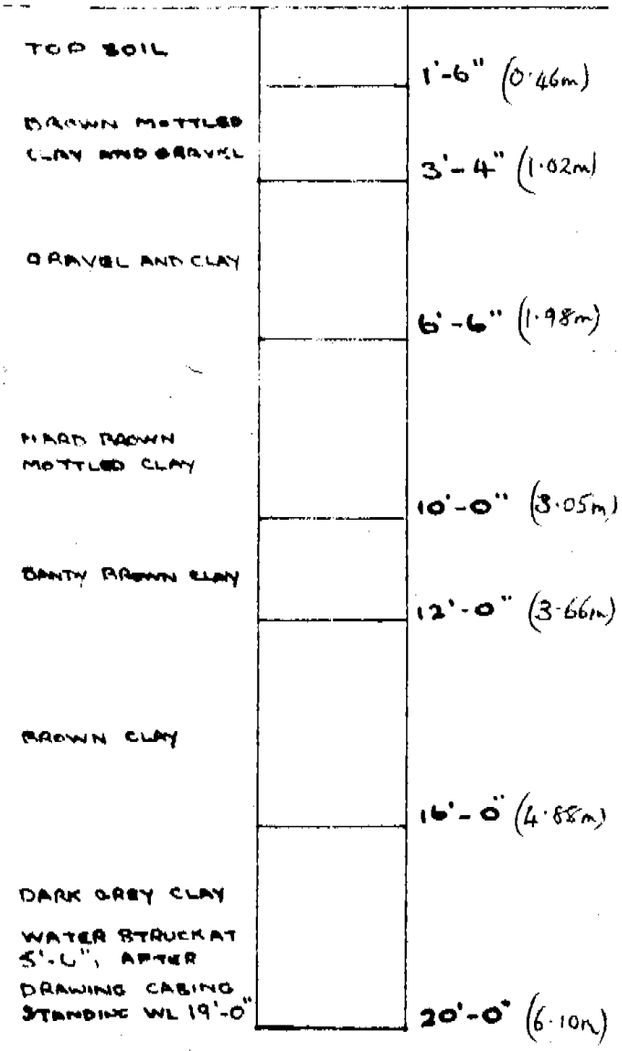
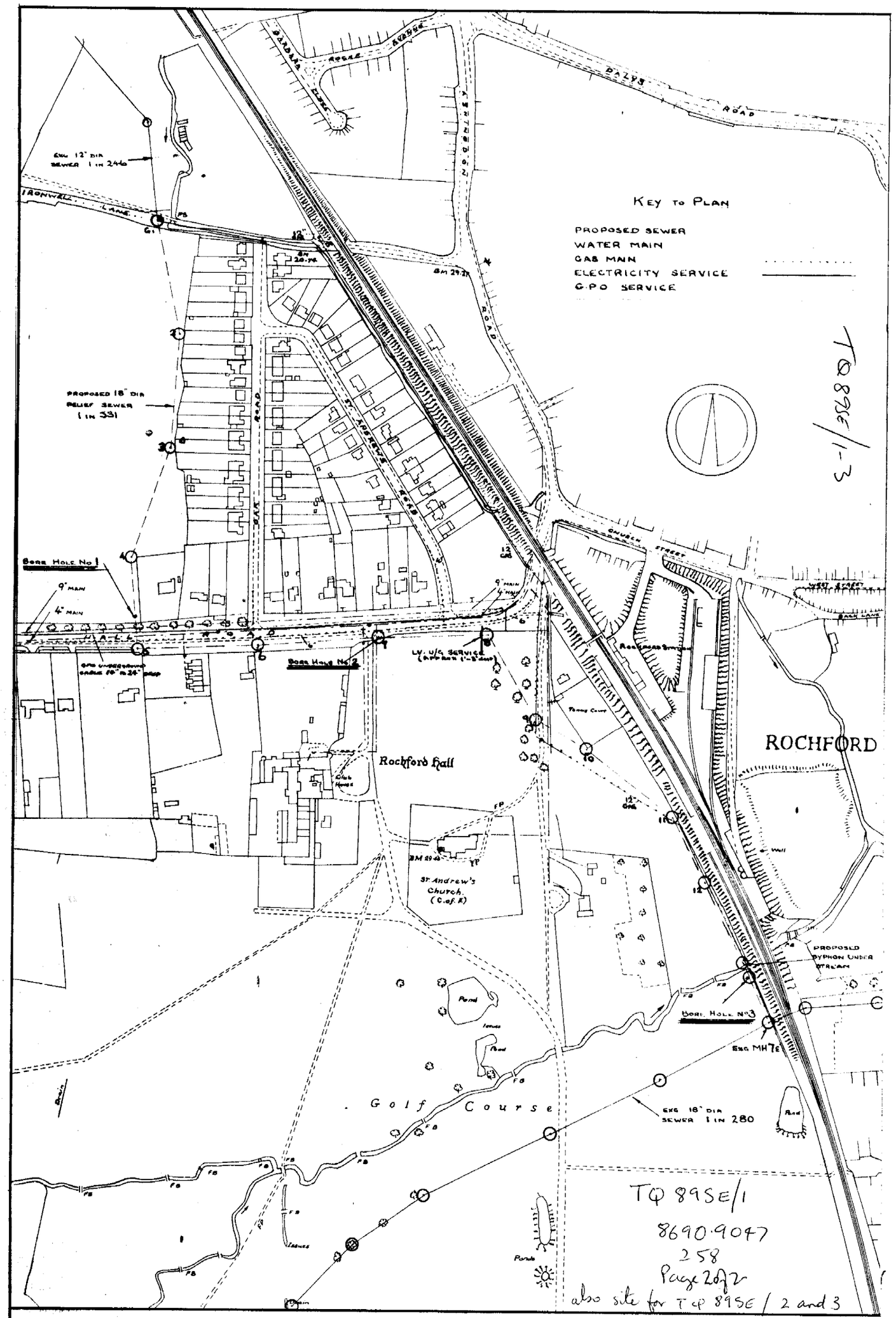


BORE HOLE Nº3

ILS



TQ 89 SE 55 8657 9046 Rochford, Essex. Block A

Surface level +11.3 m (+37.0 ft)
Water struck at +5.9 m (+19.5 ft)
Shell, 203 mm diameter
January 1973

Overburden 5.40 m
Mineral 4.10 m
Bedrock 1.00 m+

LOG

Geological Classification	Lithology	Thickness m	Depth m
Soil	Clayey silt	0.20	0.20
Brickearth	Clayey silt, light to medium yellowish brown. Race nodules common. Scattered pebbles towards base	2.20	2.40
Buried Channel Deposits	Mainly fine sand with clay and silt. Some scattered pebbles of flint. Pale yellowish orange to yellowish brown	3.00	5.40
	'Clayey' sandy gravel Medium sand with fine and coarse gravel. Gravel, composed of angular and well rounded flint, predominantly in upper 1.60 m. Sand percentage increasing with depth	4.10	9.50
London Clay	Stiff silty clay, greenish to olive black	1.00+	10.50

GRADING

Mean for Deposit				Depth below surface (m)		Bulk Samples Percentages					
	%	mm	%	From	To	Fines -1/16	+1/16-¼	Sand +¼-1	+1-4	Gravel +4-16	+16
Gravel	43	+16	17	5.4	7.0	10	2	17	6	35	30
		-16+4	26	7.0	9.2	16	7	40	10	20	7
Sand	43	-4+1	8								
		-1+¼	30								
		-¼+1/16	5								
Fines	14	-1/16	14								

87b TQ 89 SE/55 -
586570 190460

BOREHOLE LOG

E.G.U. REF. TQ8690 001 FIELD STAFF REF. TQ89SE 55 .

NATIONAL GRID REF. 586570 190460

SURFACE LEVEL 11.30 M. OD.

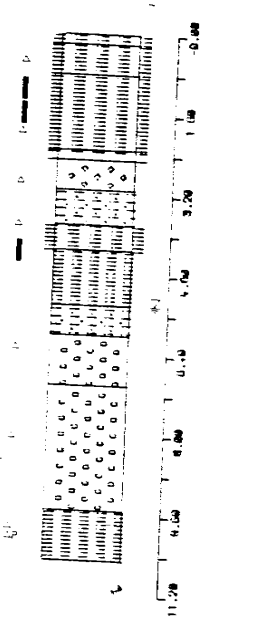
DRILLED BY M&C FRENCH

DRILL TYPE SHELL&AUGER DATE COMPLETED 11 JAN 1973

RECORDED BY R.ELLISON

FIRST WATER DEPTH 5.40M. REST WATER DEPTH M.

STRATIGRAPHY	DESCRIPTION	THICKNESS	DEPTH	O.D.L.
TOPSOIL	CLAYEY, SILT.	0.20	0.20	11.10
BRICKEARTH	CLAYEY, SILT, SOFT, 5YR5/4 (MEDIUM BROWN), CONTAINING SCATTERED CARBONACEOUS MATERIAL	2.60	0.80	10.50
	CLAYEY, SILT, FIRM, 5YR5/4 (MEDIUM BROWN) GRADING 10YR6/4 (MEDIUM YELLOW BROWN),CONTAINING RACE, SCATTERED CARBONACEOUS MATERIAL FISSURING, MODERATE, SMOOTH, PLANAR.	1.50	2.30	9.00
	CLAYEY, SANDY, SILT, WITH SOME FINE GRAVEL, 12YR5/4 (MODERATE YELLOW BROWN) CONTAINING RACE.	0.20	2.50	8.80
TERRACE DEPTS.	CLAYEY, GRAVELLY(FINE,MED AND CS), COARSE SAND.	0.62	3.12	8.20
	CLAYEY, FINE SAND, SOFT, 10YR6/5 (MEDIUM YELLOW BROWN) MOTTLED 587/1 (LIGHT BLUISH GRAY),CONTAINING FLINT.	0.70	3.80	7.52
	SANDY, CLAYEY, SILT, WITH SOME GRAVEL, FIRM, 5YR5/6 (LIGHT BROWN), 10YR6/5 (MEDIUM YELLOW BROWN), WITH SUBSIDIARY CLAYEY, FINE SAND,	0.50	4.30	7.00
	SILTY, CLAY, SOFT, 5YR5/6 (LIGHT BROWN), 10YR6/2 (PALE YELLOWISH BROWN), WITH SUBSIDIARY CLAYEY, FINE SAND.	1.12	5.42	5.90
	GRAVELLY(FINE AND MED), CLAYEY, FINE SAND, CONTAINING FLINT.	0.62	6.20	5.32
	SANDY(MED AND CS), FINE&MEDIUM GRAVEL, CONTAINING TERTIARY REWORKED FLINT, ROUNDED TERTIARY FLINT	1.20	7.20	4.30
	SANDY(MED AND CS), FINE&MEDIUM GRAVEL.	2.50	9.50	1.80
LONDON CLAY	SILTY, CLAY, STIFF, 5Y2/1 (OLIVE BLACK), 5G2/1 (GREENISH BLACK),FISSURING, HIGH.	1.22	10.50	0.60



Mr S Green

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TQ 89SE/55

Institute of Geological Sciences

Sheet 1 of 2

Borehole Reg No: TQ 89SE 55
Temp. borehole No: TQ 89SEF
Nat Grid Ref: TQ 8657 9046
Locality: ROCHFORD
Surface level: 11.3 m O.D. (36.9 ft O.D.)
Drilled by: FRENCH
Drill type: SHELL - AUGER
Hole diameter: 8"
Depth(s) bailed: 5.40 – 9.50
Date started: 10.1.73
Date finished: 11.1.73
Recorded by: R.M. ELLISON

Classification of ground	Thickness m	Nature
OVERBURDEN	5.40	clayey silts
MINERAL	4.10	MC sand + FM gravel
BEDROCK	1.00+	London clay

Remarks

Explanation: ▽ Groundwater depth first encountered; a▼ Morning water level; p▼ Evening water level; Casing depth; Borehole depth; W Water sample; U4 sample: solid ornament shows fraction recovered; • Spot disturbed sample; } Bulk sample; S.P.T. Standard Penetration Test

Geological Classification	Description of Strata	Sampling	Sample Nos	Water level	Drilling and Casing progress
10" Soil	clayey silty soil				
	clayey silt. Soft. 5YR5/4				
	50 clayey silt. Firm 5YR5/4 scattered carbonaceous remains	50 60	89SEFD1		
	55 As above with fissuring – moderate, straight, smooth.	1.00 1.45	89SEF02		
?					
?Glacial Gravel	140 As above with race.				
	150 clayey silt. firm. 10YR4/4. common race	170 2.00	D3		
	230 clayey sandy silt. C-sand in patches. 10YR6/4. Common race. Some F gravel.				
?	250 clayey gravelly sand. mainly C sand + FMC gravel	290 3.10	D4		
	310 clayey fine sand. Soft 10YR6/5 + 5B7/1 mottling. Contains stiff nodules of fine sand and angular frags of sst – med grained + some FM flints	350 400	D5		
	360 clayey silt and clayey fine sand patches. firm. occassional sst and gravel frags. Mottled 5YR5/6 and 10YR6/5 + some 10YR8/6	4.30 4.75	U6		
	430 Patchy silty clay and clayey fine sand (5YR6/6) (10YR6/2, Soft)				
5.40		5.40		▽ 5.40	
	520 As above with up to 20% FM gravel – mainly angular flints and patina.				
	542 Mainly MC sand + MF gravel. Tertiaries + ang. flints + rounded flints 5:55:40		FB57		
	720 MC sand – FM gravel. 5:65:30	7.00			
			FB58		
		9.20			
ESTUARINE ALLUVIUM (Infilled channel deposits)	910 Silty clay. stiff. 5Y3/1 and 5G3/1. Fissuring high iron staining on fissures surfaces				

TQ 89SE /55.

Borehole Reg No: TQ 89SE 65
Temp. borehole No: TQ 89SEF

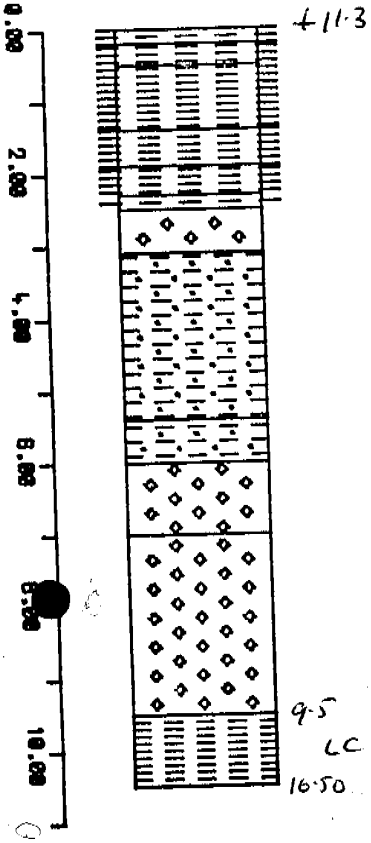
CONFIDENTIAL

Sheet 2 of 2

Geological Classification	Description of Strata	Sampling	Sample Nos	Water level	Drilling and Casing progress
(31·2') 9.5 LONDON CLAY	9.50 Silty clay. Stiff. 5·12/1 - 5G 2/1. Iron stained fissure surfaces. Bedding light. 10	D 9.70 9.90	97		
		D 9.90 10.30	P8		11.1.93
10.50	END OF BOREHOLE 10.50				

TQ 89 SE 55

TQ869 1



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