Job No. 1975 Job Title OAKAMOOR

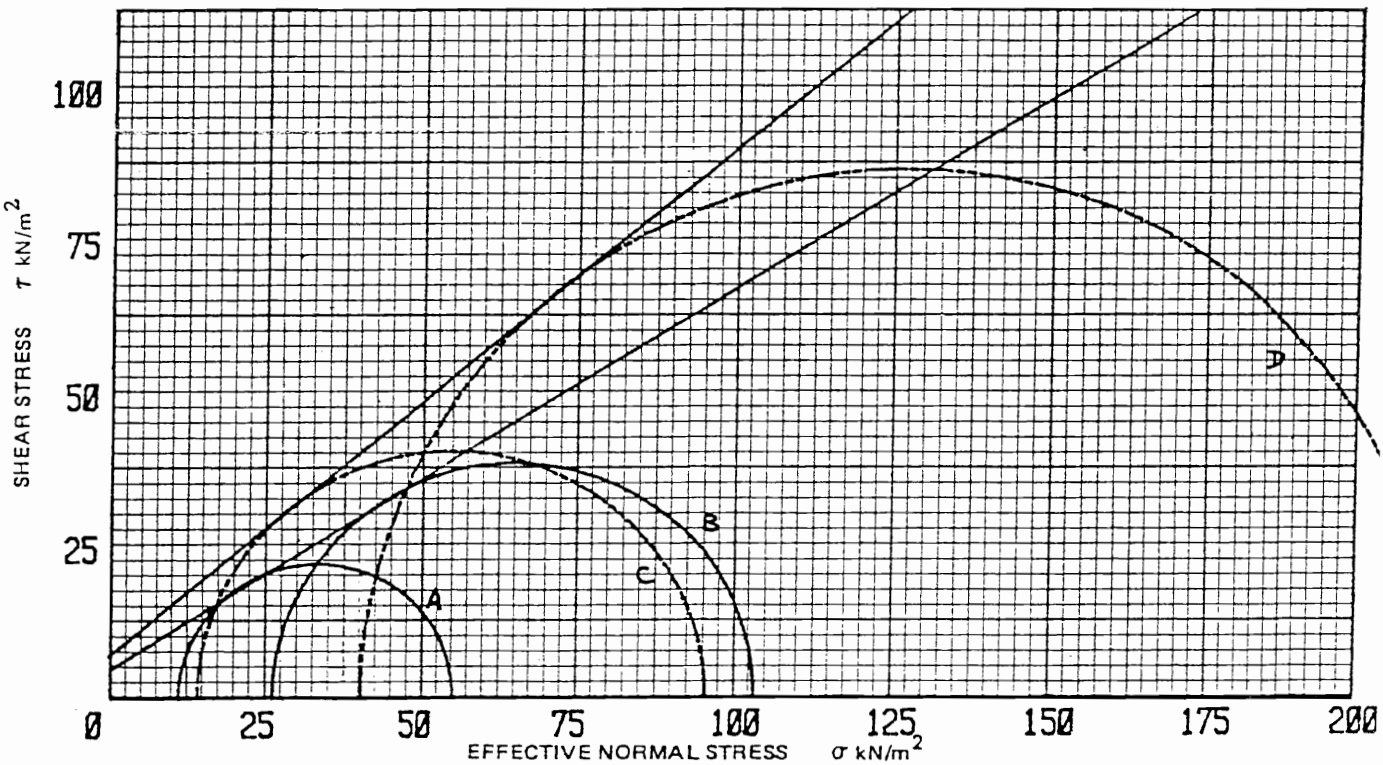
Borehole No. 002 Sample No. – Depth 0-0.90 m

Soil Description ....

Symbol	Borehole No.	Sample No.	Depth m	Soil Description	Fig. Ref.
———		A + B		.... Soft reddish brown SILT and fine SAND	28-31
– – –		C + D		.... Very soft reddish brown SILT with two	32-35
				- layers of yellow sandy silt	

SPECIMEN AND TEST DETAILS:

		A+B	C+D	
☒ 38 mm dia x 76 mm	☐ 100 mm dia x 200 mm			
☒ Undisturbed	☐ Remoulded ☐ Compacted			
☒ Presaturated by back pressure	☐ Recompacted to specified moisture content and density	ϕ' =	32	40 °
☐ Undrained	☒ Consolidated undrained with measured pore pressures	C' =	4	7 kN/m^2
☐ Consolidated drained	☐ Consolidated undrained without measured pore pressures			
☒ Peak strength	☐ Residual strength ☐ Multistage			



BINNIE & PARTNERS Geotechnical Laboratory London SW1	TRIAXIAL SHEAR TESTS MOHR CIRCLE ENVELOPE			
	Lab. Ref. No: L184	Tested by: A. M.	Date: MAR 81	Fig: 36

Form Lab. 32

Job No. 1975 Job Title OAKAMOOR

Borehole No. 002 Sample No. A Depth 8.84-9.30 m

Soil Description Soft to firm reddish brown silty medium fine SAND

SPECIMEN: ☒ Undisturbed ☐ Remoulded ☐ Compacted ☐ Recompacted as specified
☐ With filter drains ☒ Without filter drains ☐ Multistage

Diameter = 38.0 mm
Length = 76.0 mm
Drainage path d = 75.8 mm
Change in effective stress $\Delta\sigma 3'$ = 30 kN/m^2

Volumetric strain = $\Delta V/Vo$ = 1.5 %
Coefficient of volume change m_v = $\frac{\Delta V}{Vo}/\Delta\sigma 3'$ = 4.9×10^{-4} m^2

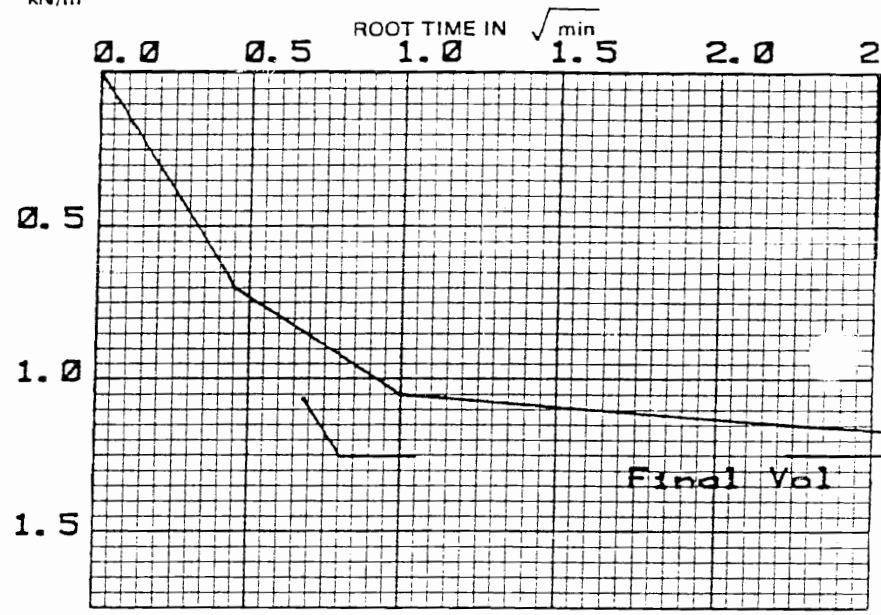
Coefficients of consolidation and permeability

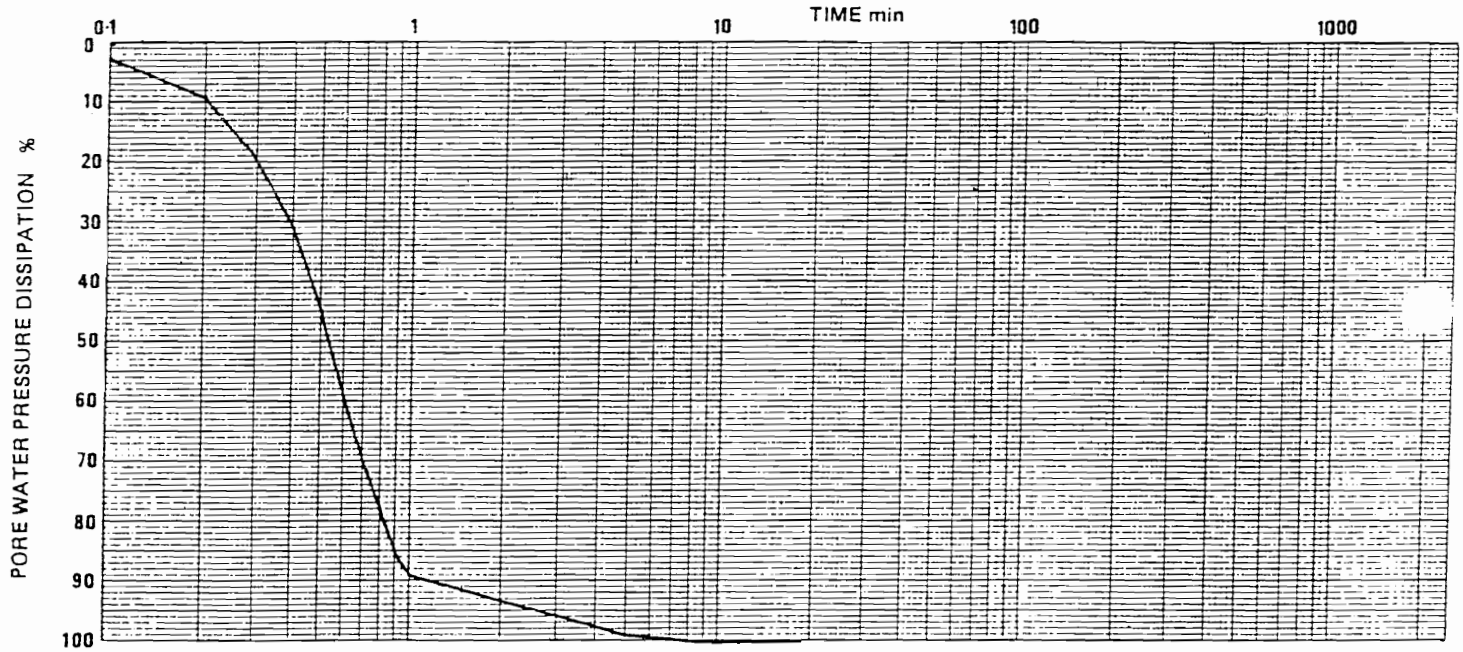
(a) Root time curve (volume)

t_{100} = 0.64 min
Cv = (0.426) d^2/t_{100}
Cv = 3800 m^2/yr
k = 3.1 m_v Cv x 10^{-7}
k = 5.8×10^{-7} m/s

(b) Log time curve (dissipation)

t_{50} = 0.54 min
Cv = (0.20) d^2/t_{50}
Cv = 2100 m^2/yr
k = 3.3×10^{-7} m/s





BINNIE & PARTNERS Geotechnical Laboratory London SW1	TRIAXIAL TEST CONSOLIDATION STAGE			
	Lab. Ref. No: L184	Tested by: A.M.	Date: MAR 81	Fig: 37

Form Lab. 27

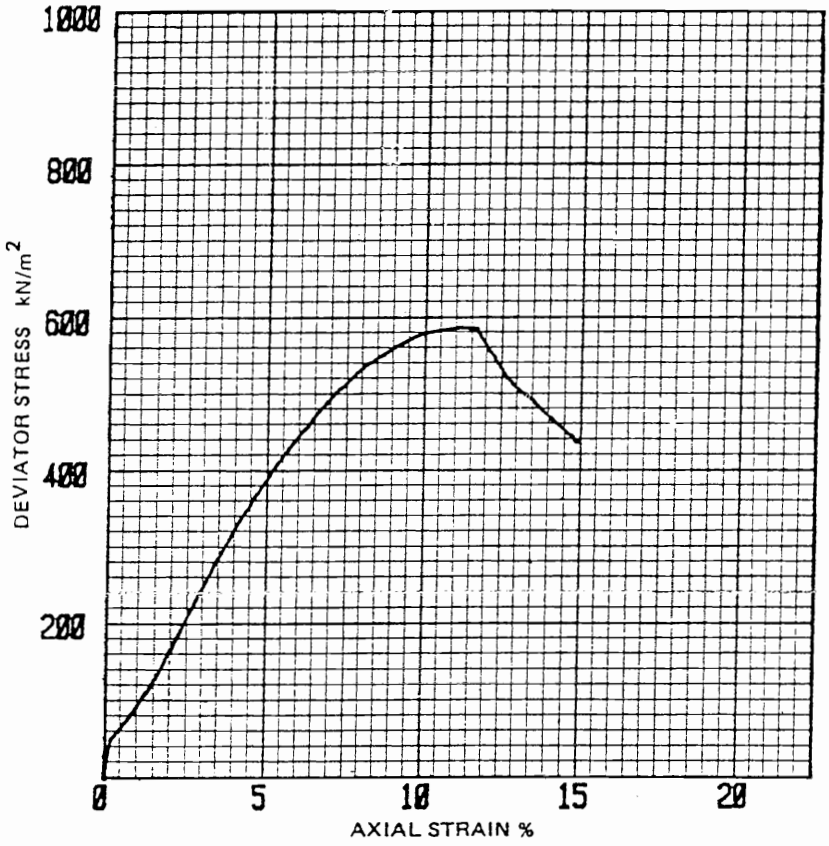
Job No. 1975 Job Title OAKAMOOR

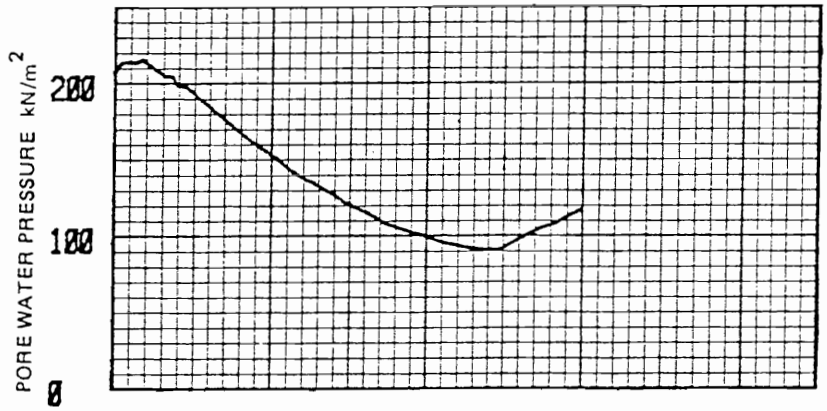
Borehole No. 002 Sample No. A Depth 8.84-9.30 m

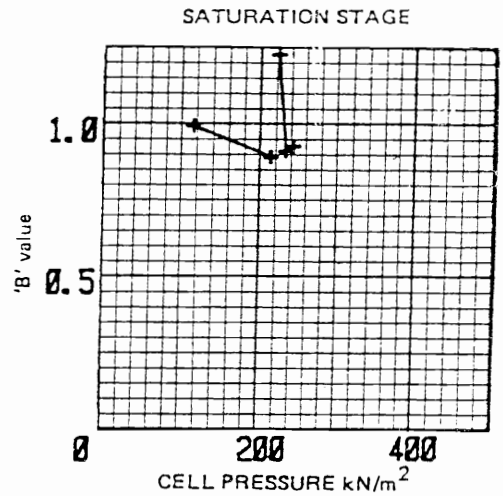
Soil Description Soft to firm reddish brown silty medium fine SAND

SPECIMEN: ☒ Undisturbed ☐ Remoulded ☐ Compacted ☐ Recompacted as specified
☒ 38 mm dia x 76 mm ☐ 100 mm dia x 200 mm ☐ Multistage

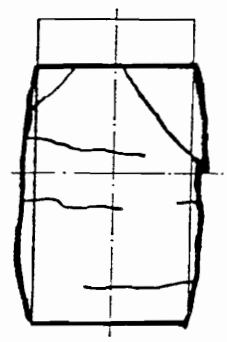
Initial moisture content	= 31 %	Cell pressure at failure	= 237 kN/m^2
Initial wet density	= 1920 kg/m^3	Pore pressure at failure	= 91 kN/m^2
Initial dry density	= 1460 kg/m^3	Effective cell pressure at failure	= 146 kN/m^2
Final mositure content	= 32 %	Rate of strain	= 3.6 %/h
Final wet density	= 1960 kg/m^3	Axial strain at failure	= 11 %
Final dry density	= 1480 kg/m^3	Membrane correction	= 3 kN/m^2
Initial cell pressure	= 237 kN/m^2	Filter drain correction	= – kN/m^2
Initial pore pressure	= 207 kN/m^2	Maximum deviator stress	= 592 kN/m^2
Initial effective cell pressure	= 30 kN/m^2	Net maximum deviator stress	= 589 kN/m^2







PRESATURATED AT BACK PRESSURE OF: 200 kN/m2



Mode after failure

BINNIE & PARTNERS Geotechnical Laboratory London SW1	CONSOLIDATED UNDRAINED TRIAXIAL SHEAR TEST			
	Lab. Ref. No: L184	Tested by: A.M.	Date: MAR 81	Fig: 38

Form Lab 30

Job No. 1973 Job Title UMMAMUUK

Borehole No. 002 Sample No. B Depth 8.84–9.30 m

Soil Description Soft to firm reddish brown silty medium fine SAND

SPECIMEN: ☒ Undisturbed ☐ Remoulded ☐ Compacted ☐ Recompacted as specified ☐ With filter drains ☒ Without filter drains ☐ Multistage

Diameter	= 38.0	mm	Volumetric strain = $\Delta V/V_o$ = 1.7 %
Length	= 76.0	mm	
Drainage path d	= 75.8	mm	Coefficient of volume change m_v = $\frac{\Delta V}{V_o}/\Delta\sigma 3'$ = 2.4×10^{-4} m
Change in effective stress $\Delta\sigma 3'$	= 72	kN/m^2	

Coefficients of consolidation and permeability

(a) Root time curve (volume)

t_{100} = 1.2 min

Cv = (0.426) d^2/t_{100}

Cv = 2000 m^2/yr

k = 3.1 m_v Cv x 10^{-7}

k = 1.5×10^{-7} m/s

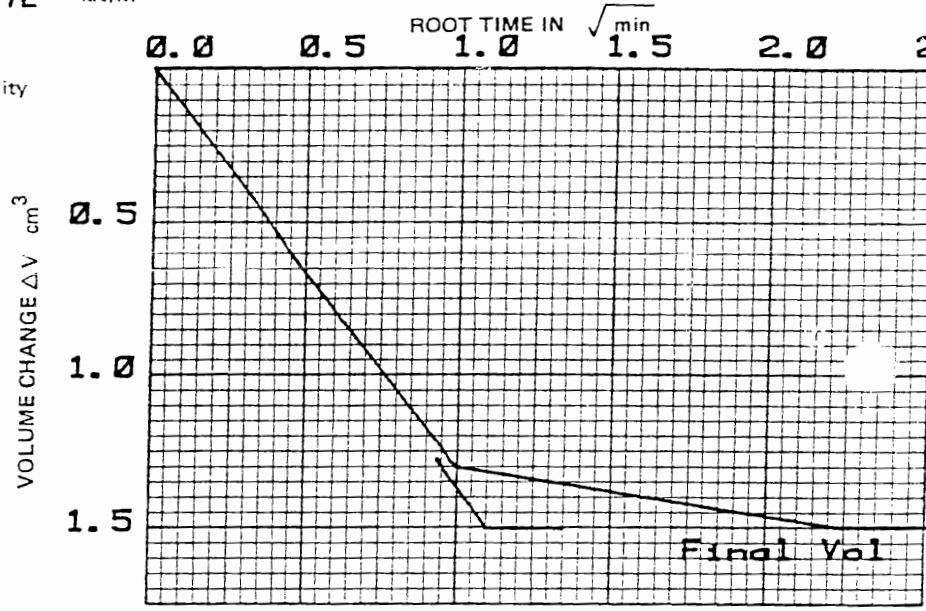
(b) Log time curve (dissipation)

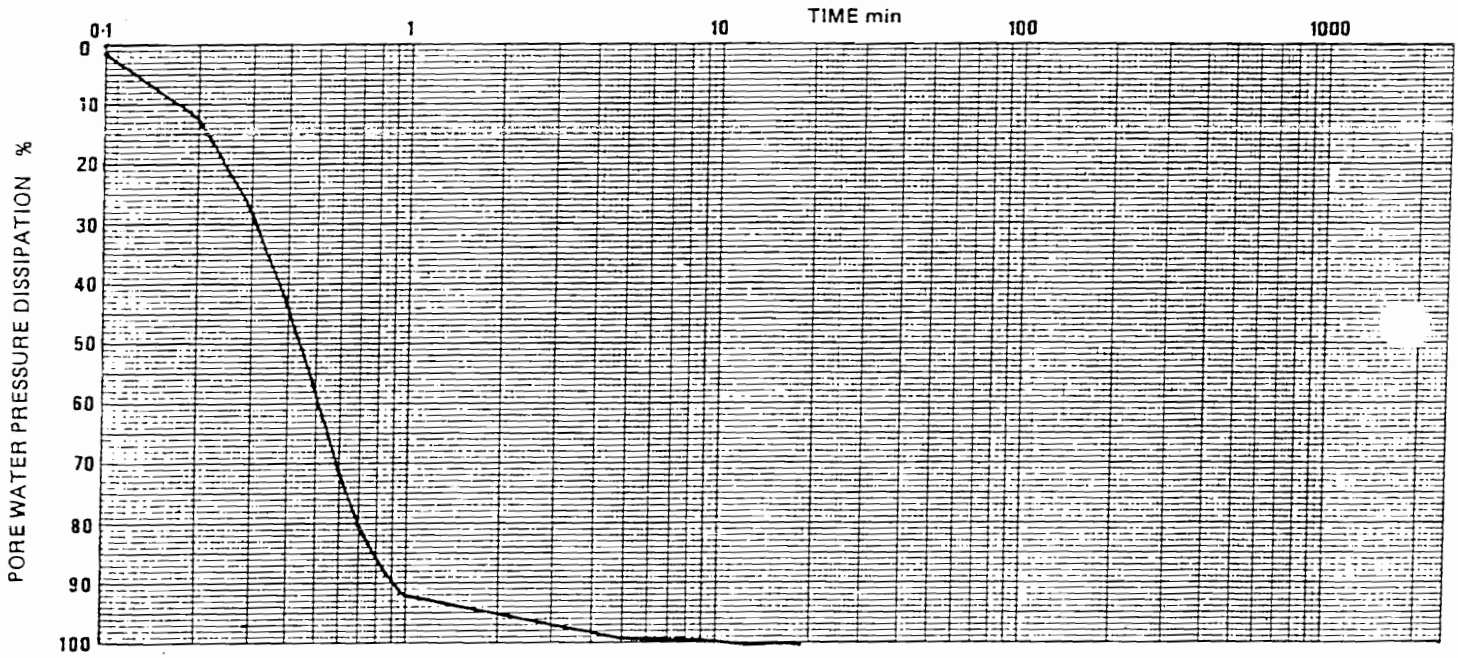
t_{50} = 0.44 min

Cv = (0.20) d^2/t_{50}

Cv = 2600 m^2/yr

k = 1.9×10^{-7} m/s





BINNIE & PARTNERS Geotechnical Laboratory London SW1	TRIAXIAL TEST CONSOLIDATION STAGE			
	Lab. Ref. No:	Tested by:	Date:	Fig:
	L184	A.M.	MAR 81	39

Form Lab. 27

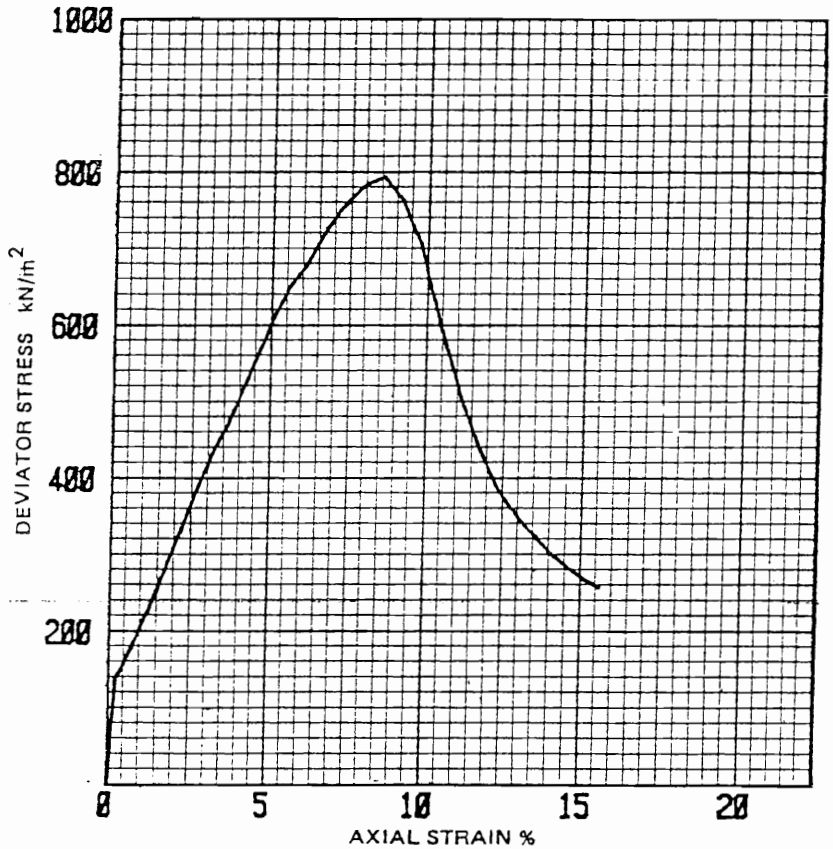
Job No. 1975 Job Title OAKAMOOR

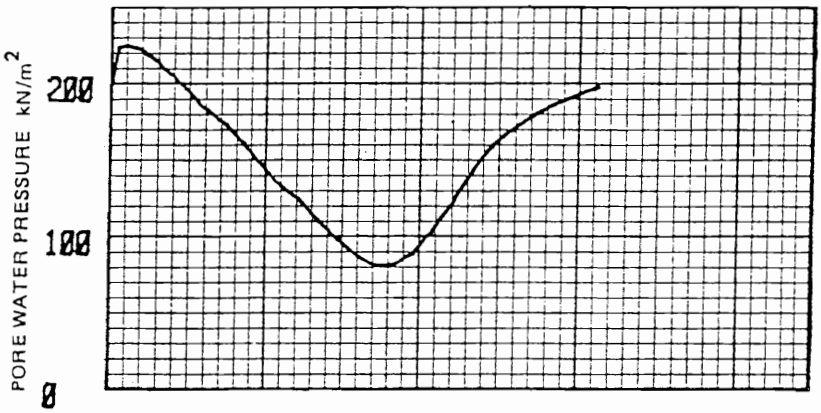
Borehole No. 002 Sample No. B Depth 8.84-9.30 m

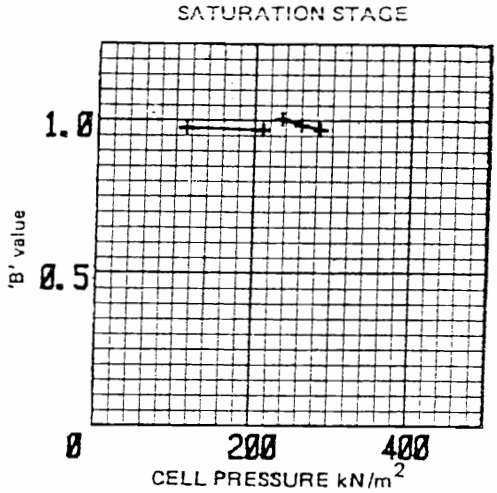
Soil Description Soft to firm reddish brown silty medium fine SAND

SPECIMEN: ☒ Undisturbed ☐ Remoulded ☐ Compacted ☐ Recompacted as specified
☒ 38 mm dia x 76 mm ☐ 100 mm dia x 200 mm ☐ Multistage

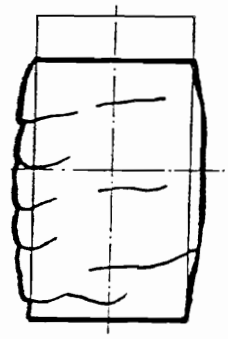
Initial moisture content	= 30 %	Cell pressure at failure	= 280 kN/m^2
Initial wet density	= 1940 kg/m^3	Pore pressure at failure	= 81 kN/m^2
Initial dry density	= 1500 kg/m^3	Effective cell pressure at failure	= 199 kN/m^2
Final mositure content	= 30 %	Rate of strain	= 3.7 %/h
Final wet density	= 1980 kg/m^3	Axial strain at failure	= 8.5 %
Final dry density	= 1520 kg/m^3	Membrane correction	= 2 kN/m^2
Initial cell pressure	= 280 kN/m^2	Filter drain correction	= - kN/m^2
Initial pore pressure	= 200 kN/m^2	Maximum deviator stress	= 796 kN/m^2
Initial effective cell pressure	= 80 kN/m^2	Net maximum deviator stress	= 794 kN/m^2







PRESATURATED AT BACK PRESSURE OF: 200 kN/m2



Mode after failure

BINNIE & PARTNERS Geotechnical Laboratory London SW1	CONSOLIDATED UNDRAINED TRIAXIAL SHEAR TEST			
	Lab. Ref. No: L184	Tested by: A.M.	Date: MAR 81	Fig: 40

Form Lab 30

Job No. 1975 Job Title OAKAMOOR

Borehole No. 002 Sample No. C Depth 8.84-9.30 m

Soil Description Soft to firm reddish brown SILT and fine SAND

SPECIMEN: ☒ Undisturbed ☐ Remoulded ☐ Compacted ☐ Recompacted as specified
☐ With filter drains ☒ Without filter drains ☐ Multistage

Diameter	= 38.0	mm	Volumetric strain = $\Delta V/V_o$ = 26.5 %
Length	= 76.0	mm	Coefficient of volume change m_v = $\frac{\Delta V}{V_o}/\Delta\sigma 3'$ = 2.2×10^{-3} $m^2/$
Drainage path d	= 72.6	mm	
Change in effective stress $\Delta\sigma 3'$	= 119	kN/m^2	

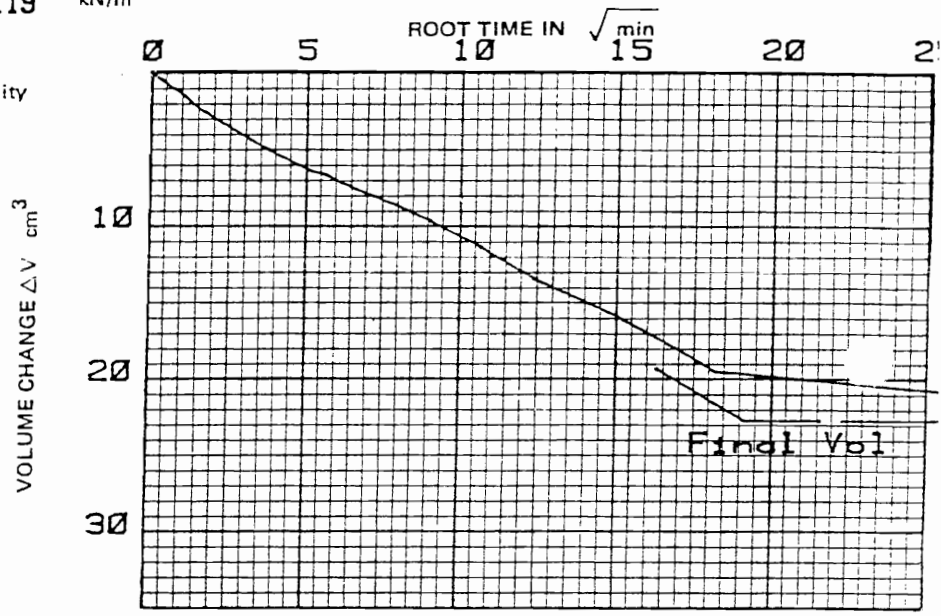
Coefficients of consolidation and permeability

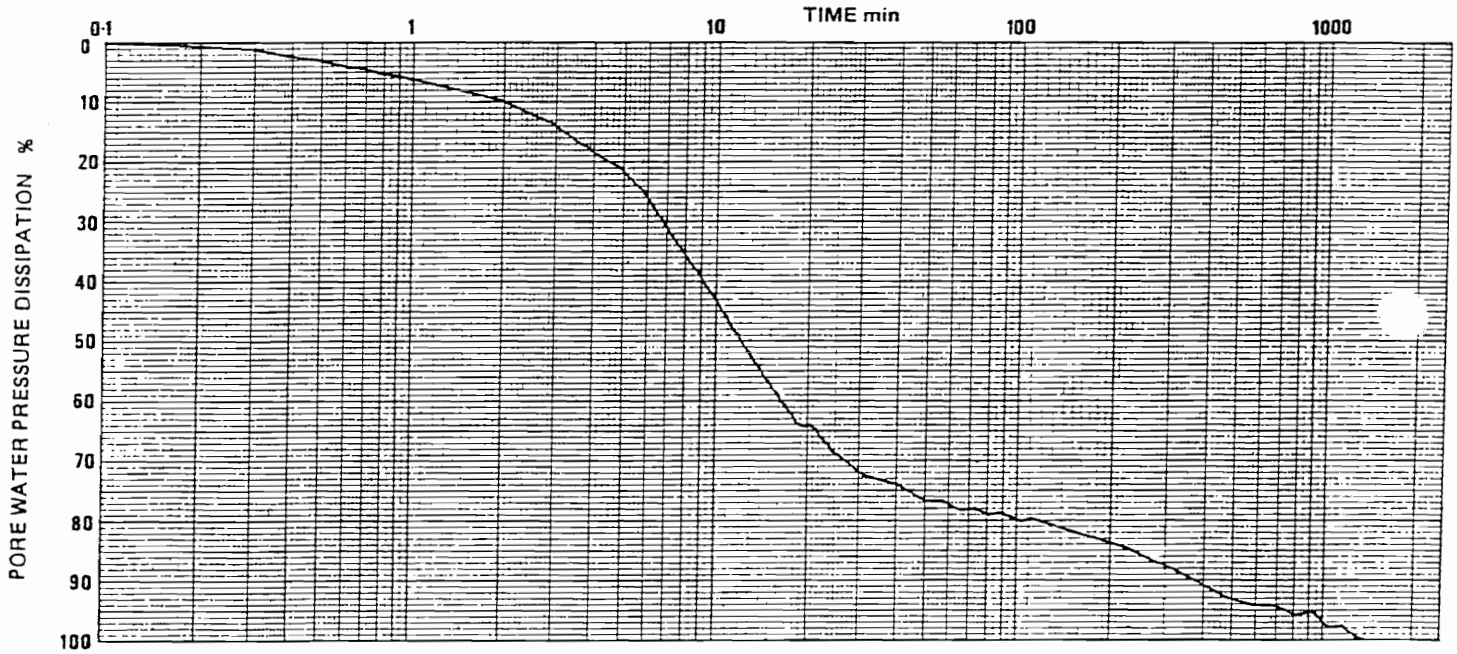
(a) Root time curve (volume)

t_{100}	= 370	min
Cv	= (0.426) d^2/t_{100}	
Cv	= 6.1	m^2/yr
k	= 3.1 m_v Cv x 10^{-7}	
k	= 4.2×10^{-9}	m/s

(b) Log time curve (dissipation)

t_{50}	= 12	min
Cv	= (0.20) d^2/t_{50}	
Cv	= 85	m^2/yr
k	= 5.9×10^{-8}	m/s





BINNIE & PARTNERS Geotechnical Laboratory London SW1	TRIAXIAL TEST CONSOLIDATION STAGE			
	Lab. Ref. No: L184	Tested by: A.M.	Date: MAR 81	Fig: 41

Form Lab. 27

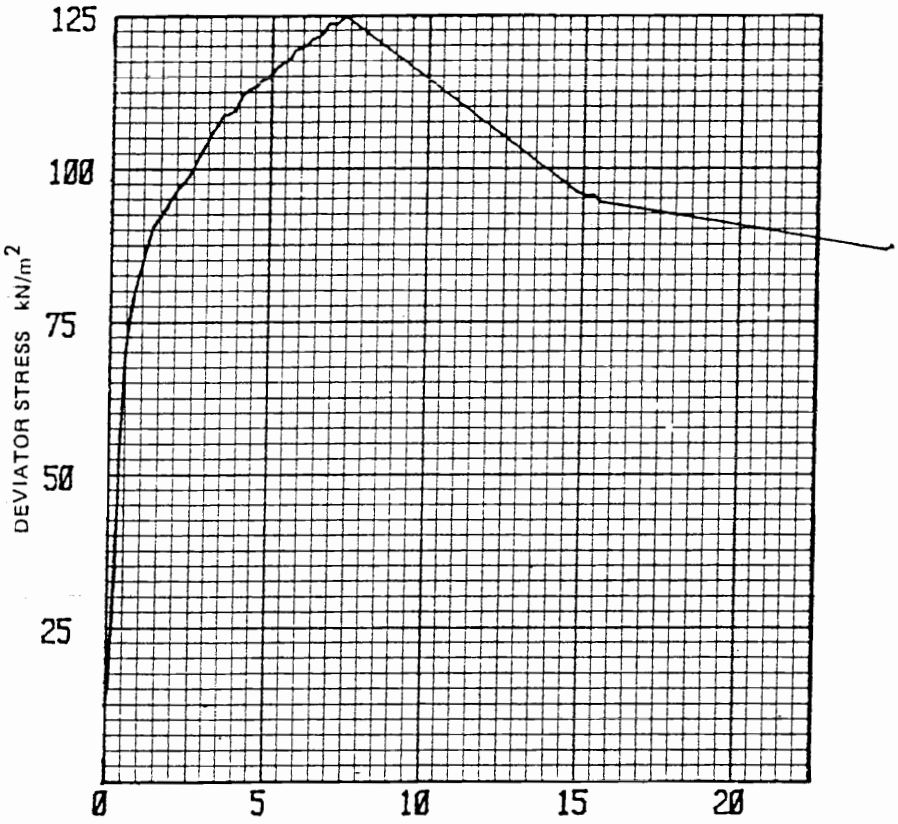
Job No. 1975 Job Title OAKAMOOR

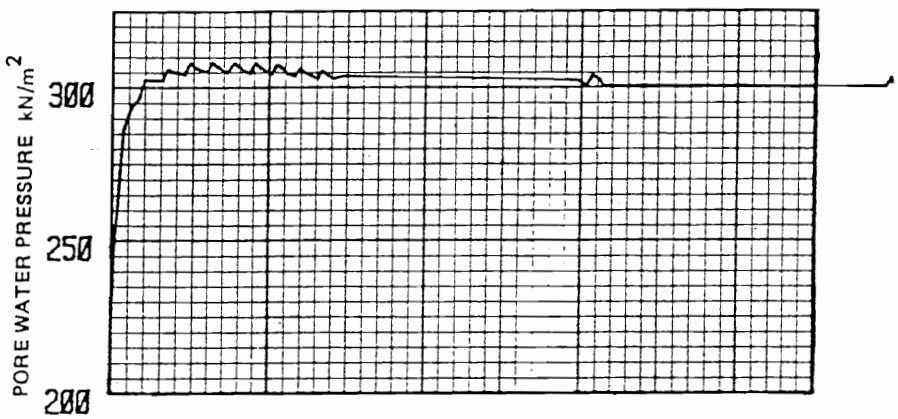
Borehole No. 002 Sample No. C Depth 8.84-9.30 m

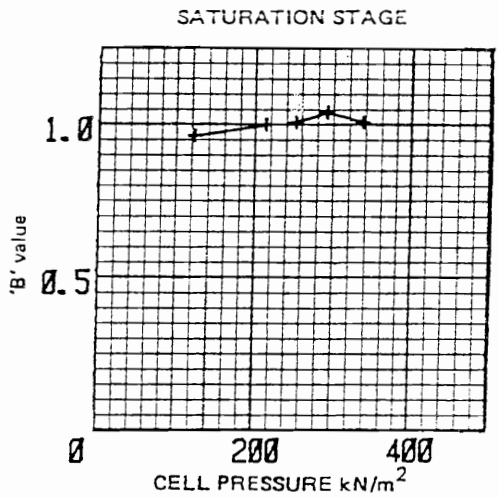
Soil Description Soft to firm reddish brown SILT and fine SAND

SPECIMEN: ☒ Undisturbed ☐ Remoulded ☐ Compacted ☐ Recompacted as specified
☒ 38 mm dia x 76 mm ☐ 100 mm dia x 200 mm ☐ Multistage

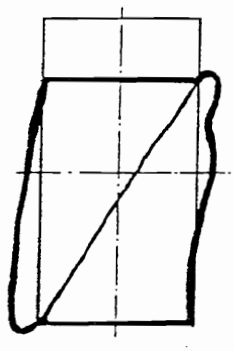
Initial moisture content	= 51 %	Cell pressure at failure	= 332 kN/m^2
Initial wet density	= 1690 kg/m^3	Pore pressure at failure	= 304 kN/m^2
Initial dry density	= 1120 kg/m^3	Effective cell pressure at failure	= 28 kN/m^2
Final mositure content	= 45 %	Rate of strain	= 0.5 %/h
Final wet density	= 2170 kg/m^3	Axial strain at failure	= 7.4 %
Final dry density	= 1490 kg/m^3	Membrane correction	= 2 kN/m^2
Initial cell pressure	= 332 kN/m^2	Filter drain correction	= – kN/m^2
Initial pore pressure	= 215 kN/m^2	Maximum deviator stress	= 125 kN/m^2
Initial effective cell pressure	= 117 kN/m^2	Net maximum deviator stress	= 123 kN/m^2







PRESATURATED AT BACK PRESSURE OF: 200 kN/m2



Mode after failure

BINNIE & PARTNERS Geotechnical Laboratory London SW1	CONSOLIDATED UNDRAINED TRIAXIAL SHEAR TEST			
	Lab. Ref. No: L184	Tested by: A.M.	Date: MAR 81	Fig: 42

Job No. 1975 Job Title OAKAMOOR

Borehole No. 002 Sample No. D Depth 8.84-9.30 m

Soil Description Soft to firm reddish brown SILT and fine SAND

SPECIMEN: ☒ Undisturbed ☐ Remoulded ☐ Compacted ☐ Recompacted as specified
☐ With filter drains ☒ Without filter drains ☐ Multistage

Diameter = 38.0 mm
Length = 76.0 mm
Drainage path d = 72.5 mm
Change in effective stress $\Delta\sigma 3'$ = 188 kN/m^2

Volumetric strain = $\Delta V/V_o$ = 27.6 %
Coefficient of volume change m_v = $\frac{\Delta V}{V_o}/\Delta\sigma 3'$ = 1.5×10^{-3} m^2

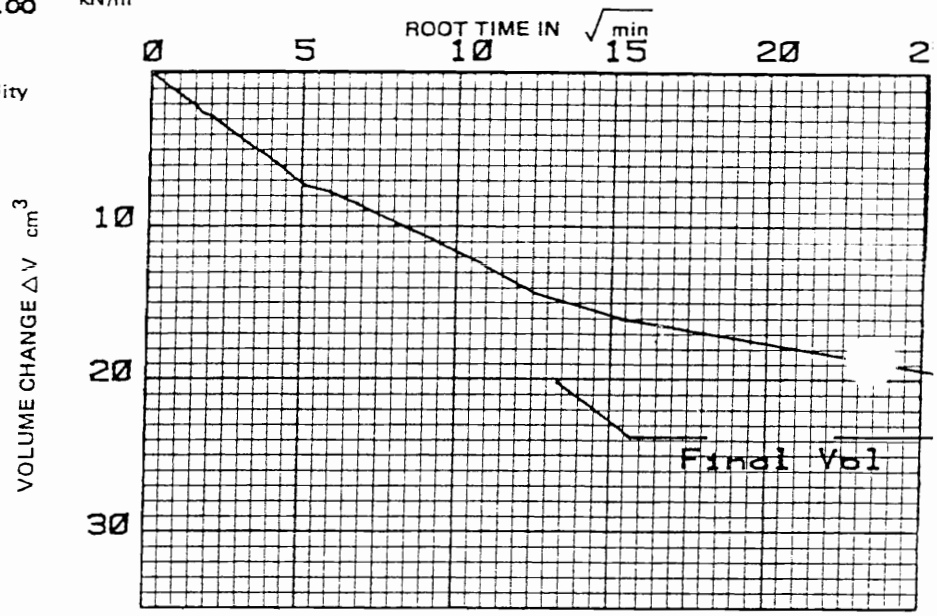
Coefficients of consolidation and permeability

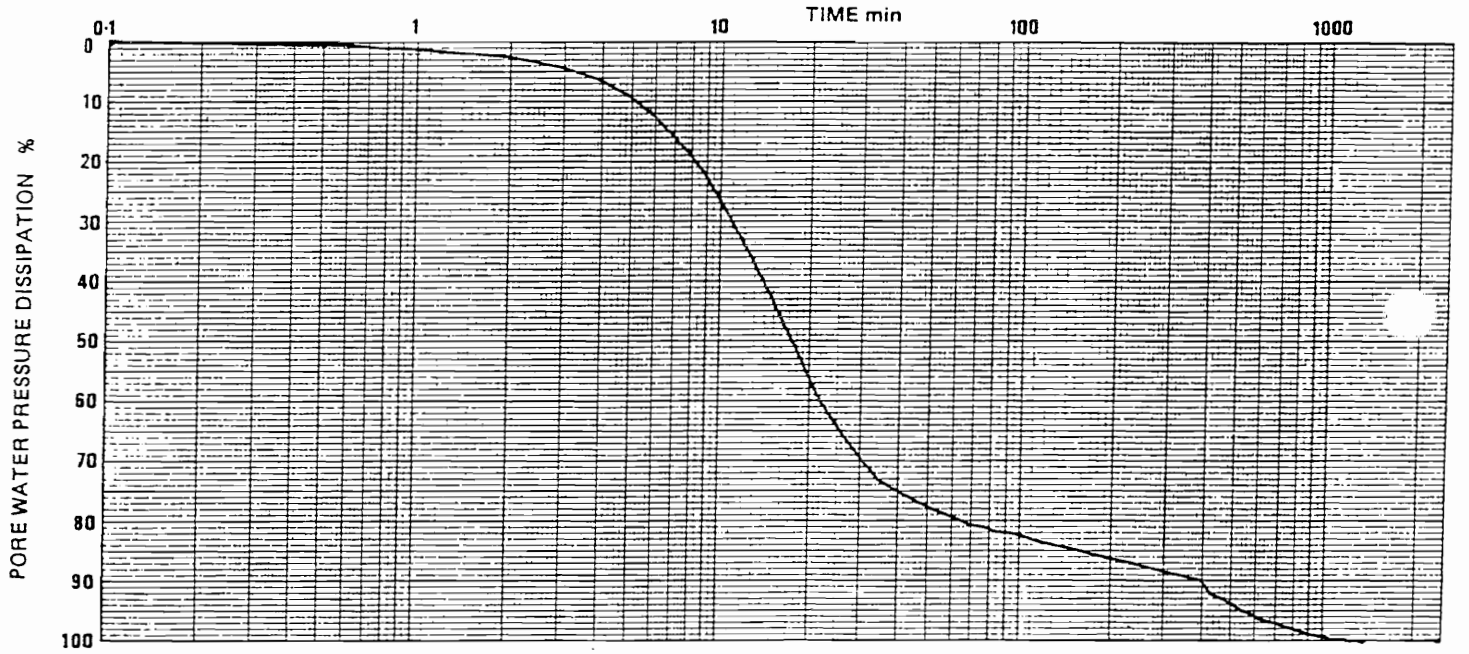
(a) Root time curve (volume)

t_{100} = 250 min
Cv = (0.426) d^2/t_{100}
Cv = 9.0 m^2/yr
k = $3.1 m_v$ Cv x 10^{-7}
k = 4.1×10^{-9} m/s

(b) Log time curve (dissipation)

t_{50} = 18 min
Cv = (0.20) d^2/t_{50}
Cv = 59 m^2/yr
k = 2.7×10^{-8} m/s





BINNIE & PARTNERS Geotechnical Laboratory London SW1	TRIAXIAL TEST CONSOLIDATION STAGE			
	Lab. Ref. No:	Tested by:	Data:	Fig:
	L184	A.M.	MAR 81	43

Form Lab. 27

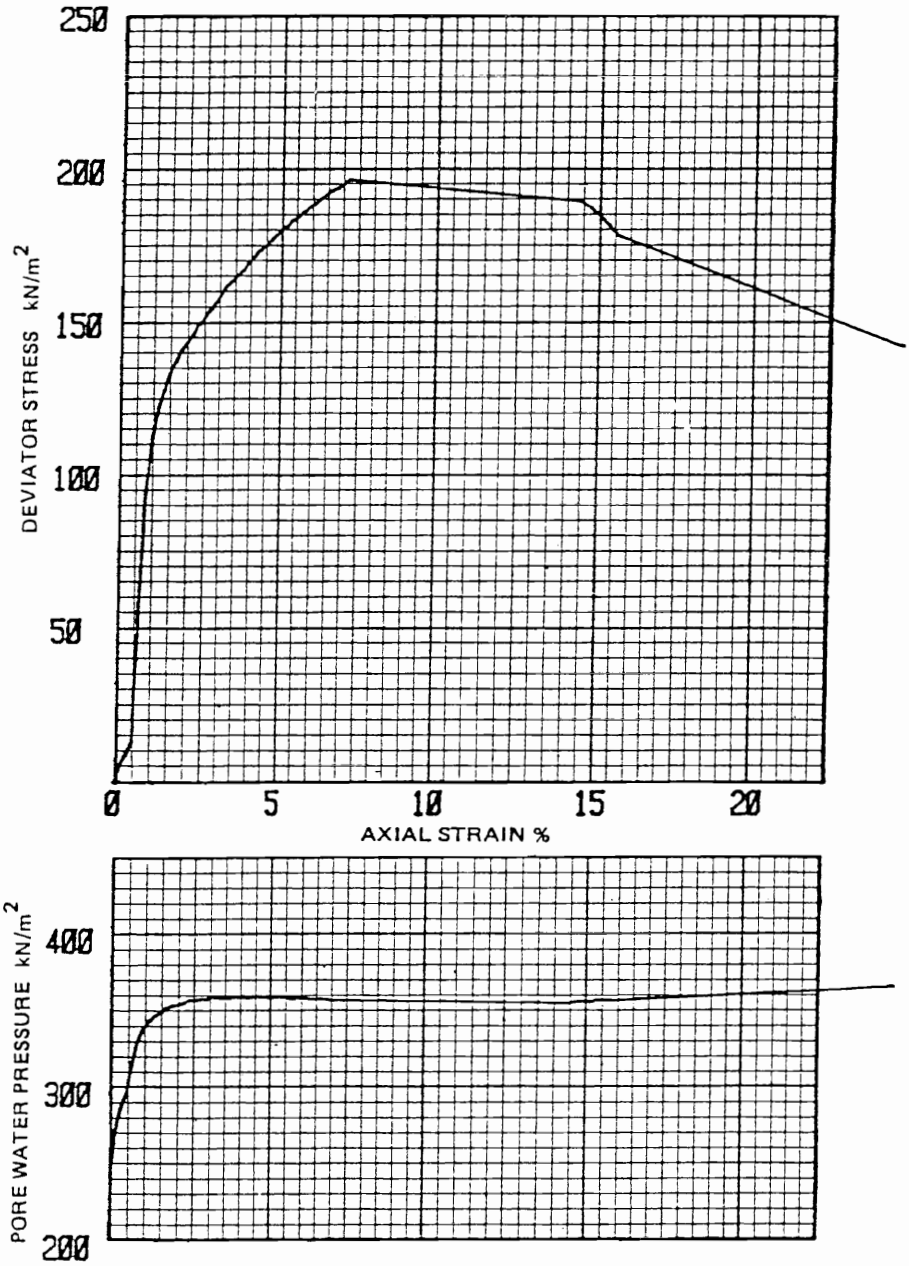
Job No. 1975 Job Title OAKAMOOR

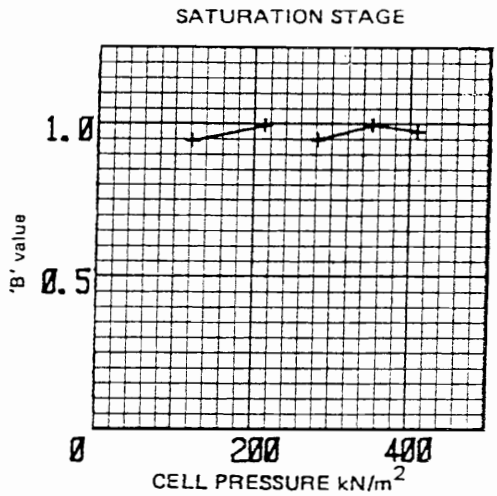
Borehole No. 002 Sample No. D Depth 8.84-9.30 m

Soil Description Soft to firm reddish brown SILT and fine SAND

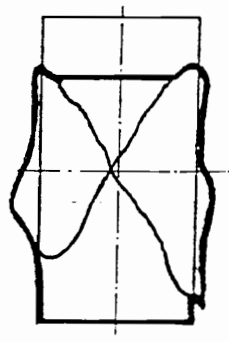
SPECIMEN: ☒ Undisturbed ☐ Remoulded ☐ Compacted ☐ Recompacted as specified
☒ 38 mm dia x 76 mm ☐ 100 mm dia x 200 mm ☐ Multistage

Initial moisture content	= 44 %	Cell pressure at failure	= 405 kN/m^2
Initial wet density	= 1800 kg/m^3	Pore pressure at failure	= 358 kN/m^2
Initial dry density	= 1250 kg/m^3	Effective cell pressure at failure	= 47 kN/m^2
Final mositure content	= 40 %	Rate of strain	= 0.5 %/h
Final wet density	= 2350 kg/m^3	Axial strain at failure	= 7.2 %
Final dry density	= 1680 kg/m^3	Membrane correction	= 2 kN/m^2
Initial cell pressure	= 405 kN/m^2	Filter drain correction	= - kN/m^2
Initial pore pressure	= 211 kN/m^2	Maximum deviator stress	= 197 kN/m^2
Initial effective cell pressure	= 194 kN/m^2	Net maximum deviator stress	= 195 kN/m^2





PRESATURATED AT BACK PRESSURE OF: 200 kN/m2



Mode after failure

BINNIE & PARTNERS Geotechnical Laboratory London SW1	CONSOLIDATED UNDRAINED TRIAXIAL SHEAR TEST			
	Lab. Ref. No: L184	Tested by: A.M.	Date: MAR 81	Fig: 44

Job No. 1975 Job Title OAKAMOOR

Borehole No. 002 Sample No. - Depth 8.84-9.30 m

Soil Description Soft to firm reddish brown .....

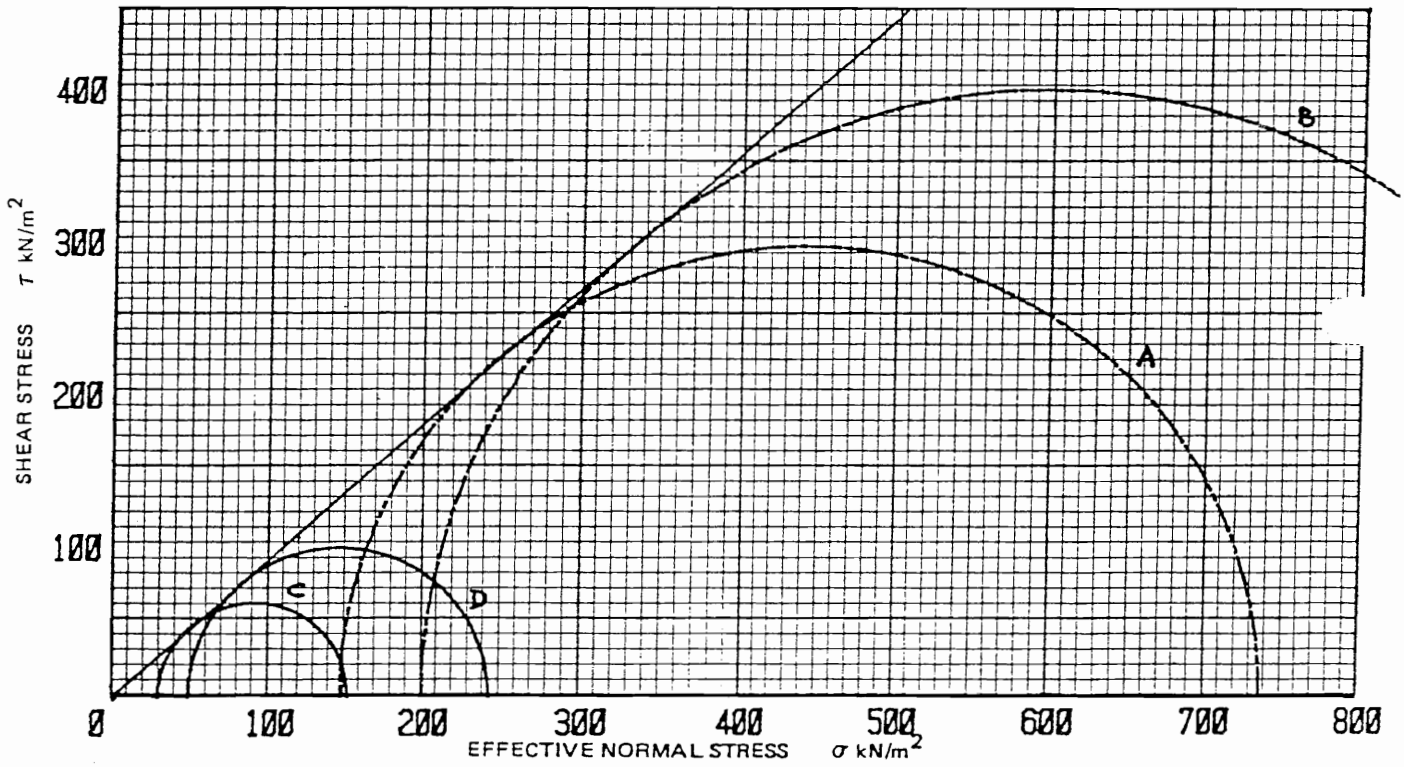
Symbol	Borehole No.	Sample No.	Depth m	Soil Description	Fig. Ref.
---—--		A + B		..... silty medium fine SAND	37-40
———		C + D		..... SILT and fine SAND	41-44

SPECIMEN AND TEST DETAILS:

- ☒ 38 mm dia x 76 mm ☐ 100 mm dia x 200 mm
- ☒ Undisturbed ☐ Remoulded ☐ Compacted
- ☒ Presaturated by back pressure ☐ Recompacted to specified moisture content and density
- ☐ Undrained ☒ Consolidated undrained with measured pore pressures
- ☐ Consolidated drained ☐ Consolidated undrained without measured pore pressures
- ☒ Peak strength ☐ Residual strength ☐ Multistage

$\phi' =$ 42 °

$C' =$ 0 kN/m^2



BINNIE & PARTNERS Geotechnical Laboratory London SW1	TRIAXIAL SHEAR TESTS MOHR CIRCLE ENVELOPE			
	Lab. Ref. No: L184	Tested by: A.M.	Date: MAR 81	Fig: 45

Form Lab. 32

Job No. 1975 Job Title OAKAMOOR

Location of Sample on site

Borehole No. - Sample No. 1-A Depth 5.0 m

Soil Description Stiff dark reddish brown siltstone

SPECIMEN DETAILS:

☒ 60 mm x 60 mm x 25 mm thick ☐ 300 mm x 300 mm x 150 mm thick

☒ Undisturbed ☐ Remoulded ☐ Compacted ☐ Recompacted as specified

☒ Water around specimen ☐ Damp cloth around specimen

Change in vertical stress $\Delta\sigma_v$ = 204 kN/m²

Initial specimen height ho = 25.0 mm

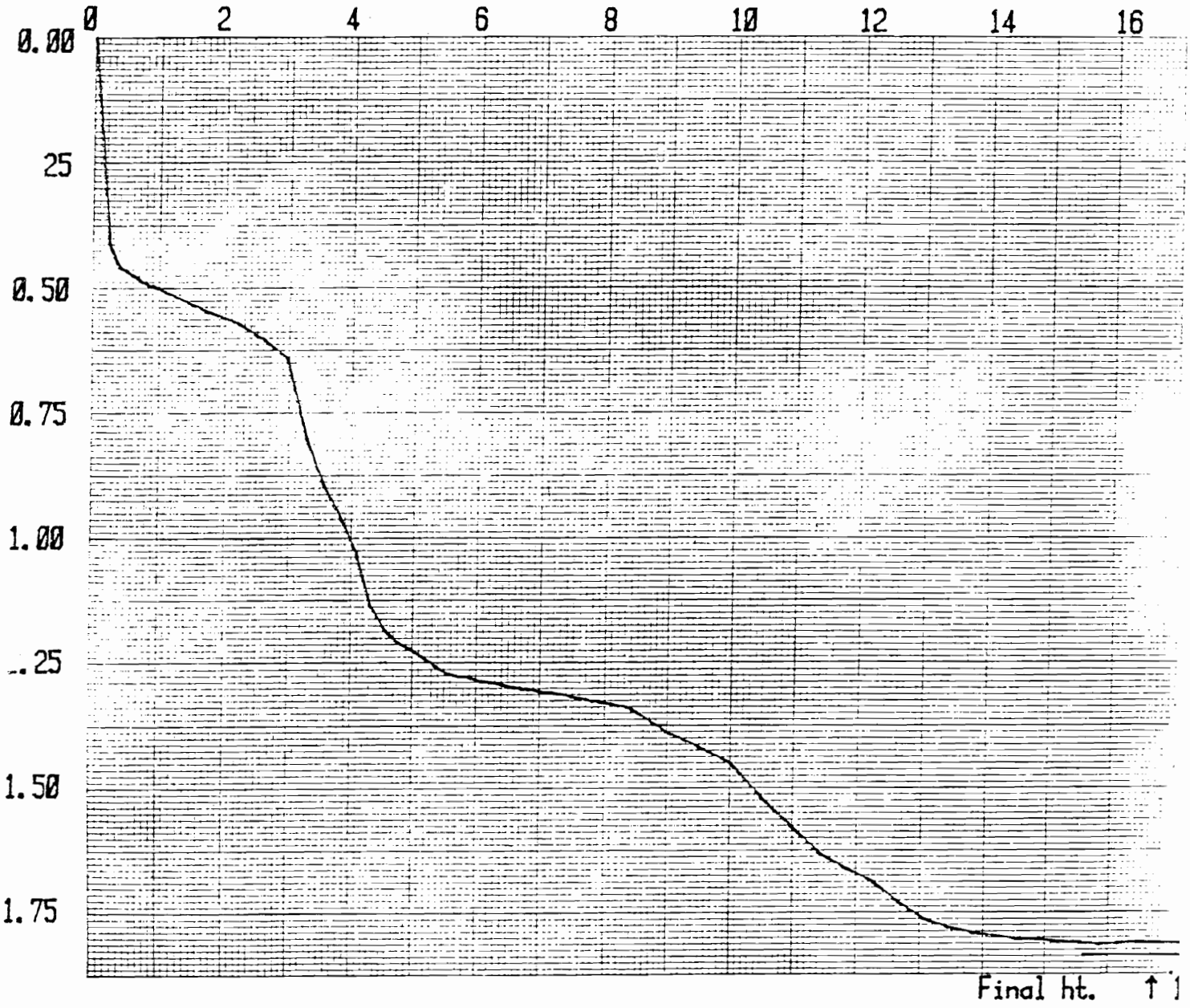
Final specimen height h_f = 23.16 mm

Drainage path d = - mm

Change in specimen height Δh = 1.84 mm

Coeff. of volume change m_v = $\frac{\Delta h}{ho} / \Delta\sigma_v$ = m²/kN

ROOT TIME in $\sqrt{min.}$



BINNIE & PARTNERS Geotechnical Laboratory London SW1	SHEAR BOX TEST (Sheet 2) (CONSOLIDATION STAGE)			
	Lab.Ref.No: L184	Tested by: A.M	Date: JUL 81	Fig 1

1975

To: A.L. Little
Alliance House

B & P
11.8.81

From: Geotechnical Laboratory
Hide Place

Job 1975: OAKAMOOR - SHEAR BOX TESTS

The results of the shear box tests carried out on three samples cut from an undisturbed block are enclosed in Figs. 1 - 10.

Moisture content of block - near to samples = 11%

(Moisture content of softer material at base of block = 21%)

The initial bulk densities of the three samples were:-

SAMPLE	BULK DENSITY
1 - A	2350 kg/m^3
1 - B	2340 kg/m^3
1 - C	2270 kg/m^3

Notes:-

(1) In the consolidation stage of sample 1 - B the top plate was observed to be caught on the top of the shear box. The sample continued consolidating after the top plate was released.

(2) In the successive shear stages of sample 1 - C it was noticed that the shear stress after the 3rd stage appeared to continue to decrease whereas samples 1 - A and 1-B had reached their residual values. After the 9th shear stage it was noticed for sample 1 - C that the loading beam was resting on a setting stop which probably occurred during the 3rd stage. For the 10th, 11th and 12th shear stages the stop was retracted so that the full normal stress was re-applied to the specimen. This brought about a further consolidation and a marked increase in residual shear stress which was similar for the 11th and 12th shear stages. This value was plotted with those of 1-A and 1-B after the 9th shear stage to give the envelope as Θ in fig. 14.

A N James

Job No. 1975 Job Title OAKAMOOR

Location of Sample on site

Borehole No. - Sample No. 1-C Depth 5.0 m

Soil Description Stiff dark reddish brown Siltstone

SPECIMEN DETAILS:

☒ 60 mm x 60 mm x 20 mm thick ☐ 300 mm x 300 mm x 150 mm thick

☒ Undisturbed ☐ Remoulded ☐ Compacted ☐ Recompacted as specified

☒ Water around specimen ☐ Damp cloth around specimen

Change in vertical stress $\Delta\sigma v$ = 817 kN/m²

Initial specimen height ho = 25.0 mm

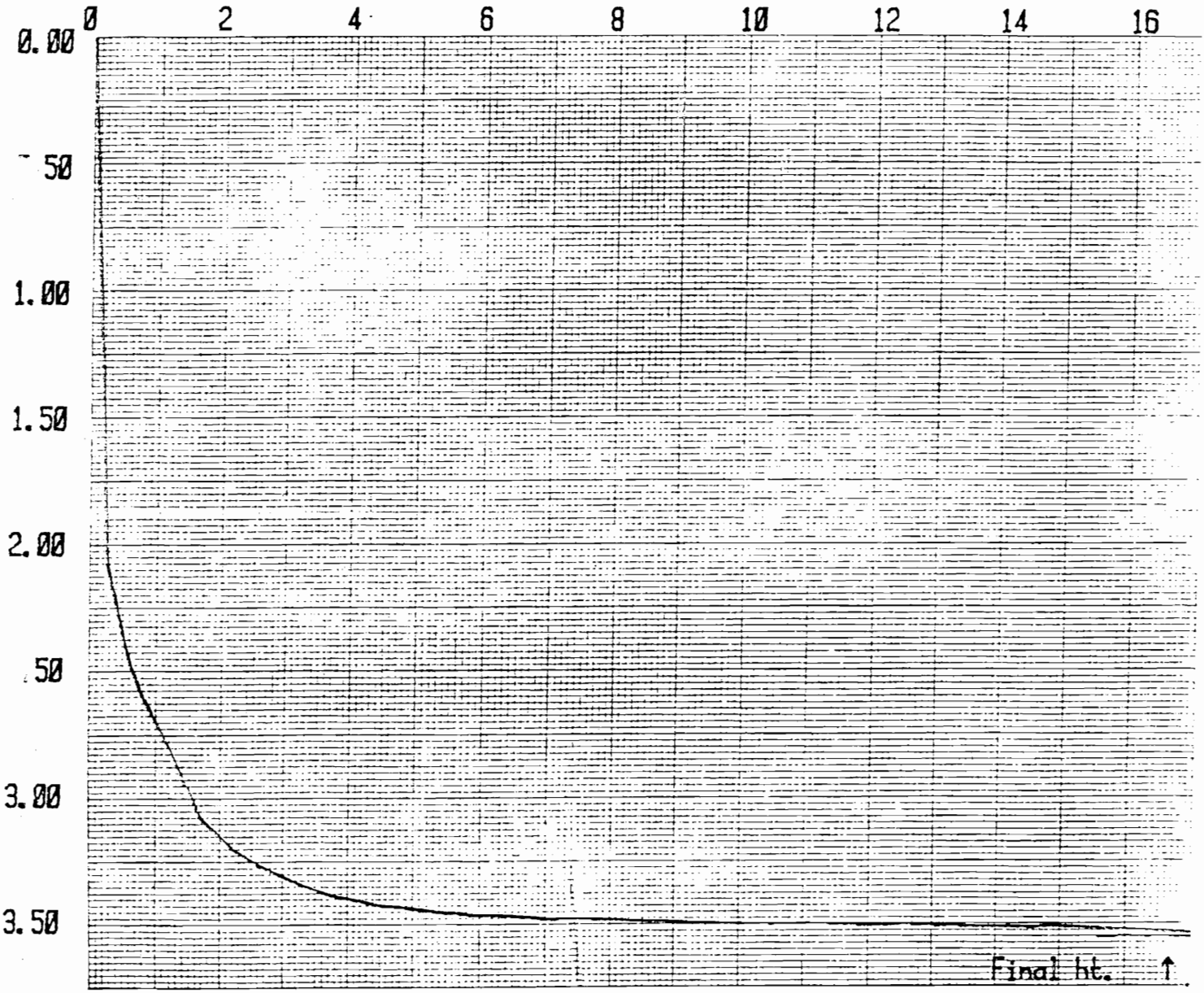
Drainage path d = - mm

Final specimen height h_f = 21.45 mm

Change in specimen height Δh = 3.55 mm

Coeff. of volume change mv = $\frac{\Delta h}{ho} / \Delta\sigma v$ = m²/kN

ROOT TIME in $\sqrt{min.}$



BINNIE & PARTNERS Geotechnical Laboratory London SW1	SHEAR BOX TEST (Sheet 2) (CONSOLIDATION STAGE)			
	Lab.Ref.No: L184	Tested by: A.M	Date: JUL 81	Fig 3

Job No. 1975 Job Title OAKAMOOR

Location of Sample on site

Borehole No. Sample No. 1-B Depth 5.0 m

Soil Description Stiff dark reddish brown siltstone

SPECIMEN DETAILS:

☒ 60 mm x 60 mm x 25 mm thick ☐ 300 mm x 300 mm x 150 mm thick

☒ Undisturbed ☐ Remoulded ☐ Compacted ☐ Recompacted as specified

☒ Water around specimen ☐ Damp cloth around specimen

Change in vertical stress $\Delta\sigma_v$ = 408 kN/m²

Initial specimen height ho = 25.0 mm

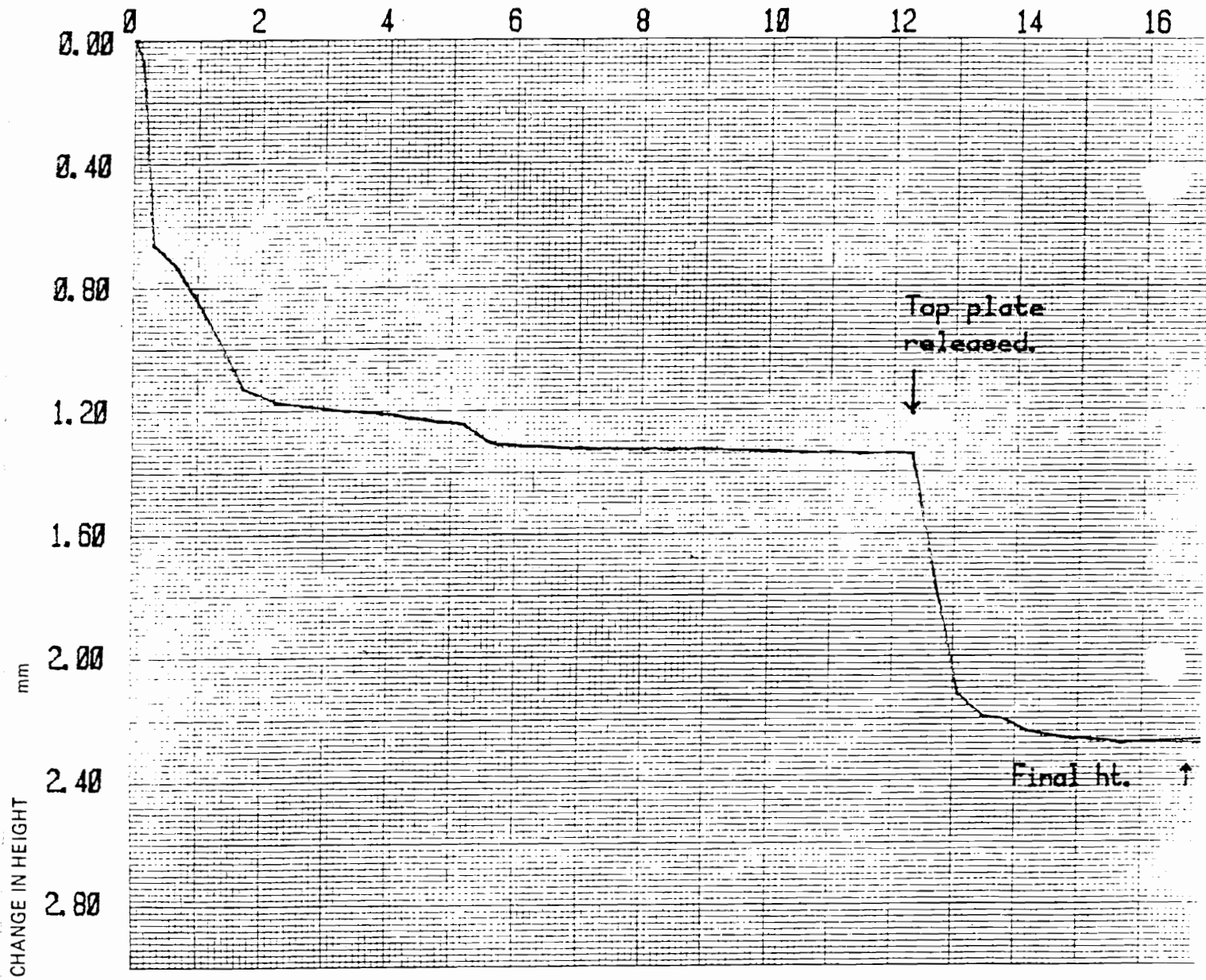
Drainage path d = — mm

Final specimen height h_f = 22.72 mm

Change in specimen height Δh = 2.28 mm

Coeff. of volume change $m_v = \frac{\Delta h}{ho} / \Delta\sigma_v$ = m²/kN

ROOT TIME in $\sqrt{min.}$



BINNIE & PARTNERS Geotechnical Laboratory London SW1	SHEAR BOX TEST (Sheet 2) (CONSOLIDATION STAGE)			
	Lab. Ref. No: L184	Tested by: A. M	Date: JUL 81	Fig: 2

Form G18

Location of Sample on site .....

Borehole No. ..... Sample No. 1-8 Depth 5.0 m

Soil Description Stiff dark reddish brown siltstone

SPECIMEN DETAILS:

☒ 60 mm x 60 mm x 25 mm thick ☐ 300 mm x 300 mm x 150 mm thick

☒ Undisturbed ☐ Remoulded ☐ Compacted ☐ Recompacted as specified

☒ Water around specimen ☐ Damp cloth around specimen

Change in vertical stress $\Delta\sigma_v$ = 408 kN/m²

Initial specimen height ho = 25.0 mm

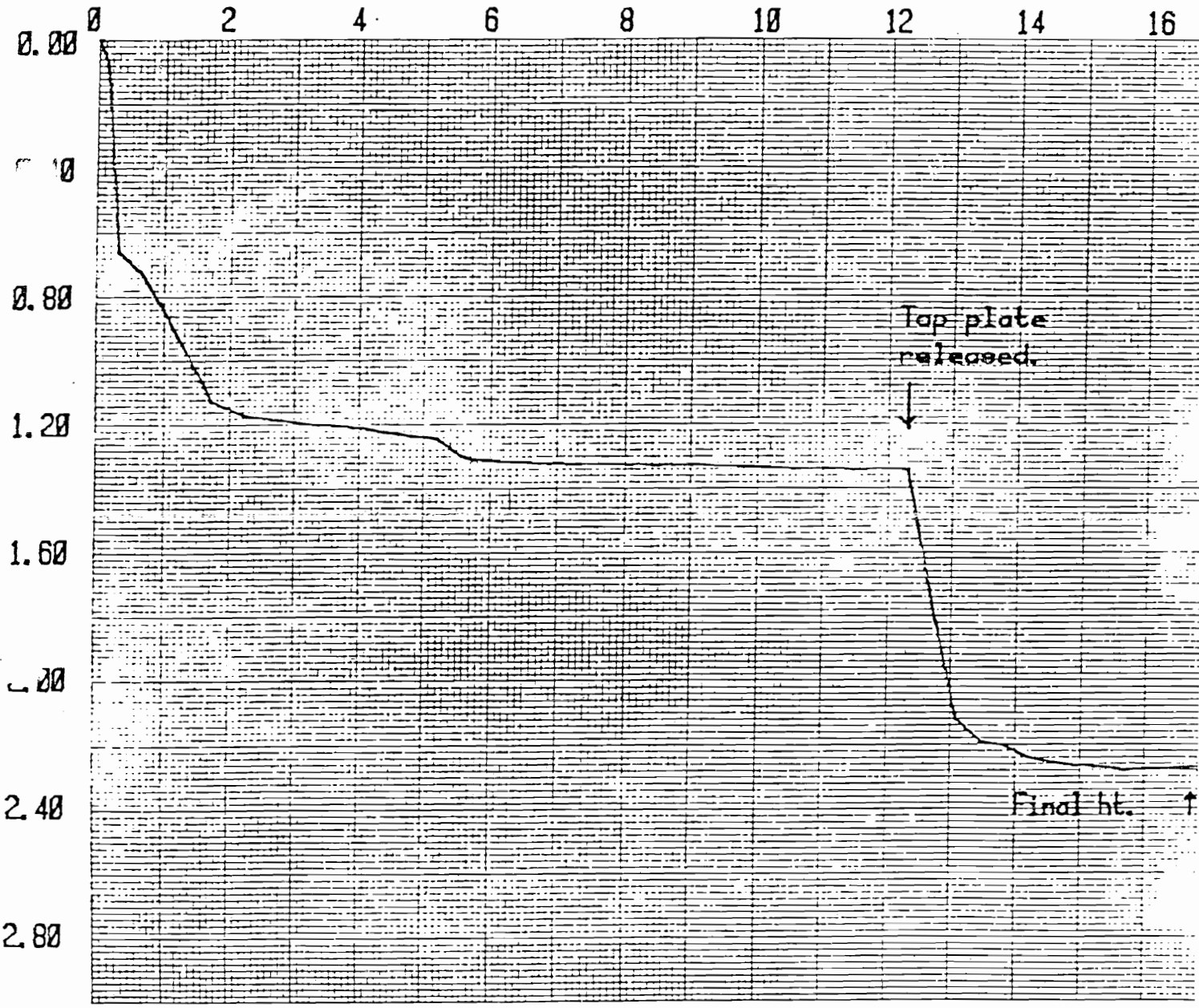
Drainage path d = — mm

Final specimen height h_f = 22.72 mm

Change in specimen height Δh = 2.28 mm

Coeff. of volume change $m_v = \frac{\Delta h}{ho} / \Delta\sigma_v$ = m²/kN

ROOT TIME in $\sqrt{min.}$



BINNIE & PARTNERS Geotechnical Laboratory London SW1	SHEAR BOX TEST (Sheet 2) (CONSOLIDATION STAGE)			
	Lab. Ref. No: L184	Tested by: A. M	Date: JUL 81	Fig 5

Location of Sample on site .....

Borehole No. – Sample No. 1-A Depth 5.0 m

Soil Description Stiff dark reddish brown siltstone

SPECIMEN DETAILS:

☒ 60 mm x 60 mm x 25 mm thick ☐ 300 mm x 300 mm x 150 mm thick

☒ Undisturbed ☐ Remoulded ☐ Compacted ☐ Recompacted as specified

☒ Water around specimen ☐ Damp cloth around specimen

Change in vertical stress $\Delta\sigma_v$ = 204 kN/m²

Initial specimen height h_o = 25.0 mm

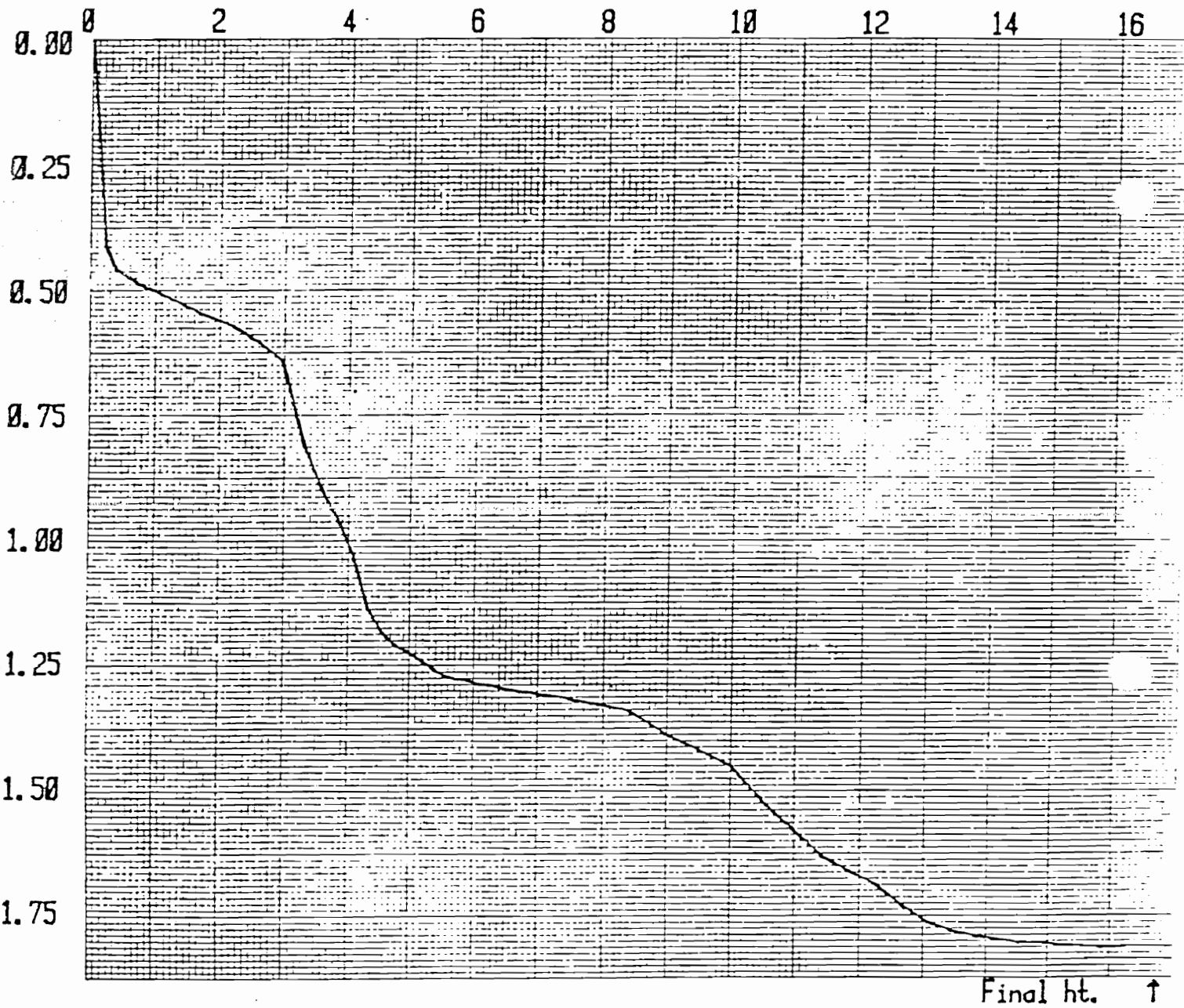
Drainage path d = – mm

Final specimen height h_f = 23.16 mm

Change in specimen height Δh = 1.84 mm

Coeff. of volume change $m_v = \frac{\Delta h}{h_o} / \Delta\sigma_v$ = m²/kN

ROOT TIME in $\sqrt{\text{min.}}$



BINNIE & PARTNERS Geotechnical Laboratory London SW1	SHEAR BOX TEST (Sheet 2) (CONSOLIDATION STAGE)			
	Lab.Ref.No: L184	Tested by: A. M	Date: JUL 81	Fig: 4

Job No..... Job Title.....

Location of Sample on site.....

Borehole No. - Sample No. 1-A Depth 5 m

Soil Description. Stiff dark reddish brown siltstone

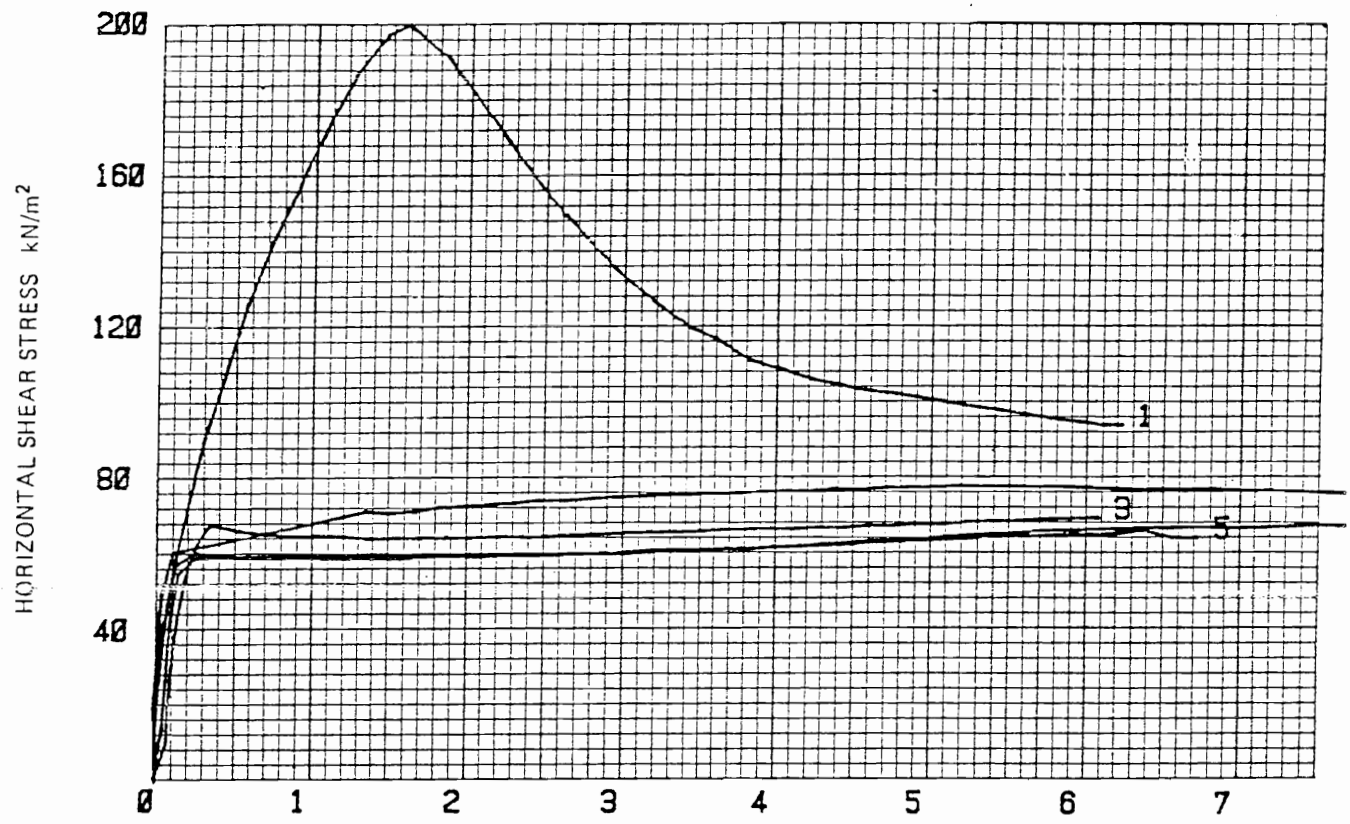
SPECIMEN AND TEST DETAILS:

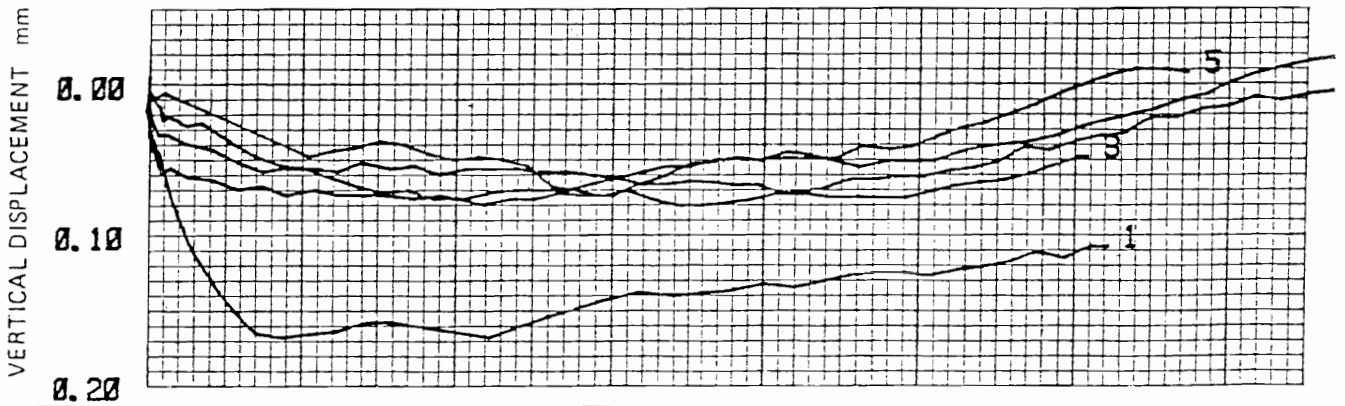
☒60 mm x 60 mm x 20 mm thick ☐300 mm x 300 mm x 150 mm thick

☒Undisturbed ☐Remoulded ☐Compacted ☐Recompacted as specified

☐Undrained ☐Consolidated-undrained ☒Consolidated-drained

Test No.		1	2	3	4	5
Applied normal stress	kN/m^2	200	200	200	200	200
Consolidated Vol. change	percent					
Initial bulk density	kg/m^3					
Initial moisture content	percent					
Rate of strain	mm/min	0.0163	0.0163	0.0163	0.0163	0.0163





BINNIE & PARTNERS Geotechnical Laboratory London SW1	SHEAR BOX TEST (Sheet 4)			
	Lab.Ref.No: L184	Tested by: A.M	Date: JUL 81	Fig 7

Job No. 1975 Job Title OAKAMOOR

Location of Sample on site

Borehole No. - Sample No. 1-C Depth 5.0 m

Soil Description Stiff dark reddish brown Siltstone

SPECIMEN DETAILS:

☒ 60 mm x 60 mm x 25 mm thick ☐ 300 mm x 300 mm x 150 mm thick

☒ Undisturbed ☐ Remoulded ☐ Compacted ☐ Recompacted as specified

☒ Water around specimen ☐ Damp cloth around specimen

Change in vertical stress $\Delta\sigma_v$ = 817 kN/m²

Initial specimen height h_o = 25.0 mm

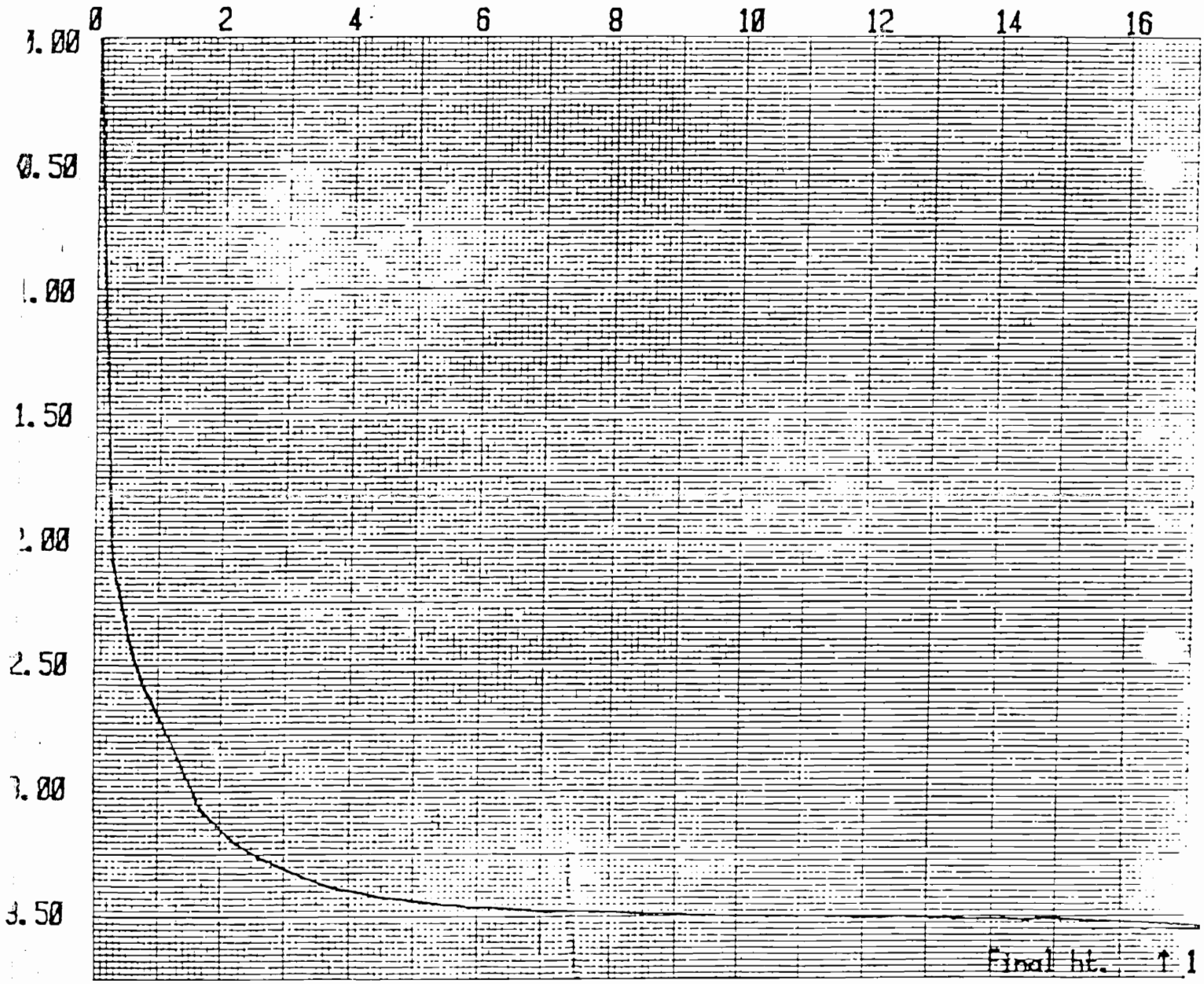
Drainage path d = - mm

Final specimen height h_f = 21.45 mm

Change in specimen height Δh = 3.55 mm

Coeff. of volume change $m_v = \frac{\Delta h}{h_o} / \Delta\sigma_v$ = m²/kN

ROOT TIME in $\sqrt{\text{min.}}$



BINNIE & PARTNERS Geotechnical Laboratory London SW1	SHEAR BOX TEST (Sheet 2) (CONSOLIDATION STAGE)			
	Lab. Ref. No: L184	Tested by: A.M	Date: JUL 81	Fig: 6

Job No..... Job Title.....

Location of Sample on site.....

Borehole No. 1-B Sample No. Depth 5.0 m

Soil Description Stiff dark reddish brown siltstone

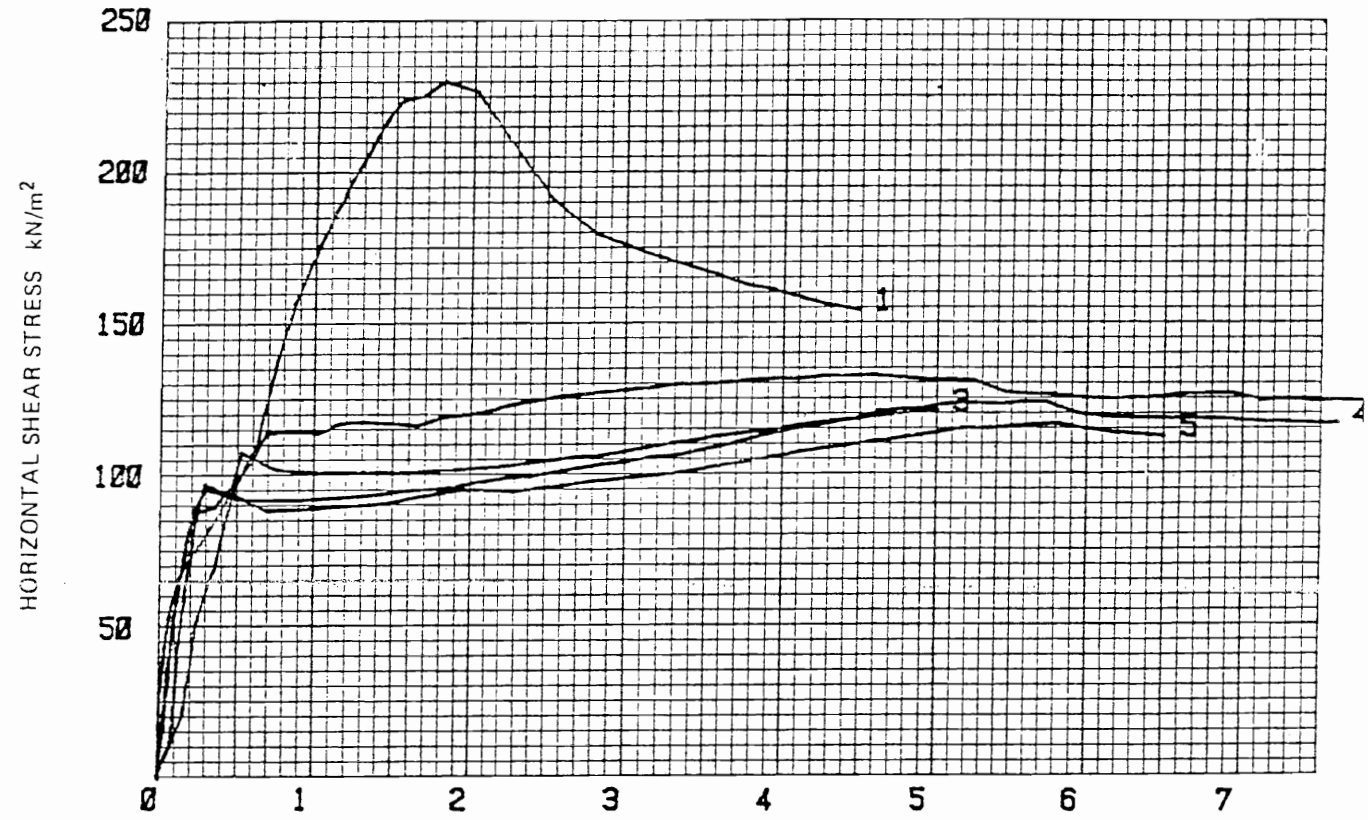
SPECIMEN AND TEST DETAILS:

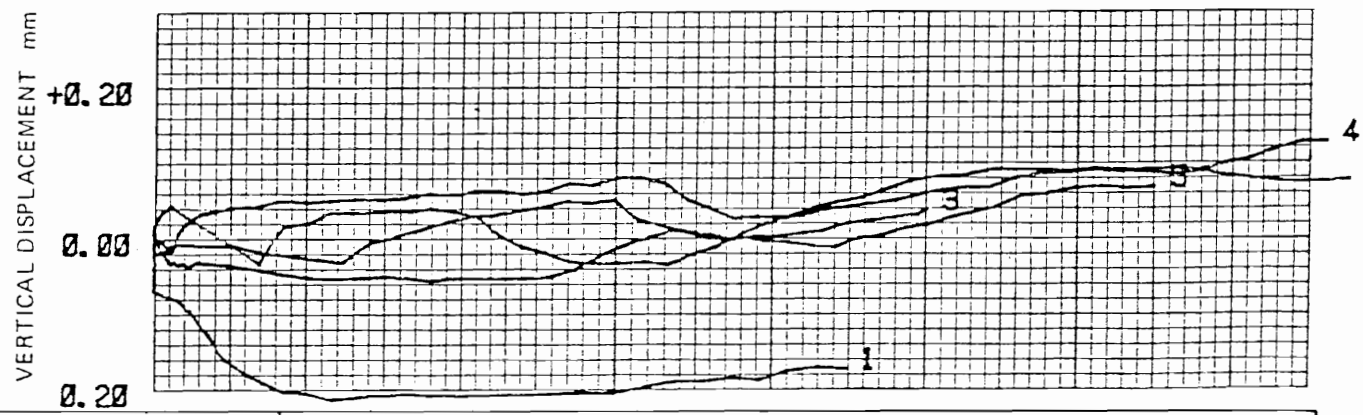
☒ 60 mm x 60 mm x 20 mm thick ☐ 300 mm x 300 mm x 150 mm thick

☒ Undisturbed ☐ Remoulded ☐ Compacted ☐ Recompacted as specified

☐ Undrained ☐ Consolidated-undrained ☒ Consolidated-drained

Test No.		1	2	3	4	5
Applied normal stress	kN/m^2	400	400	400	400	400
Consolidated Vol. change	percent					
Initial bulk density	kg/m^3					
Initial moisture content	percent					
Rate of strain	mm/min	0.0163	0.0163	0.0163	0.0163	0.0163





BINNIE & PARTNERS Geotechnical Laboratory London SW1	SHEAR BOX TEST (Sheet 4)			
	Lab.Ref.No: L184	Tested by: A.M	Date: JUL 81	Fig: 9

Job No..... Job Title.....

Location of Sample on site.....

Borehole No. - Sample No. 1-A Depth 5 m

Soil Description. Stiff dark reddish brown siltstone

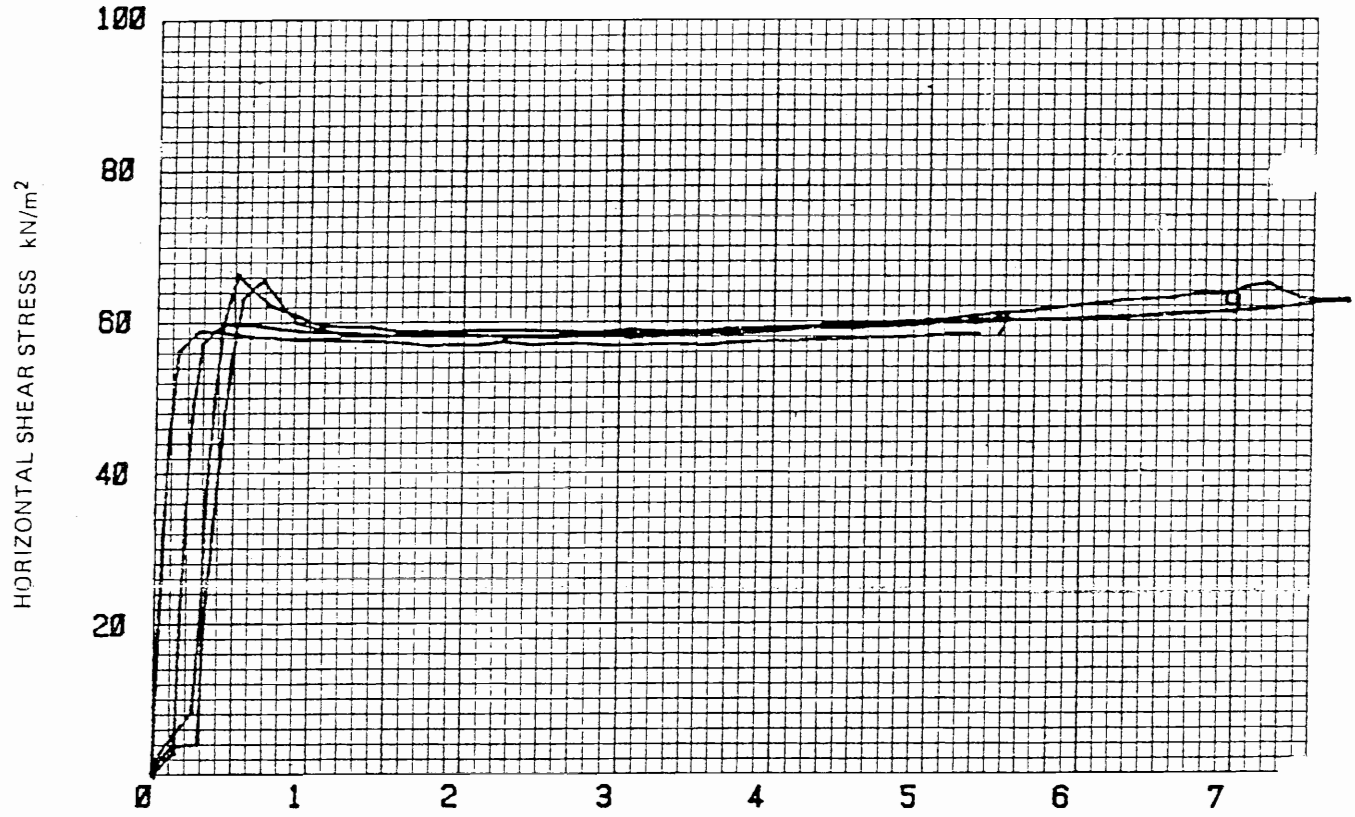
SPECIMEN AND TEST DETAILS:

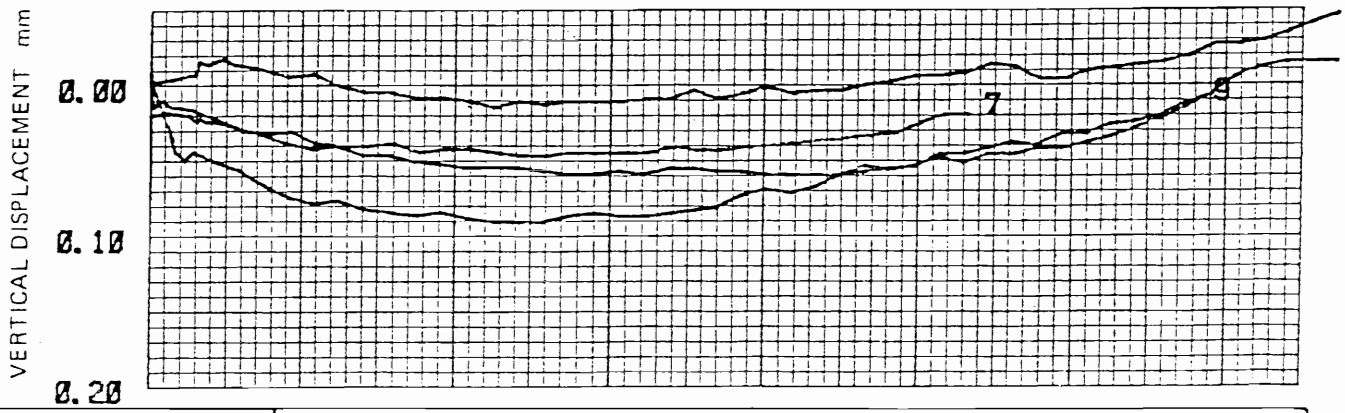
☒ 60 mm x 60 mm x 20 mm thick ☐ 300 mm x 300 mm x 150 mm thick

☒ Undisturbed ☐ Remoulded ☐ Compacted ☐ Recompacted as specified

☐ Undrained ☐ Consolidated-undrained ☒ Consolidated-drained

Test No.		6	7	8	9	
Applied normal stress	kN/m^2	200	200	200	200	
Consolidated Vol. change	percent					
Initial bulk density	kg/m^3					
Initial moisture content	percent					
Rate of strain	mm/min	0.0163	0.0163	0.0163	0.0163	





BINNIE & PARTNERS Geotechnical Laboratory London SW1	: SHEAR BOX TEST (Sheet 4)			
	Lab.Ref.No: L184	Tested by: A.M	Date: JUL 81	Fig: 8

Job No..... Job Title.....

Location of Sample on site.....

Borehole No. – Sample No. 1-C Depth 5.0 m

Soil Description. Stiff dark reddish brown Siltstone

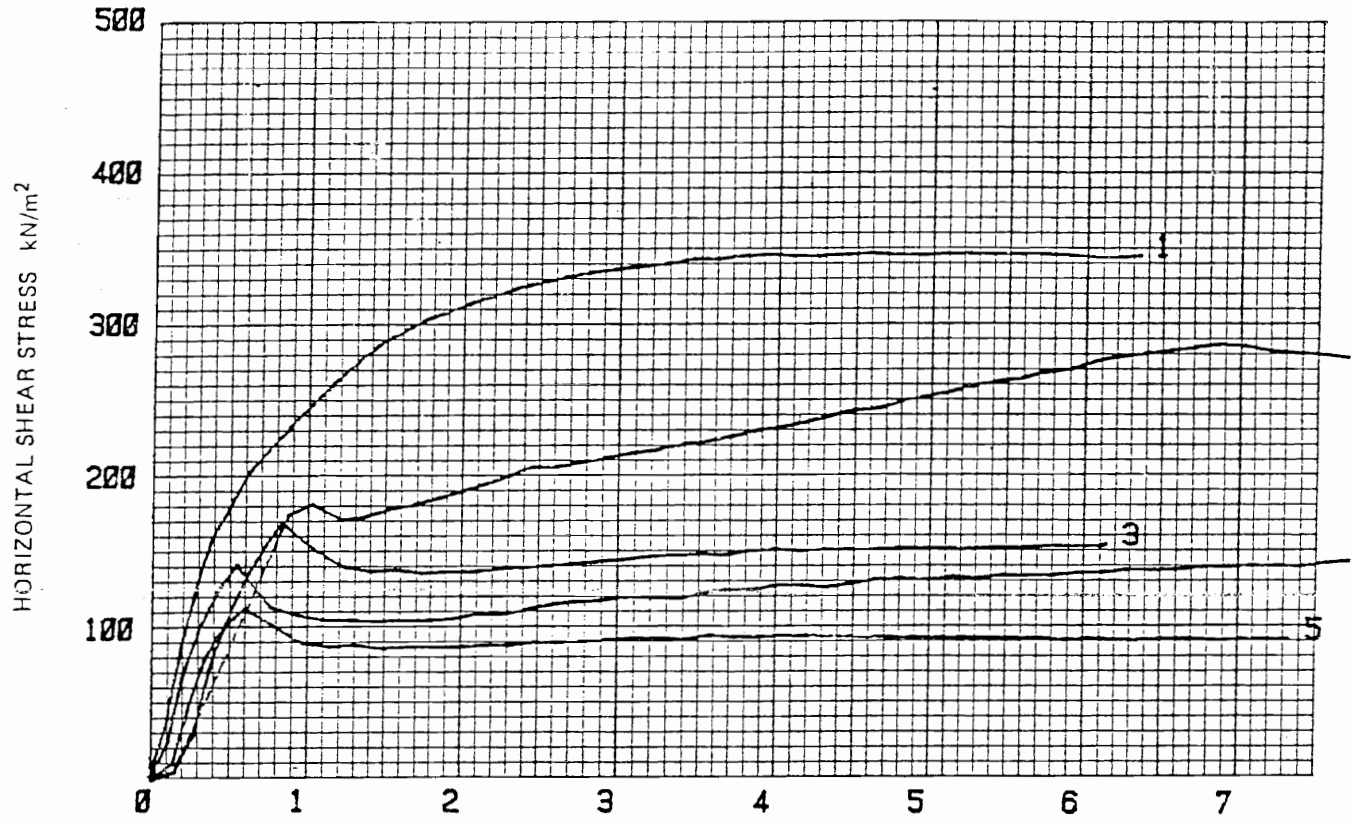
SPECIMEN AND TEST DETAILS:

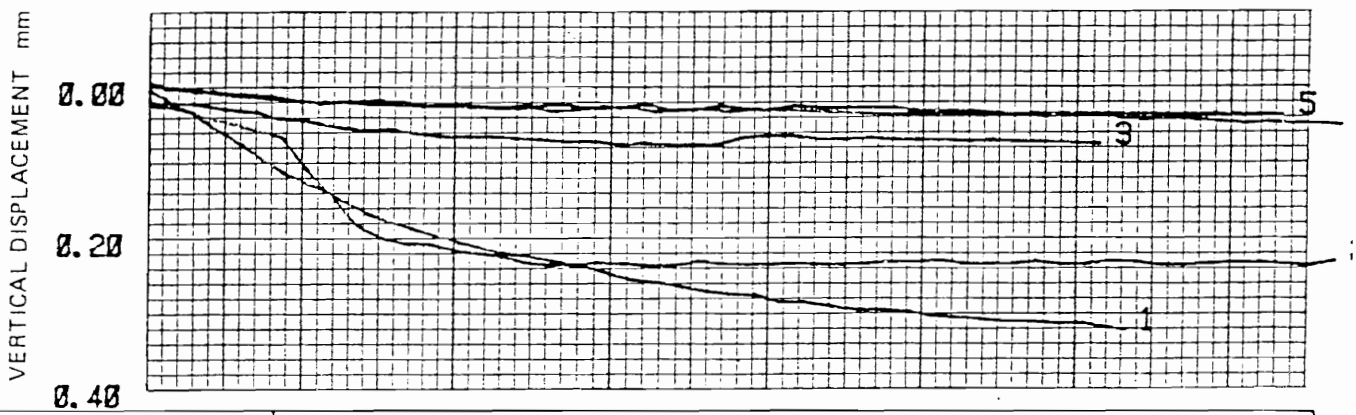
☒ 60 mm x 60 mm x 20 mm thick ☐ 300 mm x 300 mm x 150 mm thick

☒ Undisturbed ☐ Remoulded ☐ Compacted ☐ Recompacted as specified

☐ Undrained ☐ Consolidated-undrained ☒ Consolidated-drained

Test No.		1	2	3	4	5
Applied normal stress	kN/m^2	817	817	<817?	<817?	<817?
Consolidated Vol. change	percent					
Initial bulk density	kg/m^3					
Initial moisture content	percent					
Rate of strain	mm/min	0.0163	0.0163	0.0163	0.0163	0.0163





BINNIE & PARTNERS Geotechnical Laboratory London SW1	: SHEAR BOX TEST (Sheet 4)			
	Lab.Ref.No: L184	Tested by: A.M	Date: JUL 81	Fig: 11

Job No..... Job Title.....

Location of Sample on site.....

Borehole No. 1-B Sample No. Depth 5.0 m

Soil Description. Stiff dark reddish brown siltstone

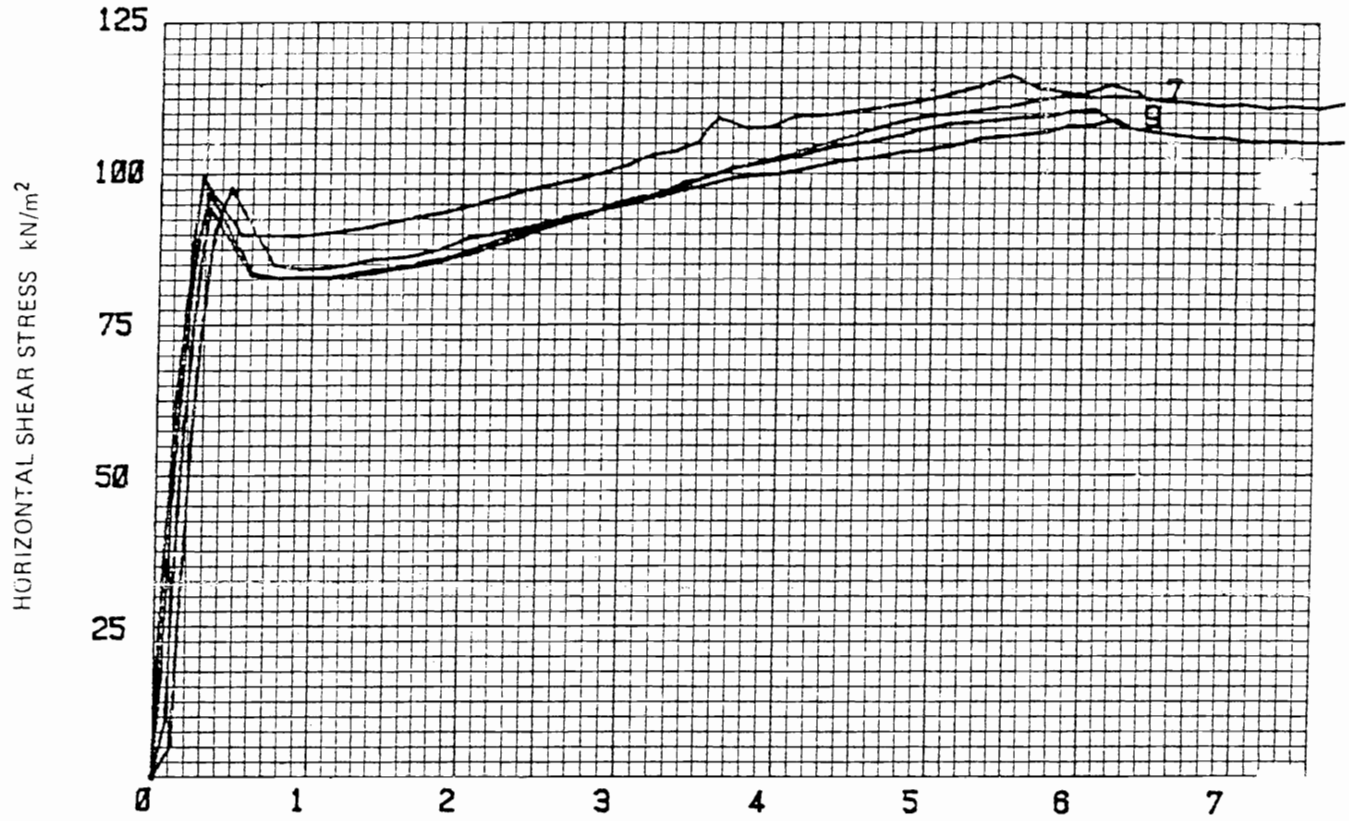
SPECIMEN AND TEST DETAILS:

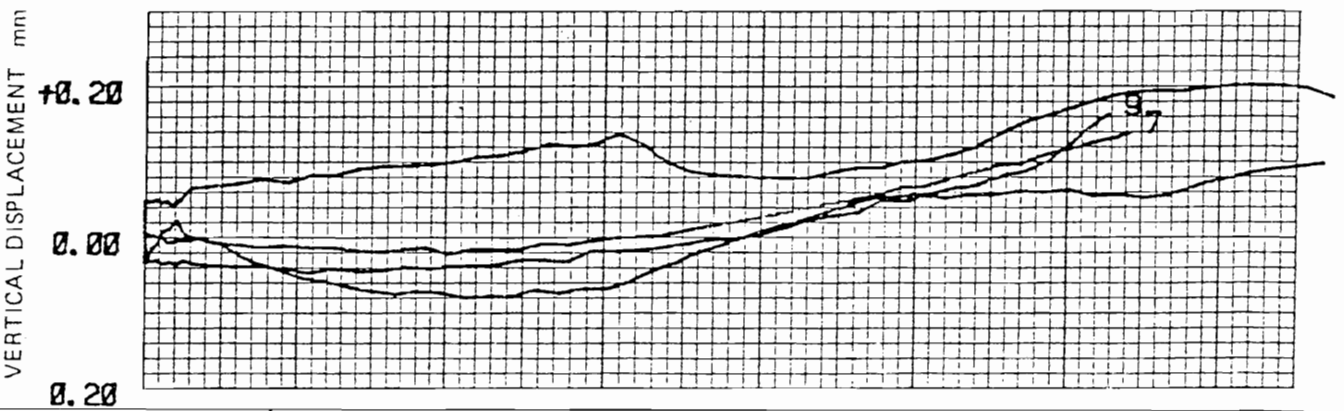
☒ 60 mm x 60 mm x 20 mm thick ☐ 300 mm x 300 mm x 150 mm thick

☒ Undisturbed ☐ Remoulded ☐ Compacted ☐ Recompacted as specified

☐ Undrained ☐ Consolidated-undrained ☒ Consolidated-drained

Test No.		6	7	8	9	
Applied normal stress	kN/m^2	400	400	400	400	
Consolidated Vol. change	percent					
Initial bulk density	kg/m^3					
Initial moisture content	percent					
Rate of strain	mm/min	0.0163	0.0163	0.0163	0.0163	





BINNIE & PARTNERS Geotechnical Laboratory London SW1	SHEAR BOX TEST (Sheet 4)			
	Lab. Ref. No: L184	Tested by: A. M	Date: JUL 81	Fig: 10

Job No..... Job Title.....

Location of Sample on site.....

Borehole No. 1-C Sample No. Depth 5.0 m

Soil Description Stiff dark reddish brown siltstone

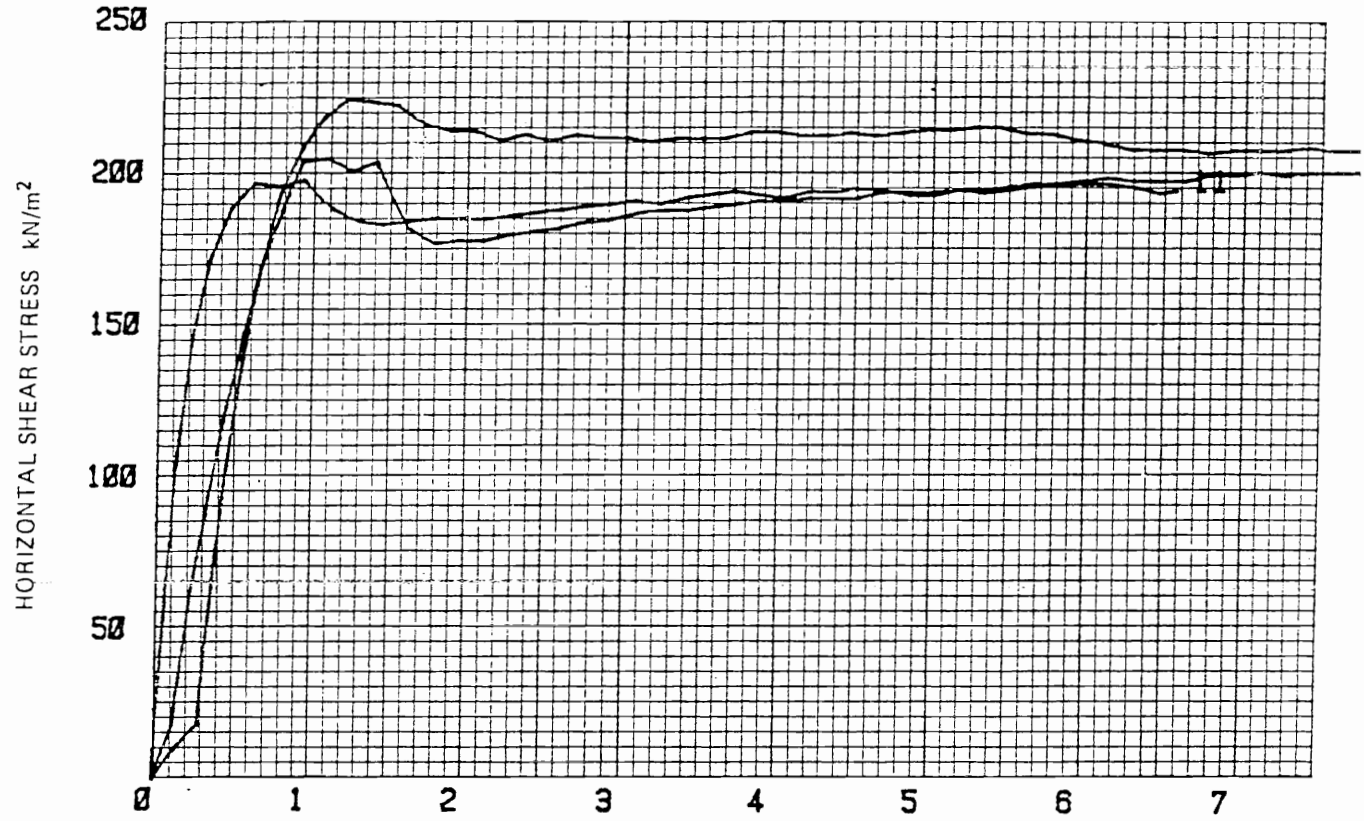
SPECIMEN AND TEST DETAILS:

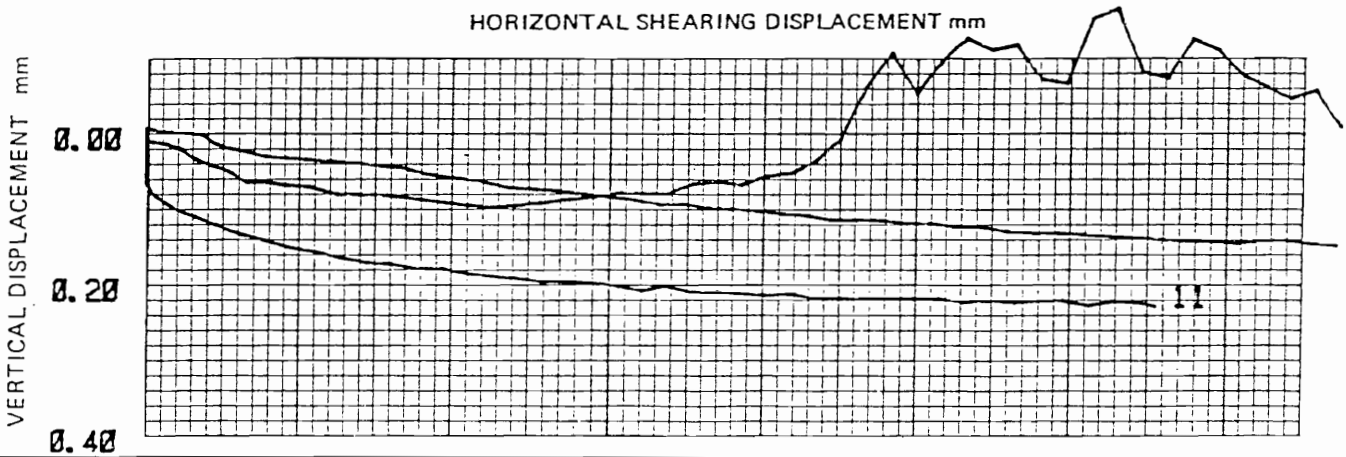
☒ 60 mm x 60 mm x 25 mm thick ☐ 300 mm x 300 mm x 150 mm thick

☒ Undisturbed ☐ Remoulded ☐ Compacted ☐ Recompacted as specified

☐ Undrained ☐ Consolidated-undrained ☒ Consolidated-drained

Test No.		10	11	12		
Applied normal stress	kN/m^2	817	817	817		
Consolidated Vol. change	percent					
Initial bulk density	kg/m^3					
Initial moisture content	percent					
Rate of strain	mm/min	0.0163	0.0163	0.0163		





BINNIE & PARTNERS Geotechnical Laboratory London SW1	SHEAR BOX TEST (Sheet 4)			
	Lab.Ref.No: L184	Tested by: A.M	Date: AUG 81	Fig. 13

Job No.....Job Title.....

Location of Sample on site.....

Borehole No. - Sample No. 1-C Depth 5.0 m

Soil Description. Stiff dark reddish brown Siltstone

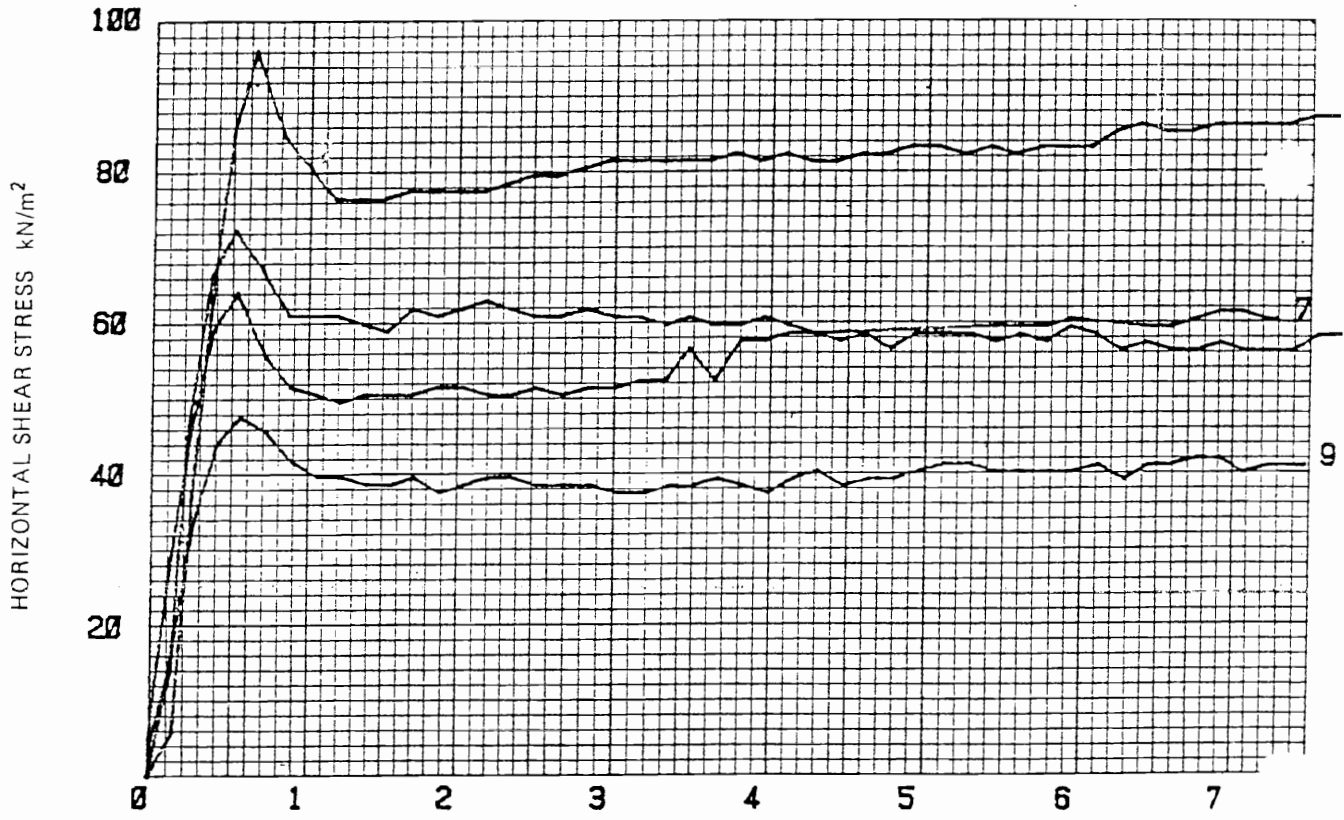
SPECIMEN AND TEST DETAILS:

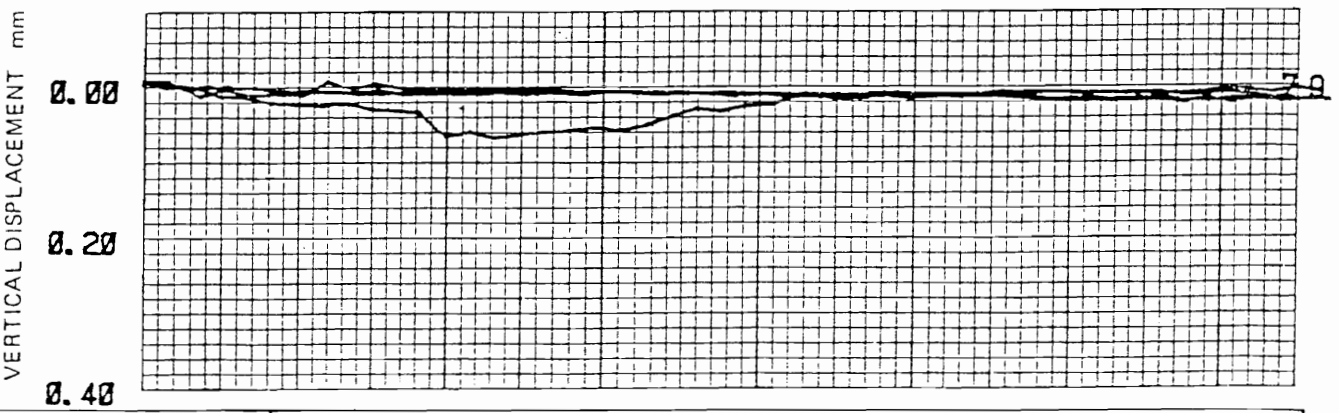
☒ 60 mm x 60 mm x 20 mm thick ☐ 300 mm x 300 mm x 150 mm thick

☒ Undisturbed ☐ Remoulded ☐ Compacted ☐ Recompacted as specified

☐ Undrained ☐ Consolidated-undrained ☒ Consolidated-drained

Test No.		6	7	8	9	
Applied normal stress	kN/m²	<817?	<817?	<817?	<817?	
Consolidated Vol. change	percent					
Initial bulk density	kg/m³					
Initial moisture content	percent					
Rate of strain	mm/min	0.0163	0.0163	0.0163	0.0163	





BINNIE & PARTNERS Geotechnical Laboratory London SW1	SHEAR BOX TEST (Sheet 4)			
	Lab.Ref.No: L184	Tested by: A.M	Date: JUL 81	Fig: 12

Job No. 1975 Job Title OAKAMOOR

Location of Sample on site

Borehole No. Sample No. 1 Depth 5.0 m

Soil Description Stiff reddish brown siltstone

Symbol	Borehole No.	Sample No.	Depth m	Soil Description

SPECIMEN AND TEST DETAILS:

☒ 60 mm x 60 mm x 25 mm thick ☐ 300 mm x 300 mm x 150 mm thick

☒ Undisturbed ☐ Remoulded ☐ Compacted

☐ Recompacted to specified density and water content

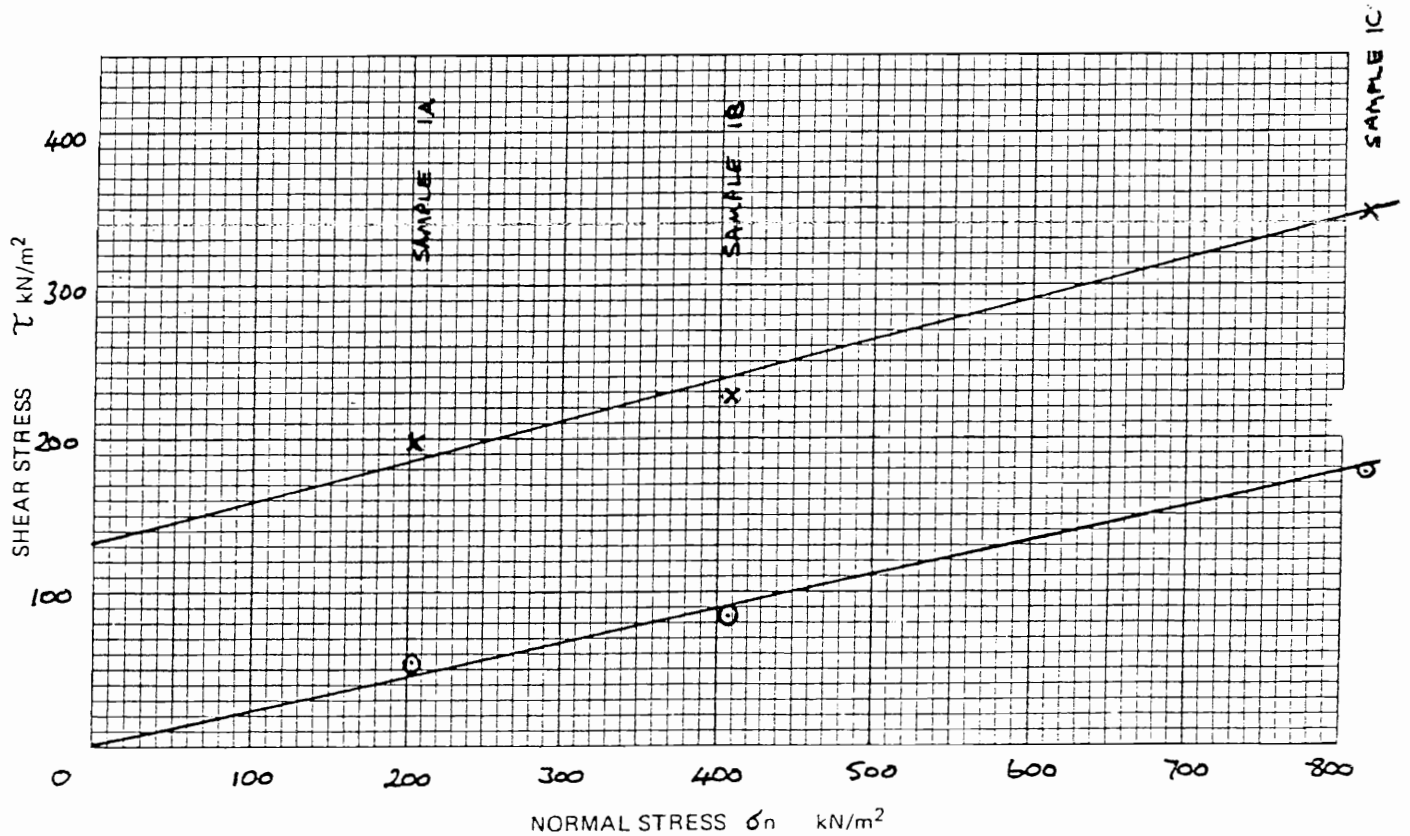
☒ Consolidated-drained ☐ Consolidated-undrained ☐ Undrained

☐ Peak strength —X— ☐ Residual strength —⊙—

..... stress reversal cycles:- 1A - nine
1B - nine
1C - twelve

PEAK STRENGTH ϕ = 15
c = 132 kN/

RESIDUAL STRENGTH ϕ = 12½ °
c = 0 kN/



BINNIE & PARTNERS Geotechnical Laboratory London SW1	SHEAR BOX TESTS FAILURE ENVELOPE			
	Lab. Ref. No: L184	Tested by: A.M.	Date: JUL 81	Fig 14

Form G22

APPENDIX D - CHEMICAL TEST RESULTS

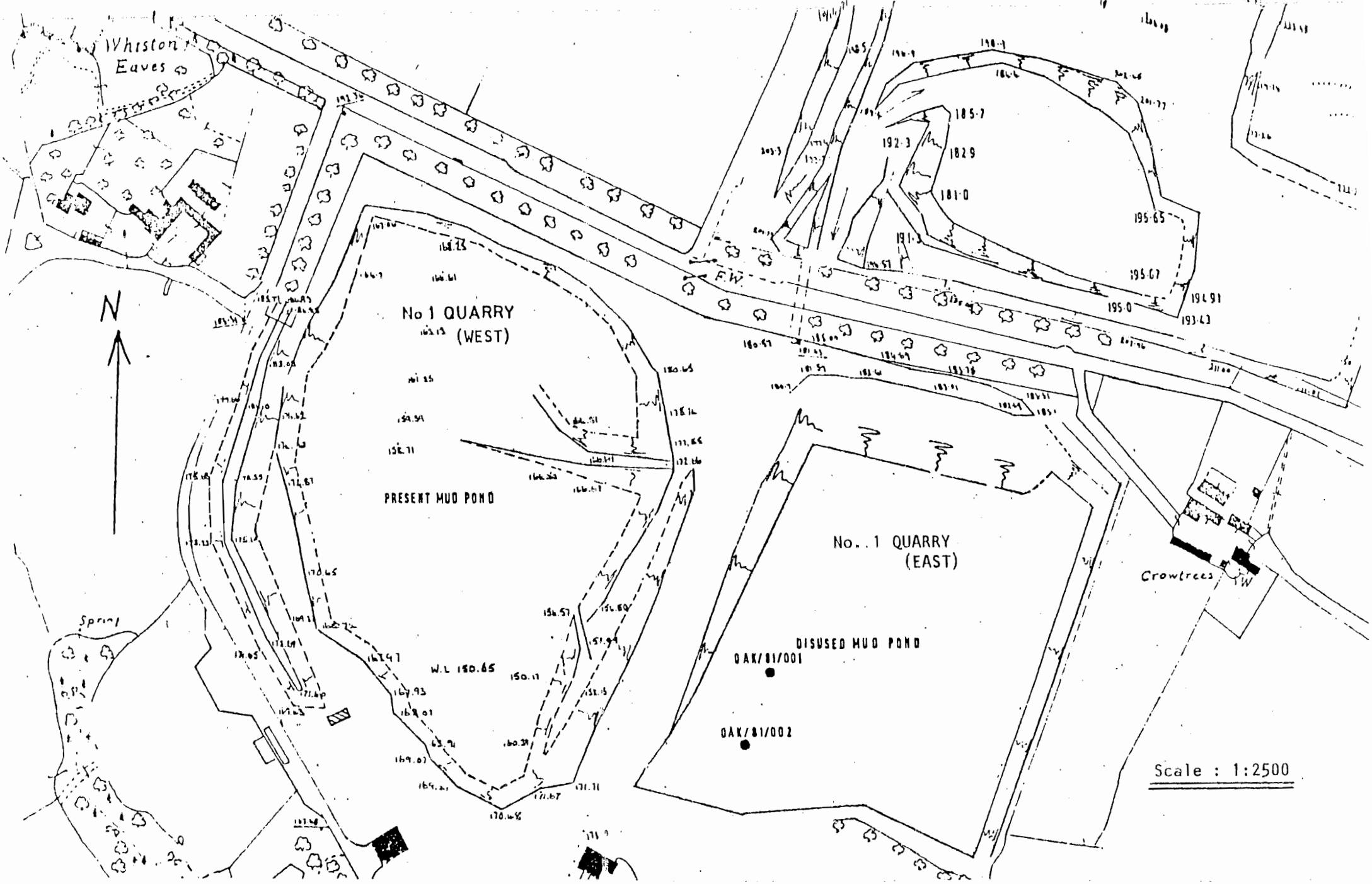
BINNIE & PARTNERS WESTMINSTER LONDON, S.W.1	Subject Soil Analysis	Job Oakamoor
		Job No. 1975
	Computed ..... Chkd.	Date 13.3.81 Page 1 of 1 pages

Report No. 81/193-6

Four composite samples were taken from core samples on 9.3.81

Sample labelled	Borehole No. 2			Borehole 1 Sample 2
	0 - 0.60 red material	10.04-10.50 red material	0 - 0.60 whitish material	1.52-2.52 white material
Moisture Content - dried at 80°C	44.62	21.04	58.95	48.84
% Loss on heating at 105°C	1.88	0.07	2.94	3.33
105 - 180°C	0.62	0.06	1.14	0.98
180 - 600°C	6.81	0.62	6.24	4.78
600 - 1000°C	9.06	0.85	11.36	3.87
Analysis of material dried at 80°C				
Acid Insoluble (siliceous) material %	64.98	95.97	25.82	58.76
Calcium as CaO % dry weight	6.82	0.71	20.77	12.88
Iron as Fe_2O_3 %	6.18	0.89	5.30	3.24
Aluminium as Al_2O_3 %	2.35	0.24	4.45	1.23
Sulphate as SO_3 %	9.11	0.23	24.20	14.59
Magnesium as MgO mg/kg dry wt.	2030	310	2130	2355
Manganese as MnO "	3110	485	9150	770
Chromium as Cr_2O_3 "	63	11	108	44
Zinc as ZnO "	51	6	72	32
Lead as PbO "	29	10	62	18
Copper as CuO "	30	12	62	32
Cadmium as CdO "	1.8	0.8	4.7	2.0
Sodium as Na_2O "	195	160	510	510
Potassium as K_2O "	1500	455	995	1370

The core sample labelled Borehole 2, 0-0.6 m did not contain any discrete white material as found in Borehole 1, Sample 2. Striations of off-white creamy material were present and a sample of this was analysed.



DRAWING 2 : Site Plan showing locations of boreholes OAK/81/001 and 002 (Fr[illegible]S Limited, March 1981)

Table 11.4 Water Quality Data

Determinand	BH950011	Stream	Units
pH	6.2	7.0	-
Alkalinity	45	44	mg/l as $CaCO_3$
EC	370	360	uS/cm
Sodium	36	24	mg/l
Calcium	31	38	mg/l
Magnesium	1.4	3.6	mg/l
Chloride	49	43	mg/l
Sulphate	52	40	mg/l
Iron	0.09	<0.04	mg/l
Manganese	0.27	0.03	mg/l
Nitrate	4.3	5.8	mg/l as N

11.1.36 A baseline water sampling exercise was undertaken in 1998/1999, and included 12 monthly sampling rounds. Water quality data were collected from streams A, B and C (Figure 11.3) to define the baseline chemistry in the surface waters, in order to appropriately constrain the quality of augmentation flows. The methodology and scope of the sampling exercise was agreed with the Environment Agency at the time. Results are summarised in Table 11.5 below.

Table 11.5 Summary of Water Quality Data

Parameter	Stream A			Stream B			Stream C		
	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Temp (°c)	6.7	9.6	11.8	6.0	9.6	12.4	7.0	9.8	12.4
Ph	6.8	7.2	7.7	6.7	7.2	7.7	6.9	7.3	7.7
DO(%)	88.0	91.9	95.1	90.7	93.4	95.6	86.2	91.8	95.8
DO	9.6	10.5	11.6	9.6	10.7	11.6	9.6	10.4	11.1
TDS	134	160	189	157	202	244	102	134	154
EC (us/cm)	246	311	360	381	394	420	190	252	299
Susp sols	5.0	24.3	53.0	4.0	10.8	20.0	2.0	47.5	244.0
BOD (mg/l O)	1.5	1.5	1.5	1.7	1.7	1.7		<1.4	
Ammonia NH_4		<0.1			<0.1	0.2		<0.1	
Chloride	19.0	21.8	24.0	29.0	40.2	63.0	18.0	20.8	23.0
Sulphate	28.0	32.0	38.0	34.0	37.2	41.0	27.0	31.0	35.0
Nitrate	19.0	24.2	29.0	18.0	20.0	24.0	15.0	16.8	19.0
Alk ($_{HCO3}$)	55.0	79.2	128.0	67.0	95.4	201.0	30.0	57.6	137.0
Calcium	27.0	33.8	38.0	30.0	39.4	47.0	21.0	26.2	31.0
Magnesium	2.7	3.7	5.4	2.6	3.6	4.3	1.5	2.1	2.7
Iron	0.01	0.02	0.03	0.01	0.05	0.07	0.04	0.06	0.08
Manganese	0.02	0.09	0.24	0.01	0.03	0.04	0.01	0.01	0.01
Cadmium		<0.005			<0.005			<0.005	
Chromium		<0.01			<0.01			<0.01	
Copper		<0.01			<0.01	0.01		<0.01	
Nickel		<0.01			<0.01	0.02		<0.01	
Lead		<0.01			<0.01			<0.01	
Zinc	0.50	0.50	0.50	0.56	0.56	0.56	0.41	0.41	0.41

All data in mg/l unless stated otherwise

Temp: Water Temperature

DO: Dissolved Oxygen

TDS: Total Dissolved Solids

EC: Electrical Conductivity

Susp Sols: Suspended Solids

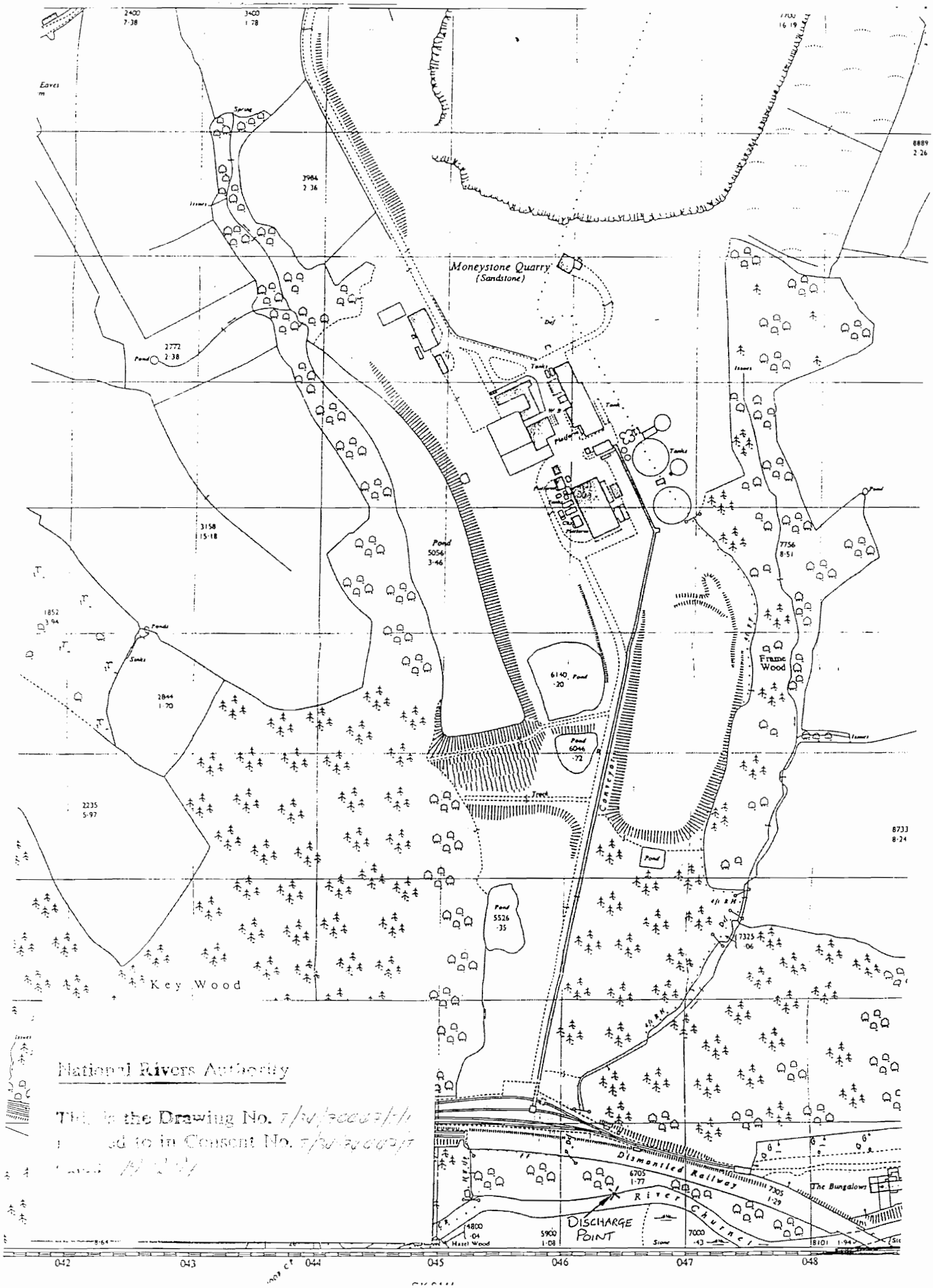
BOD: Biological Oxygen Demand

Alk (HCO_3): Alkalinity as HCO_3

Potential Receptors

Site of Special Scientific Interest (SSSI)

11.1.37 There is a SSSI located to the south west of the permitted quarry area, as shown in Figure 11.3. This forms part of Whiston Eaves SSSI, which predominantly comprises a series of species-rich meadows managed as grazing pasture or hay meadows with additional areas of rush pasture, scrub and running water. The topography is varied and there is a range of soils of variable drainage and nutrient status. The majority of this area is directly underlain by Coal Measures strata, and therefore the impacts of



National Rivers Authority

This is the Drawing No. referred to in Consent No.

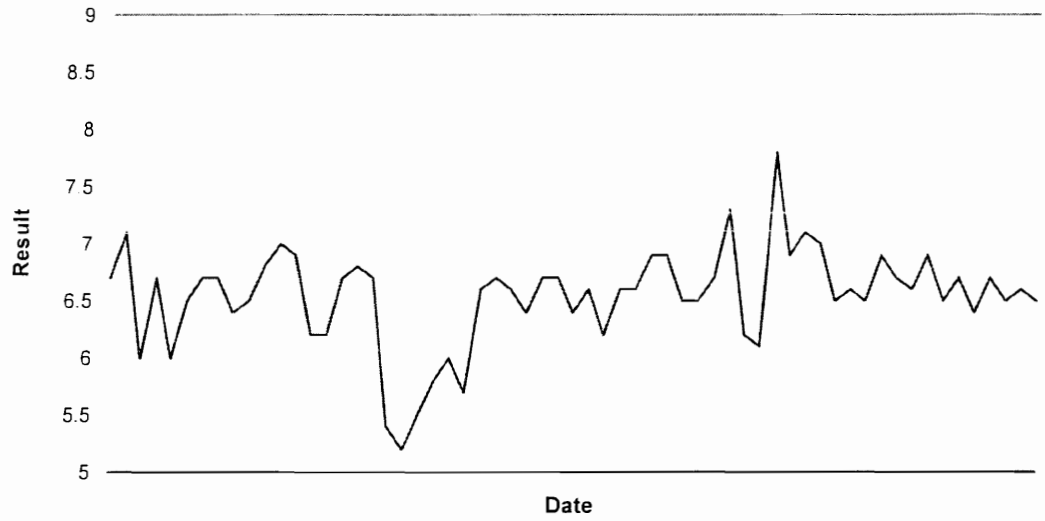
SIBELCO
UK

Quarterly Water Circuit Report - Oakamoor

For: 01/10/2009 to 24/12/2009

River Discharge Analysis

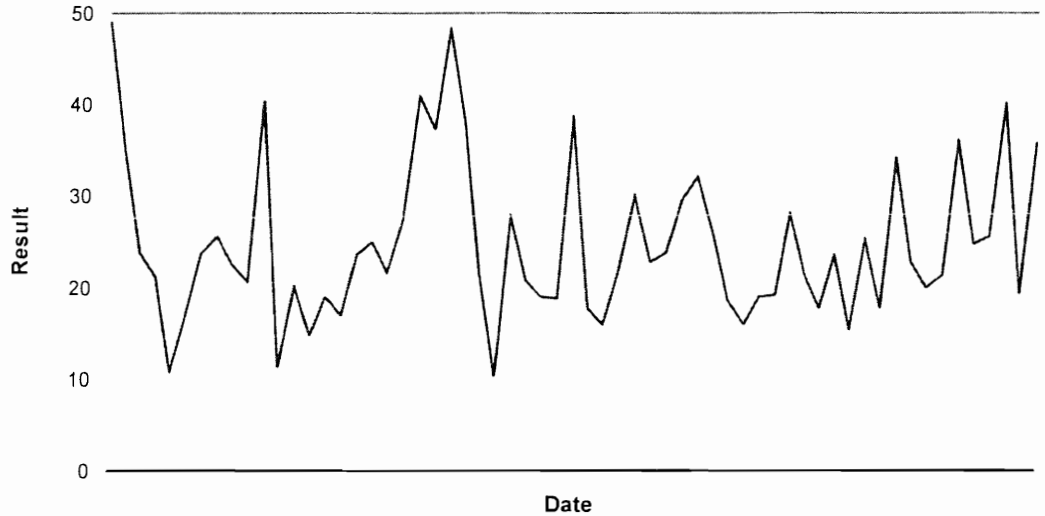
For River Discarge pH



No of Samples	61
Minimum	5.20
Maximum	7.80
Average	6.54
Std Dev (n-1)	0.44
Limits 5.00 to 9.00	

River Discharge Analysis

For River Discarge SS



No of Samples	61
Minimum	10.40
Maximum	49.00
Average	24.84
Std Dev (n-1)	8.74
Limits 0.00 to 50.00	ppm

Environment Agency Samples

Date Sampled	Analysis	Result
18/02/2009	pH EA Recorded	7.20
	pH OK Recorded	6.50
	SS Result	35.00
11/03/2009	pH EA Recorded	7.50
	pH OK Recorded	6.90
	SS Result	28.60
05/06/2009	pH EA Recorded	7.10
	pH OK Recorded	6.90
	SS Result	14.40
28/07/2009	pH EA Recorded	7.50
	pH OK Recorded	6.90
	SS Result	21.00
25/11/2009	pH EA Recorded	6.50
	pH OK Recorded	7.00
	SS Result	16.40
09/12/2009	pH EA Recorded	6.50
	pH OK Recorded	6.80
	SS Result	22.00

Abstraction

Monthly Volumes Extracted (G x 1000)

October 2009	Total Volume	7,609
November 2009	Total Volume	10,945
December 2009	Total Volume	6,166

NOTES

It is essential that Nikki Carey is informed of visits by the EA and samples taken in conjunction with them are saved for analysis, and the EA portable pH results noted.

Similarly, it is essential that both Nikki Carey and Production Management are informed immediately of discharge failures and corrective action taken. This applies to both production personnel observing the continuous monitoring equipment, and to lab staff carrying out daily analysis.

APPENDIX E - ABSTRACTION LICENCES

ENVIRONMENT AGENCY

Water Resources Act 1991

(as amended by the Environment Act 1995)

Consent to Discharge
Certificate of Holder

Part A

To: Sibelco Minerals and Chemicals Limited (trading as WBB Minerals)
Brookside Hall
Sandbach
Cheshire

The **Environment Agency** ("The Agency") hereby confirms that the above named person(s) or body corporate is and has been since its date of issue the registered holder of Consent T/30/35773/T.

Nature of Discharge(s): Augmentation Water Consisting of Pumped Quarry Water Only
At: Moneystone Quarry, Whiston Eaves Lane, Stoke-on-Trent, Staffordshire

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Note: This certificate should be kept with the consent document for future reference. If you transfer responsibility for the discharge to somebody else you must pass the consent to them and tell the Agency within 21 days. **Responsibility for the consent cannot be disclaimed by the holder but the registration of holder may be transferred to a successor**. To do this please complete the form below, then tear it off and return it to the address shown. If you fail to transfer the consent, even though you are no longer on the site, you may still be liable for prosecution for pollution. If you transfer the consent but do not tell us, you will be committing an offence. In case of any queries please contact your local Environment Agency office.

Part B **Please complete in block capitals or type.**

To: **The Environment Agency,** Authorisations Section
Sentinel House, 9 Wellington Crescent, Fradley Park, Lichfield, WS13 8RR

Water Resources Act 1991: Notice of transfer of consent to discharge

Consent T/30/35773/T

Name Sibelco Minerals and Chemicals Limited (trading as WBB Minerals)
Address Brookside Hall
Sandbach
Cheshire

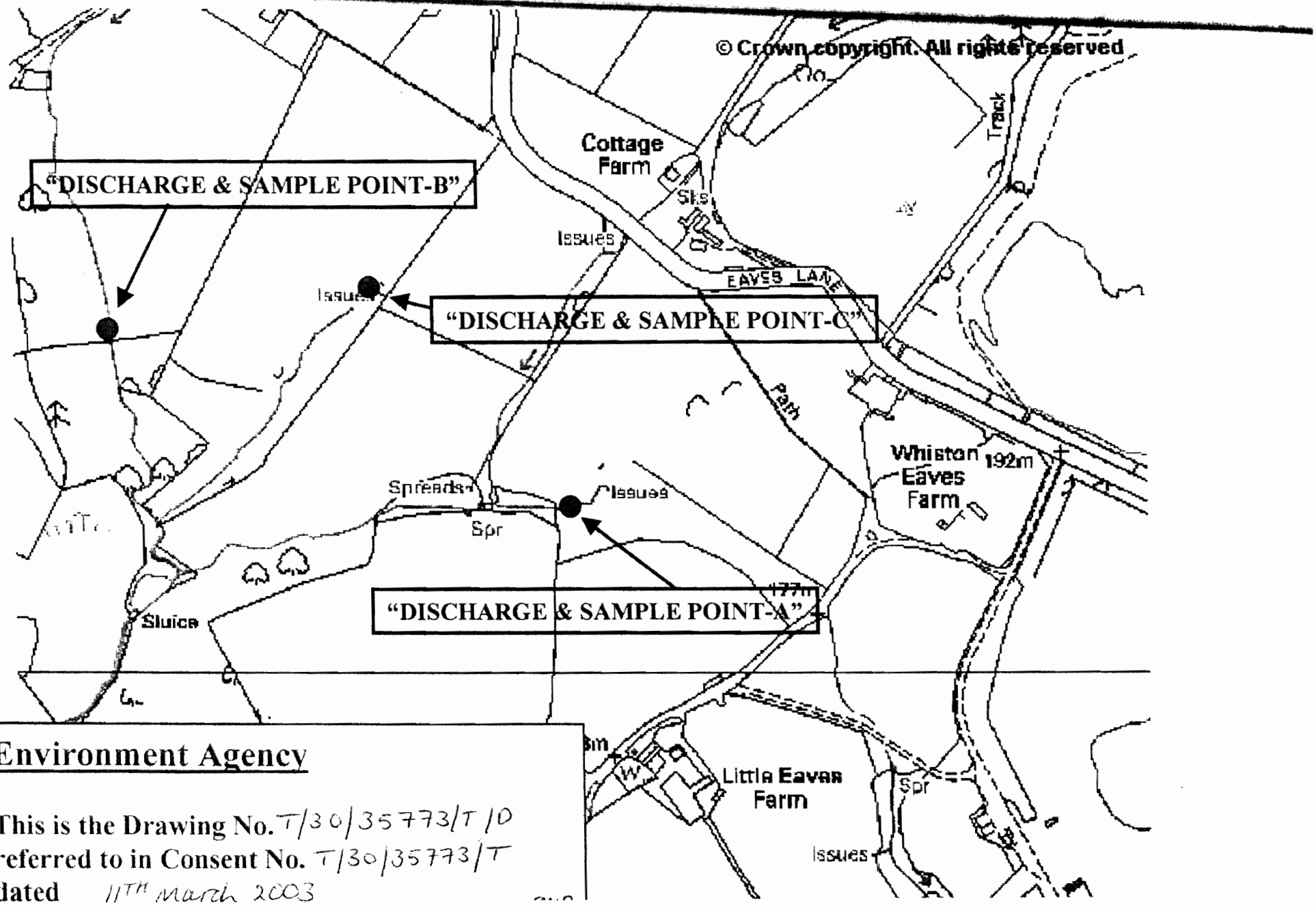
I/We* hereby serve notice on the Agency and I/We* am/are* no longer a/the Holder of the above consent which will be/was* transferred to: * delete as appropriate

Name(s) of new Holder(s):
Address:

Post Code:
Date of Transfer to New Holder(s):.....
Signed:..... **Dated:** .....
Name (block capitals):..... **Position:** .....

(to be completed when signing on behalf of corporate bodies)

RECYCLED



Environment Agency

This is the Drawing No. T/30/35773/T/D
referred to in Consent No. T/30/35773/T
dated 11TH March 2003

ENVIRONMENT AGENCY

CONSENT NO.	T/30/35773/T

WATER RESOURCES ACT 1991
(AS AMENDED BY THE ENVIRONMENT ACT 1995)
SECTION 88 – SCHEDULE 10
CONSENT TO DISCHARGE

TO: Sibelco Minerals and Chemicals Limited
Brookside Hall
Sandbach
Cheshire

The **ENVIRONMENT AGENCY** (the "Agency") in pursuance of its powers under the Water Resources Act 1991 **HEREBY CONSENTS** to the making of three discharges of **TRADE EFFLUENT** as follows:

Augmentation Water Consisting of Pumped Quarry Water Only
Augmentation Water Consisting of Pumped Quarry Water Only
Augmentation Water Consisting of Pumped Quarry Water Only

FROM: Moneystone Quarry

AT: Whiston Eaves Lane, Stoke-on-Trent, Staffordshire

TO: Unnamed tributaries of the River Churnet

SUBJECT TO the conditions set out in the following schedules:

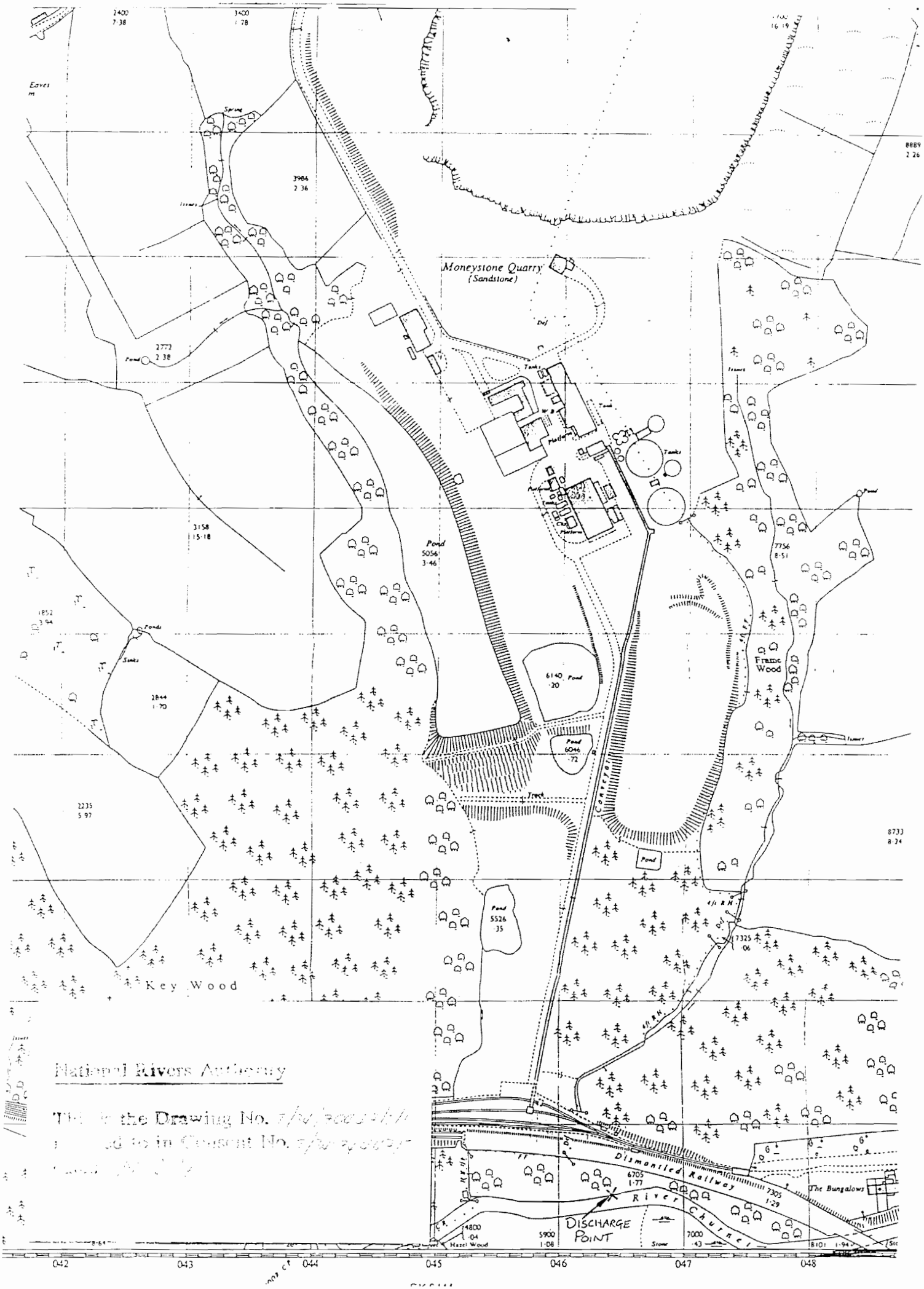
Augmentation Water Consisting of Pumped Quarry Water Only	Schedule No. T/30/35773/T 01
Augmentation Water Consisting of Pumped Quarry Water Only	Schedule No. T/30/35773/T 02
Augmentation Water Consisting of Pumped Quarry Water Only	Schedule No. T/30/35773/T 03

Subject to the provisions of Paragraphs 7 and 8 of Schedule 10 of the Water Resources Act 1991, as amended by the Environment Act 1995, no notice shall be served by the Agency, altering this consent without the agreement in writing of the consent holder, during a period of 4 years from the date this consent takes effect or such later date as may be specified in an endorsement to this document.

This consent is issued and takes effect on the eleventh day of March 2003

Signed.....
Team Leader Environment Management

The Environment Agency, Upper Trent Area,
Sentinel House, 9 Wellington Crescent, Fradley Park, Lichfield WS13 8RR



National Rivers Authority

This is the Drawing No. referred to in Consent No.

CONSENT NO.	**T/30/35773/T**
SCHEDULE NO.	**T/30/35773/T 01**
DATE ISSUED	11 MAR 2003

CONDITIONS OF CONSENT TO DISCHARGE

AUGMENTATION WATER CONSISTING OF PUMPED QUARRY WATER ONLY ("the Discharge")

FROM: MONEYSTONE QUARRY, WHISTON EAVES LANE, STOKE-ON-TRENT, STAFFORDSHIRE

MINIMISE EFFECT

1 (a) The Discharge shall not contain any poisonous, noxious, or polluting matter or solid waste matter.

(b) Provided that the Discharge hereby consented is made in accordance with the following conditions of this consent, such discharge shall not be taken to be in breach of paragraph (a) above by reason of containing substances or having properties identified in and controlled by these conditions.

NATURE

2 The Discharge shall consist solely of augmentation water consisting of pumped quarry water only.

LOCATION

3 The Discharge shall be made in the manner and at the place specified as:-

(a) discharging to an unnamed tributary of the River Churnet

(b) at National Grid Reference SK 0404 4614

(c) shown marked "DISCHARGE & SAMPLE POINT-A" on attached Drawing No.**T/30/35773/T/D.**

SAMPLE POINT

4 The outlet to the watercourse shall be constructed and maintained so that a representative sample of the Discharge may be obtained at National Grid Reference SK 0387 4614 as shown marked "DISCHARGE & SAMPLE POINT-A" on attached Drawing No. **T/30/35773/T/D.**

VOLUME, RATE & FLOW

5 The volume of the Discharge shall not exceed 950 cubic metres per day.

6 The rate of discharge shall not exceed 11 litres per second.

SCHEDULE NO.	T/30/35773/T 01

FLOW MEASUREMENT

7 At the request of the Agency, the consent holder shall install, operate and maintain a means of flow measuring to a specification and at a location required by the Agency, to enable the daily volume and/or instantaneous flow of the discharge to be recorded. The consent holder shall calibrate, operate and maintain the flow monitoring and recording system to a standard agreed or specified by the Agency. The flow and maintenance records shall be provided to the Agency as and when requested.

COMPOSITION

8 The composition of the Discharge shall be such that:

(a) suspended solids, dried at 105 degrees Celsius, shall not exceed 25 milligrams per litre.

(b) the pH value shall not be less than 6 nor greater than 9.

(c) there shall be no visible oil or grease in the receiving watercourse as a result of the discharge.

NON-INJURIOUS TO FISH

9 As far as is reasonably practicable, the Discharge shall not contain any matter, other than matter specifically covered by numerical conditions in this consent, to such an extent as to cause the receiving waters, or any waters of which the receiving waters are a tributary, to be poisonous or injurious to fish in those waters, or to the spawning grounds, spawn or food of fish in those waters, or otherwise cause damage to the ecology of those waters or to have any other adverse environmental impact.

RECORDING AND REPORTING

10 The consent holder shall establish and operate a documented maintenance programme and record all non-routine actions undertaken. These records shall be kept in a format agreed by the Agency and shall be made available for inspection by the Agency's officers at all reasonable times. Upon request the consent holder shall also provide the Agency with copies of the said records.

START DATE

11 There shall be no discharge under the terms of this consent until the **01 OCTOBER 2003 or some other date as modified in writing by the Agency prior to that date** or the start of commissioning of the works whichever is the sooner. The consent holder shall give the Agency at least 28 days written notice before making the discharge.

Dated this eleventh **day of** March **2003.**

S M Bowen

Team Leader Environment Management

CONSENT NO.	**T/30/35773/T**
SCHEDULE NO.	**T/30/35773/T 02**
DATE ISSUED	11 MAR 2003

CONDITIONS OF CONSENT TO DISCHARGE

AUGMENTATION WATER CONSISTING OF PUMPED QUARRY WATER ONLY
("the Discharge")

FROM: MONEYSTONE QUARRY, WHISTON EAVES LANE, STOKE-ON-TRENT, STAFFORDSHIRE

MINIMISE EFFECT

1 (a) The Discharge shall not contain any poisonous, noxious, or polluting matter or solid waste matter.

(b) Provided that the Discharge hereby consented is made in accordance with the following conditions of this consent, such discharge shall not be taken to be in breach of paragraph (a) above by reason of containing substances or having properties identified in and controlled by these conditions.

NATURE

2 The Discharge shall consist solely of augmentation water consisting of pumped quarry water only.

LOCATION

3 The Discharge shall be made in the manner and at the place specified as:-

(a) discharging to an unnamed tributary of the River Churnet

(b) at National Grid Reference SK 0364 4630

(c) shown marked "DISCHARGE & SAMPLE POINT-B" on attached Drawing No.**T/30/35773/T/D.**

SAMPLE POINT

4 The outlet to the watercourse shall be constructed and maintained so that a representative sample of the Discharge may be obtained at National Grid Reference SK 0364 4630 as shown marked "DISCHARGE & SAMPLE POINT-B" on attached Drawing No. **T/30/35773/T/D.**

VOLUME, RATE & FLOW

5 The volume of the Discharge shall not exceed 2110 cubic metres per day.

6 The rate of discharge shall not exceed 24.5 litres per second.

SCHEDULE NO.	T/30/35773/T 02

FLOW MEASUREMENT

7 At the request of the Agency, the consent holder shall install, operate and maintain a means of flow measuring to a specification and at a location required by the Agency, to enable the daily volume and/or instantaneous flow of the discharge to be recorded. The consent holder shall calibrate, operate and maintain the flow monitoring and recording system to a standard agreed or specified by the Agency. The flow and maintenance records shall be provided to the Agency as and when requested.

COMPOSITION

8 The composition of the Discharge shall be such that:

(a) suspended solids, dried at 105 degrees Celsius, shall not exceed 25 milligrams per litre.

(b) the pH value shall not be less than 6 nor greater than 9.

(c) there shall be no visible oil or grease in the receiving watercourse as a result of the discharge.

NON-INJURIOUS TO FISH

9 As far as is reasonably practicable, the Discharge shall not contain any matter, other than matter specifically covered by numerical conditions in this consent, to such an extent as to cause the receiving waters, or any waters of which the receiving waters are a tributary, to be poisonous or injurious to fish in those waters, or to the spawning grounds, spawn or food of fish in those waters, or otherwise cause damage to the ecology of those waters or to have any other adverse environmental impact.

RECORDING AND REPORTING

10 The consent holder shall establish and operate a documented maintenance programme and record all non-routine actions undertaken. These records shall be kept in a format agreed by the Agency and shall be made available for inspection by the Agency's officers at all reasonable times. Upon request the consent holder shall also provide the Agency with copies of the said records.

START DATE

11 There shall be no discharge under the terms of this consent until the **01 OCTOBER 2003 or some other date as modified in writing by the Agency prior to that date** or the start of commissioning of the works whichever is the sooner. The consent holder shall give the Agency at least 28 days written notice before making the discharge.

Dated this eleventh **day of** March **2003.**

S M Bowen

Team Leader Environment Management

CONSENT NO.	**T/30/35773/T**
SCHEDULE NO.	**T/30/35773/T 03**
DATE ISSUED	11 MAR 2008

CONDITIONS OF CONSENT TO DISCHARGE

AUGMENTATION WATER CONSISTING OF PUMPED QUARRY WATER ONLY ("the Discharge")

FROM: MONEYSTONE QUARRY, WHISTON EAVES LANE, STOKE-ON-TRENT, STAFFORDSHIRE

MINIMISE EFFECT

1 (a) The Discharge shall not contain any poisonous, noxious, or polluting matter or solid waste matter.

(b) Provided that the Discharge hereby consented is made in accordance with the following conditions of this consent, such discharge shall not be taken to be in breach of paragraph (a) above by reason of containing substances or having properties identified in and controlled by these conditions.

NATURE

2 The Discharge shall consist solely of augmentation water consisting of pumped quarry water only.

LOCATION

3 The Discharge shall be made in the manner and at the place specified as:-

(a) discharging to an unnamed tributary of the River Churnet

(b) at National Grid Reference SK 0386 4634

(c) shown marked "DISCHARGE & SAMPLE POINT-C" on attached Drawing No.**T/30/35773/T/D.**

SAMPLE POINT

4 The outlet to the watercourse shall be constructed and maintained so that a representative sample of the Discharge may be obtained at National Grid Reference SK 0386 4634 as shown marked "DISCHARGE & SAMPLE POINT-C" on attached Drawing No. **T/30/35773/T/D.**

VOLUME, RATE & FLOW

5 The volume of the Discharge shall not exceed 350 cubic metres per day.

6 The rate of discharge shall not exceed 4 litres per second.

SCHEDULE NO.	T/30/35773/T 03

FLOW MEASUREMENT

7 At the request of the Agency, the consent holder shall install, operate and maintain a means of flow measuring to a specification and at a location required by the Agency, to enable the daily volume and/or instantaneous flow of the discharge to be recorded. The consent holder shall calibrate, operate and maintain the flow monitoring and recording system to a standard agreed or specified by the Agency. The flow and maintenance records shall be provided to the Agency as and when requested.

COMPOSITION

8 The composition of the Discharge shall be such that:

(a) suspended solids, dried at 105 degrees Celsius, shall not exceed 25 milligrams per litre.

(b) the pH value shall not be less than 6 nor greater than 9.

(c) there shall be no visible oil or grease in the receiving watercourse as a result of the discharge.

NON-INJURIOUS TO FISH

9 As far as is reasonably practicable, the Discharge shall not contain any matter, other than matter specifically covered by numerical conditions in this consent, to such an extent as to cause the receiving waters, or any waters of which the receiving waters are a tributary, to be poisonous or injurious to fish in those waters, or to the spawning grounds, spawn or food of fish in those waters, or otherwise cause damage to the ecology of those waters or to have any other adverse environmental impact.

RECORDING AND REPORTING

10 The consent holder shall establish and operate a documented maintenance programme and record all non-routine actions undertaken. These records shall be kept in a format agreed by the Agency and shall be made available for inspection by the Agency's officers at all reasonable times. Upon request the consent holder shall also provide the Agency with copies of the said records.

START DATE

11 There shall be no discharge under the terms of this consent until the **01 OCTOBER 2003 or some other date as modified in writing by the Agency prior to that date** or the start of commissioning of the works whichever is the sooner. The consent holder shall give the Agency at least 28 days written notice before making the discharge.

Dated this eleventh **day of** March **2003.**

P M Bowen

Team Leader Environment Management