DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY

ENGINEERING GEOLOGY SECTION

PROPOSED BUILDING EXTENSIONS - NORWOOD HIGH SCHOOL
Section 286, Hd. Adelaide
FOUNDATION INVESTIGATION

DESIGN STAGE

- Public Buildings Department -

by

P.A. ROGERS
GEOLOGIST
ENGINEERING GEOLOGY SECTION

Rept.Bk.No. 71/95

9th June, 1971

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Rept.Bk.No. 71/95
G.S. No.4670
D.M. No.594/71

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DEPARTMENT OF MINES
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PROPOSED BUILDING EXTENSIONS - NORWOOD HIGH SCHOOL

Section 286, Hd. Adelaide

FOUNDATION INVESTIGATIONS

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Client: Public Buildings Department

SUMMARY AND CONCLUSIONS

A cable-tool hole (CH1) was drilled to a depth of 60ft. on the site of proposed building extensions at Norwood High School. The hole penetrated a sequence of sediments consisting of 2ft. of top soil (very stiff CLAY SOIL*) overlying the Hindmarsh Clay Formation. The Hindmarsh Clay consists of firm to hard CLAY SOIL of low plasticity, and stiff to hard CLAY SOIL of high plasticity with layers of GRAVEL. The clays are highly calcareous, particularly in the upper 20ft. Between 38ft. and 49ft., just below the water table, the clays have a moisture content greater than plastic limit.

The groundwater level, measured after a period of heavy rain at the onset of winter is 39ft. below ground surface.

The clays of Hindmarsh Clay, below a depth of 20ft. should provide adequate support for piled foundations.

Possible future movements on the active Eden Fault and the Burnside Fault, which pass within 0.5 miles of the site, should be taken into consideration when designing the foundations.

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*These terms are defined in Appendix A.

INTRODUCTION

On the 28th April, 1971, the Public Buildings Department asked the Department of Mines to determine soil foundation conditions for proposed building extensions to the Norwood High School.

An exploratory cable-tool hole was proposed (Fig.1), with an anticipated depth of 60ft.

Hole CH1 was drilled from the 4 to 12 of May, 1971, to a depth of 60ft.

Sealed tube samples were taken at 5 foot intervals to a depth of 45ft., and standard penetration tests were carried out at intervals of 5ft. to a depth of 57ft. Open tube samples were taken throughout the remainder of the hole. The sealed tube samples were sent for testing to the E. & W.S. Laboratory.

Portions of open-tube samples taken from 8ft. to 9ft. and 15ft. to 16ft. were sent to A.M.D.L. for gradings, and Atterberg Limits on fines. The results are given in appendix B.

REGIONAL GEOLOGY

Norwood High School is situated on the Burnside Splinter which is a sliver of land 0.25 to 0.75 miles wide, partly separated from the Para Block by the concealed Burnside Fault. (Sprigg et al, 1951). In the Norwood area, the Burnside Splinter is probably 0.75 miles wide. The school lies about 0.25 miles east of the Burnside Fault, and about 0.5 miles west of the Eden Fault, which forms the eastern boundary of the Para Block.

The surface deposits in the Norwood area consist of Recent alluvial clays and sands, which are underlain by the Hindmarsh Clay (Pleistocene to Recent).

SITE GEOLOGY

Topography and Geology

Hole CH 1 is located on a flat, grass-covered area and there are no exposures of the underlying material. Geological observations are limited to the logged drill core (Appendix A), which is summarized in Table 1.

The thin covering of recent top soil is underlain by the Hindmarsh Clay which consists of red-brown, stiff to hard clay with gravel layers (CH/GC) and firm to hard calcareous silty clay (CL).

Groundwater

Water was cut at a depth of 40ft., in a bed of clayey gravel. The water appeared as a very slow seepage. The water rose to 39ft. but had fallen to 40ft. when drilling was finished. Although drilling was preceded by a period of heavy rainfall, it is likely that the water table would rise further towards the end of the winter season.

DISCUSSION

The Hindmarsh Clay consists mainly of stiff to hard clay soil. Between 38ft. and 49ft., the clays have a moisture content greater than, or equal to, plastic limit, but still have a stiff to very stiff consistency. Thin gravel layers have a high clay content and a similar consistency to the clays with which they are interbedded.

TABLE 1 - SUMMARY OF HOLE CH 1

DEPTH IN FT.	THICKNESS (FT.)	STRATIGRAPHIC UNIT	LITHOLOGY	ENGINEERING PROPERTIES	
				CONSISTENCY	MOISTURE CONTENT
0 to 2	2	Recent topsoil	CLAY SOIL (CH) dark red-brown sandy, pebbly clay with plant roots.	very stiff	less than plastic limit
2 to 20	18	Hindmarsh Clay	CLAY SOIL (CH) red brown silty clay with scattered pebbles; CLAY SOIL (CL) pale red-brown silty sandy calcareous clay.	stiff to very stiff; firm to hard	less than plastic limit
20 to 60	40	Hindmarsh Clay	CLAY SOIL (CH) red-brown silty clay with scattered pebbles; thin layers of GRAVEL (GC) with excess clayey fines.	stiff to hard	Clay exceeds plastic limit between 38ft. and 49ft. Clay approx. equal to plastic limit in rest of core.

Layers of very silty, calcareous clay occur between 4ft. and 19ft. These clays have a firm to hard consistency.

Paul A. Rogers.

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PAR:CF
9.6.71

REFERENCES

Sprigg, R.C.; Whittle, A.W.G.; Campana, B., 1951. *Adelaide* map sheet, Geological Atlas of South Australia, 1:63,360 series, *geol. Surv. S.Aust.*

APPENDIX A

Log of cable-tool hole, CH1,

and explanatory notes.

DEPARTMENT OF MINES · SOUTH AUSTRALIA

LOG OF CABLE TOOL HOLE

PROJECT	NORWOOD HIGH SCHOOL
FEATURE	SCHOOL EXTENSIONS
LOCATION	Adjacent to shelter shed
SECTION	286
HUNDRED	Adelaide
CO-ORDS	–
HOLE	CH 1
SERIAL No.	395/71
R.L. Surface	– FT.
R.L. Collar	– FT.
Datum	–

GEOLOGICAL NOTES AND CLASSIFICATION	R.L. (FEET) DEPTH	GROUP SYMBOL	SOIL DESCRIPTION GROUP NAME (Unified Soil Classification, U.S.B.R. Earth Manual 2nd Edition 1966)	Consistency / Compact Dens'y	FIELD TEST DATA: BLOWS PER FOOT (20 40 60 80)	SOILTEST P'TR'METER Units* (1 2 3 4)
RECENT TOPSOIL		CH	CLAY SOIL - dark red-brown sandy clay; plant roots & rock fragments.	V.St.		
PLEISTOCENE TO RECENT, Hindmarsh Clay. Red-brown, slightly silty, generally stiff clay and crumbly, silty, clay (calcareous); with gravel layers. Highly porous with numerous root holes up to 1 mm. throughout. Infilled worm burrows 5 mm. diameter. Highly calcareous.		CH	CLAY SOIL - mottled red-brown slightly sandy clay with scattered rock fragments.		5 blows	
		CL	CLAY SOIL - pale red-brown very silty, crumbly calcareous clay.	F, St./V.St.		
	10	CH	CLAY SOIL - red-brown silty clay.		16 blows	
		CL	CLAY SOIL - red-brown, crumbly very silty calcareous clay.	H, V.St.	12 blows	
		CH/CL	CLAY SOIL - red-brown silty clay with scattered small pebbles. Crumbly, silty calcareous clay & gravel at 18 ft. to 19 ft.	St., V.St.		
Few holes up to 1 mm. diameter, slightly porous. Red-brown and pale red-brown (calcareous) mottling	20	CH	CLAY SOIL - red-brown clay with clayey gravel layers.		25 blows	>4.5
		GC		H		>4.5, >4.5
	30	CH		V.St., H	16 blows	
				V.St., H	18 blows	
		GC				
		CH	Clay with scattered gravel.	V.St.	18 blows	
	40	GC		St., V.St.		
				St.	11 blows	
Near horizontal shiny surfaces showing slicken-siding. Small patches of pale grey unaltered clay.				V.St.	17 blows	>4.5
	50	CH	clay with scattered gravel.	H, V.St.	23 blows	
				H		
	60			St., V.St.	14 blows	
			END OF HOLE 60·0 ft.			

Water level: 11 May '71; WC

Moisture content: < PL (to approx. 40 ft.); ≥ PL; ≈ PL

TYPE OF SAMPLE		CONSISTENCY (Clays)	COMPACTNESS (Silts)	RELATIVE DENSITY (Sands)	MOISTURE CONTENT
A Shoe (SA)	Water level (date) 7 Dec. '66	VS. — Very Soft	Ls — Loose	VL — Very Loose	H — Humid
D " (SD)	Casing	S — Soft	MC — Moderately Compact	L — Loose	D — Damp
E " (SE)	WC ▶ Water cut	F — Firm	C — Compact	MD — Medium Dense	M — Moist
G " (SG)		St. — Stiff	VC — Very Compact	D — Dense	W — Wet
Sealed Tube - A Shoe - SAL		V. St. — Very Stiff		VD — Very Dense	S — Saturated
Standard Penetration Test - SPT		H. — Hard			LL — Liquid Limit
					PL — Plastic Limit

* These values refer to clay soils only and provide an indication of their consistency.

ENGINEERING GEOLOGY SECTION

DRILL No.	24
TYPE	DM 500
DRILLER	E. JAMIESON
START	4 May '71
FINISH	12 May '71
LOGGED BY	P. ROGERS
DATE	14 May '71
TRACED	D.W.W.
CHECKED	L.V.W.
SHEET	1 OF 1
DRG No.	S9315 Ha 6

APPENDIX

LOGS OF CABLE TOOL HOLES AND EXPLANATORY NOTES

NOTES ON DRILLING PROCEDURES

Equipment

The drilling is carried out with a cable tool drilling plant using sampling tubes attached, through a vacuum head, to the sampling tools (Figs. 1 and 2).

Sampling Procedures

S.A. Samples

To obtain, for logging purposes, an almost continuous series of samples, with a relatively small amount of sample disturbance, SA type samples are taken. These are obtained by driving an "S" tube, fitted with a Mark A shoe (Fig. 2), into the material to be sampled.

The assembly is lowered carefully to the bottom of the hole, and the tube driven exactly 1 foot, and the number of blows required for the 1 foot of penetration recorded.

The sample, or core, is extruded from the sampling tube using an hydraulic ram. The extruded core is sealed in a labelled plastic bag and stored in a core box (Fig. 3).

The hole is reamed with a "D" or "E" shoe (Fig. 2) and then the next sample is taken, using the same procedure as above. Thus the hole proceeds by alternate sampling, reaming (and where required, casing) operations, and the samples form a continuous record of the materials penetrated except for a few inches which may be lost between samples during reaming operations.

SA sampling equipment is a composite sampler for simple class sampling. Details are as follows:-

"S" SERIES CUTTING SHOES

MARK	FEATURES	USES
A	Inside clearance 3%. Area Ratio 33%.	Continuous open-tube sampling in strong soils, in which it causes little deformation. Samples extruded and used for logging purposes. Hole is reamed after each sample.
D	Shoe belled out to 4 29/32 in. (just greater than outside dia. of vacuum head)	Continuous open tube sampling where considerable deformation of sample is permissible. Essentially self-reaming.

MARK	FEATURES	USES
E	Shoe belled out to 5 7/16 in. (just less than internal dia. of 6 in casing)	Cleaning hole and reaming out hole.

Sealed Tube (LB) Samples

Sealed tube samples, for laboratory testing, are taken at various intervals during drilling. These are obtained by driving an "L" type sampling tube with a Mark B cutting shoe (Fig. 4) a distance of 1 foot into the material to be sampled.

Before the sample is taken the hole is cleaned out to the depth specified. The hole is not reamed or cased for at least 1 foot from the bottom, however, because these operations can cause considerable disturbance in the soil below. The sampling assembly is lowered carefully to the bottom of the hole, the sampling tube driven exactly 1 foot, and the number of blows recorded.

The sample is sealed in the tube by inserting in each end, plastic seals with rubber sealing rings, and the tube is then labelled and stored in a Laboratory Sample Box.

LB sampling equipment is a composite sampler for obtaining samples with the least possible disturbance. Details are as follows:

Sampler tube "L" type - ASSAB tube cadmium plated
4.016 in I.D.
4.282 in O.D.

Mark B shoe - ASSAB tube, heat treated, cadmium plated
Area ratio 15%
Inside clearance - ~~nil~~ 0.4%
Outside clearance - nil
Cutting edge angle - 7°

Standard Penetration Test

The Standard Penetration Test (Terzaghi et al 1948) is used to test the in-situ density of sands and to give an indication of the consistency of clays, and compactness of silts. However the test results can be affected by several geological factors such as degree of cementation, and size and shape of grains. These factors should be taken into account in interpretation of results.

The equipment is illustrated in Fig. 5 and consists of a 2in. diameter, sampling spoon (tube) and a hammer of standard weight (140 lbs).

With the equipment assembled as in Fig. 5 the hammer is allowed to fall on to the drill rods until the sampling shoe has penetrated 6 in. into the soil. The Standard Penetration Test is the number of blows (N) required to produce the next foot of penetration.

NOTES ON DRILL LOG SHEETS

The logs are plotted on a standard cable-tool log form.

Near the centre of the form a graphic log of the materials encountered is shown.

In the column to the right of the graphic log, the soils are classified and described according to the Unified Soil Classification (U.S. Dept. of Interior, Bureau of Reclamation 1966) as shown on Figure 6.

To the left of the graphic log is a geological description of the materials sampled. This includes:-

........Geological age)
........Soil unit name) Printed vertically
........Type of material)

........Mineral composition

........Grain shape

........Cementation

........Organic materials

Water levels are indicated by a small arrow with the date at which the observation was made.

In the blows per foot column, a continuous histogram is made of the number of blows required to drive the sampling tube through each foot of material. A hatching code is used to distinguish various types of sample. This code is reproduced at the bottom of each log sheet.

In the column on the far right of the log sheet, readings of unconfined compressive strength (qu) made with a Soiltest Penetrometer, are recorded. The readings are plotted as a histogram. The Soiltest Penetrometer only gives true values of qu when used in clays in which $\phi = 0$.

REFERENCES

TERZAGHI, K. and PECK, R.B., 1948. Soil Mechanics in Engineering Practice. John Wiley and Sons.

UNITED STATES DEPARTMENT OF THE INTERIOR, BUREAU OF RECLAMATION, 1966. Earth Manual, 2nd Edition.

DESCRIPTIVE TERMS

1. CLAY SOILS

CONSISTENCY

CONSISTENCY	SYMBOL	UNCONFINED COMPRESSIVE STRENGTH (kg/sq. cm)	FIELD TEST	N
Very Soft	V.S.	less than 0.25	Easily penetrated several inches by fist.	2
Soft	S	0.25 to 0.5	Easily penetrated several inches by thumb.	2 to 4
Firm	F	0.5 to 1.0	Can be penetrated several inches by thumb with moderate effort.	4 to 8
Stiff	St	1.0 to 2.0	Readily indented by the thumb but penetrated only with great effort	8 to 15
Very Stiff	V.St.	2.0 to 4.0	Readily indented by thumb nail.	15 to 30
Hard (Extremely stiff)	H	over 4.0	Indented with difficulty by thumb nail.	30 and over

Based partly on Terzaghi, K. and Peck. R.B. 1966. Soil Mechanics in Engineering Practice, Wiley - New York.

MOISTURE CONTENT

Abbreviation	Meaning
MC ≃ LL	Moisture Content near liquid limit.
MC < LL	" " less than liquid limit.
MC > PL	" " greater than plastic limit.
MC ≃ PL	" " near " "
MC ≤ PL	" " less or equal to plastic limit.
MC < PL	" " less than " "
MC << PL	" " much less than " "

2. SILT SOILS

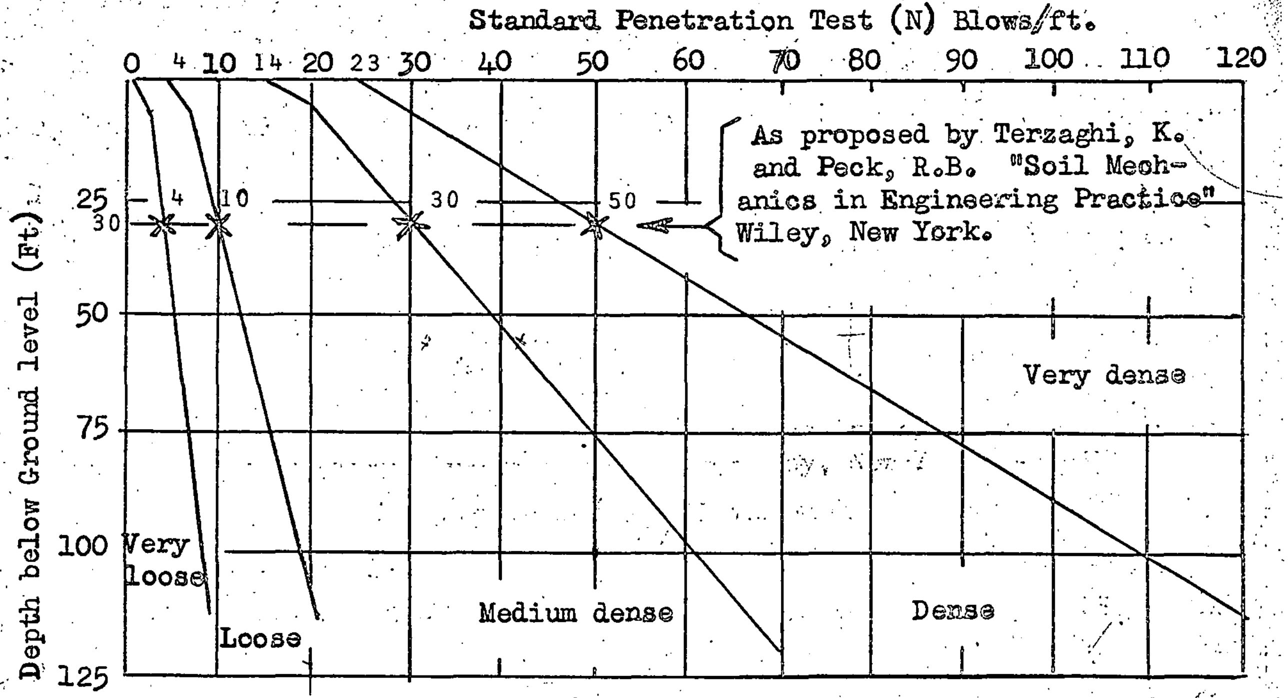
COMPACTNESS	SYMBOL	N
Loose	Ls	0 to 8
Moderately compact	MC	8 to 15
Compact	C	15 to 30
Very Compact	VC	greater than 30

3. SANDS

CLASSIFICATION OF SANDS BY STANDARD PENETRATION TEST

The relative density of granular soils has been judged from the results of Standard Penetration Tests carried out by the procedure described by Terzaghi and Peck (1948) bearing in mind the limitations of the method as discussed by Gibbs and Holtz (1957). At all times the water in the drill hole was kept at the level of surrounding groundwater.

EFFECT OF OVERBURDEN PRESSURE ON STANDARD PENETRATION TEST

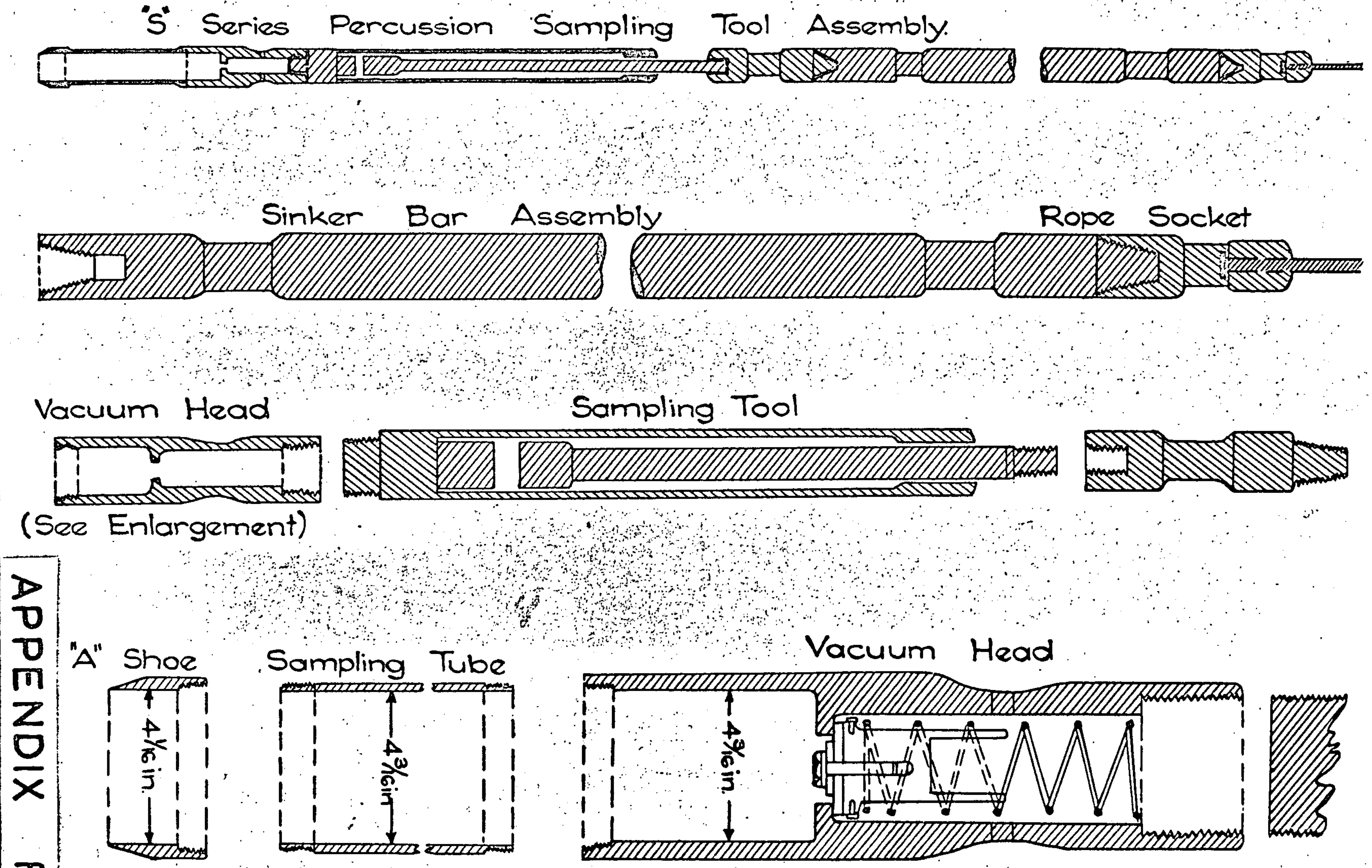


Based on Gibbs, H.J. & Holtz, W.G. (1957) "Research on Determining the Density of Sands by Spoon Penetration Testing" Vol. I Proc. 4th Int. Conf. SM & FE, London.

REFERENCES

TERZAGHI, K., and PECK, 1948. "Soil Mechanics in Engineering Practice". Wiley. New York.

GIBBS, H.T. and HOLTZ, W.G., 1957. Research on Determining the Density of Sands by Spoon Penetration Testing. Proc. 4th Inter. Conf. SM & FE, London, Vol. 9.



APPENDIX FIG. 1

DEPARTMENT OF MINES — SOUTH AUSTRALIA

ENGINEERING GEOLOGY SECTION

SENIOR GEOLOGIST

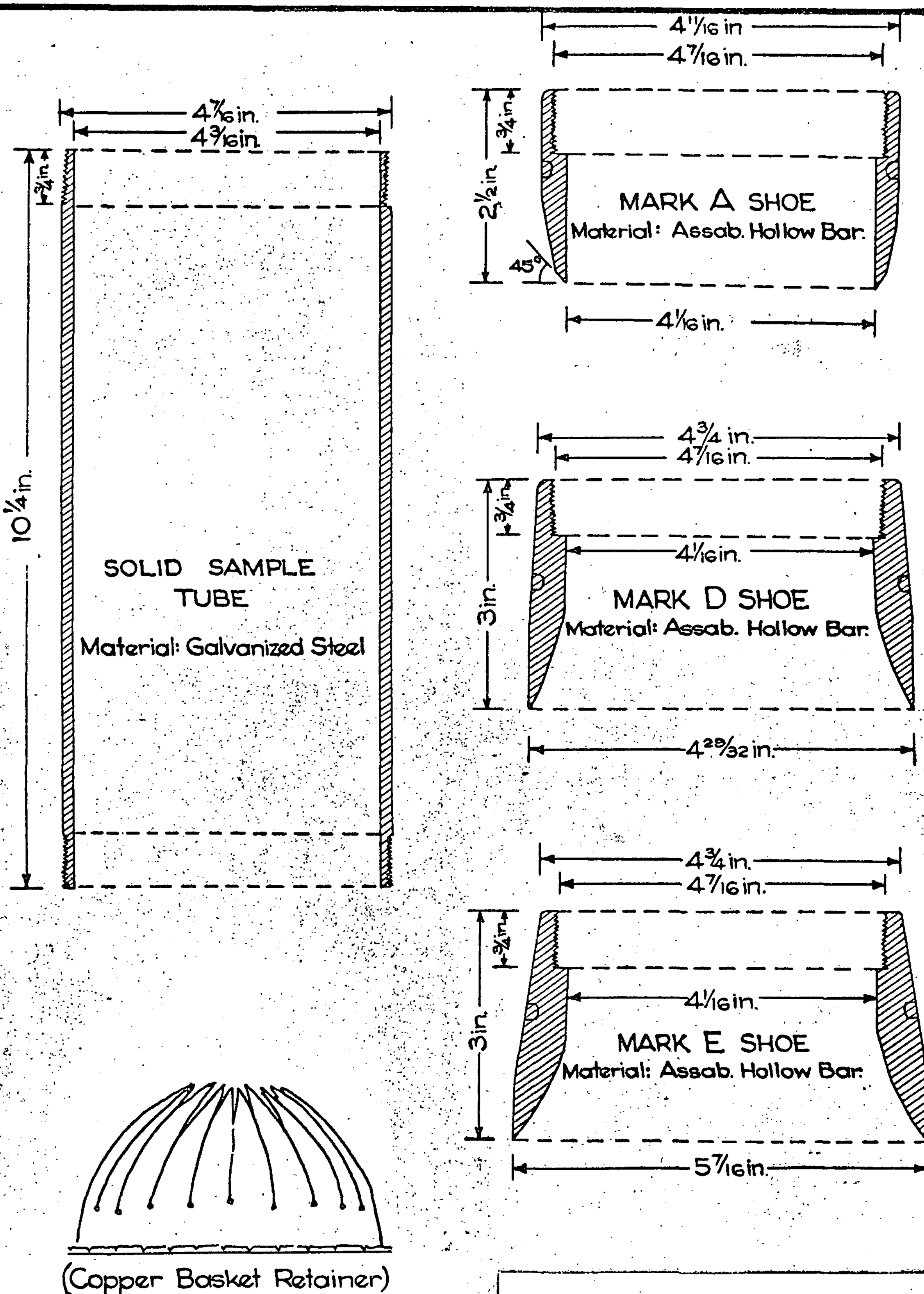
Drn. DHS
Tcd AMSD
Ckd. LVW
Exd DA

CABLE-TOOL DRILLING SAMPLING TOOL ASSEMBLY WITH "S" SERIES SHOES

SCALE: NOT TO SCALE

S 4416 MB

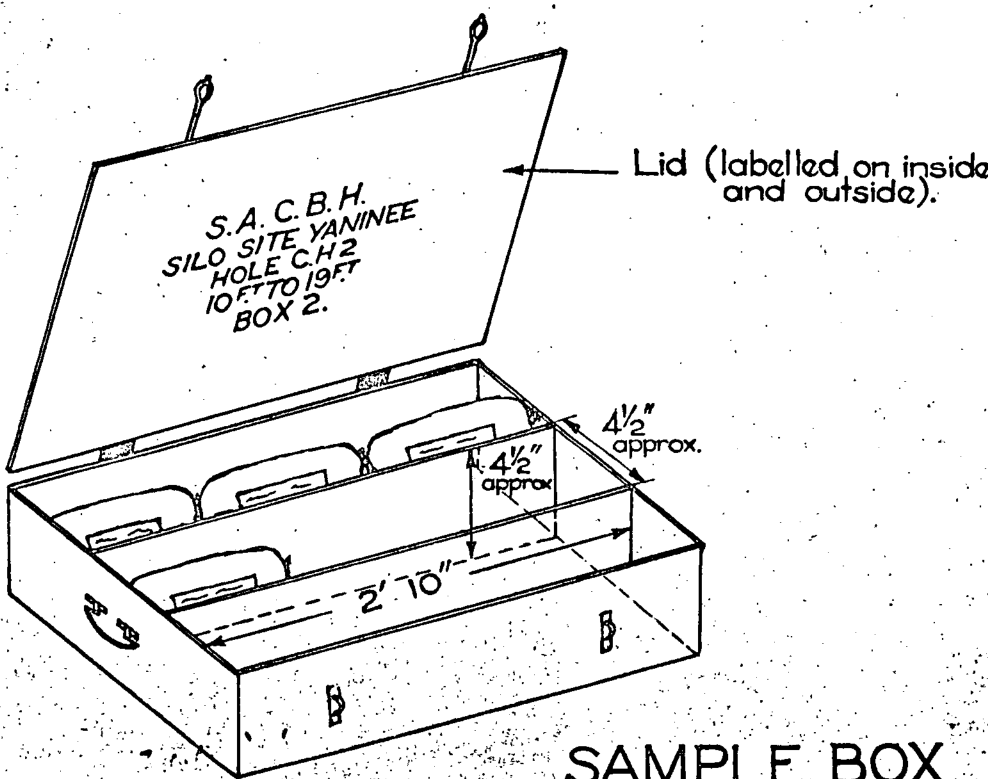
DATE: 21 Oct '69



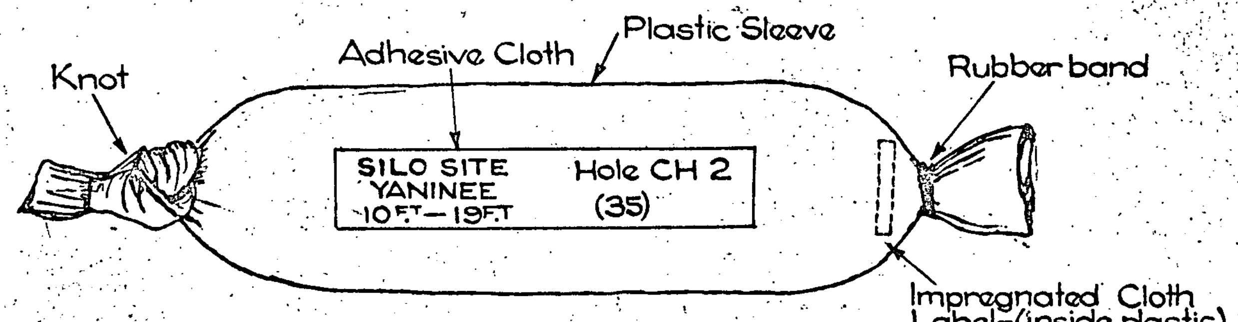
APPENDIX FIG. 2

DEPARTMENT OF MINES — SOUTH AUSTRALIA

ENGINEERING GEOLOGY SECTION	Drn D.H.S.	CABLE-TOOL DRILLING	SCALE: NOT TO SCALE
	Tcd. AMcD	S SERIES SAMPLING	S4418 MB
	Ckd. L.V.W.	TUBE AND SHOES	
[signature] for SENIOR GEOLOGIST	Exd. D.H.S.		DATE: 21 Oct '69



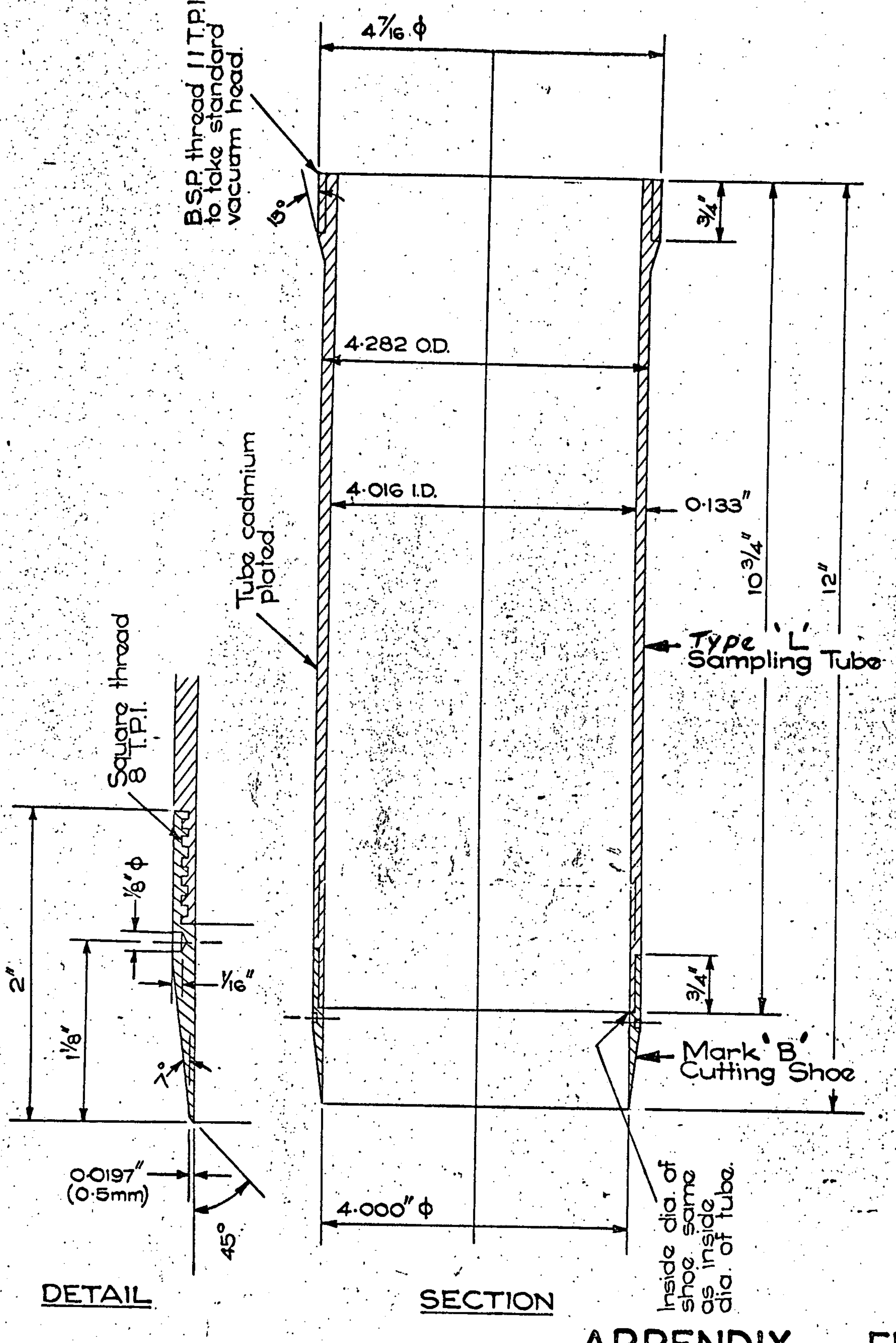
SAMPLE BOX



EXTRUDED SAMPLE
SEALED IN PLASTIC SLEEVE.

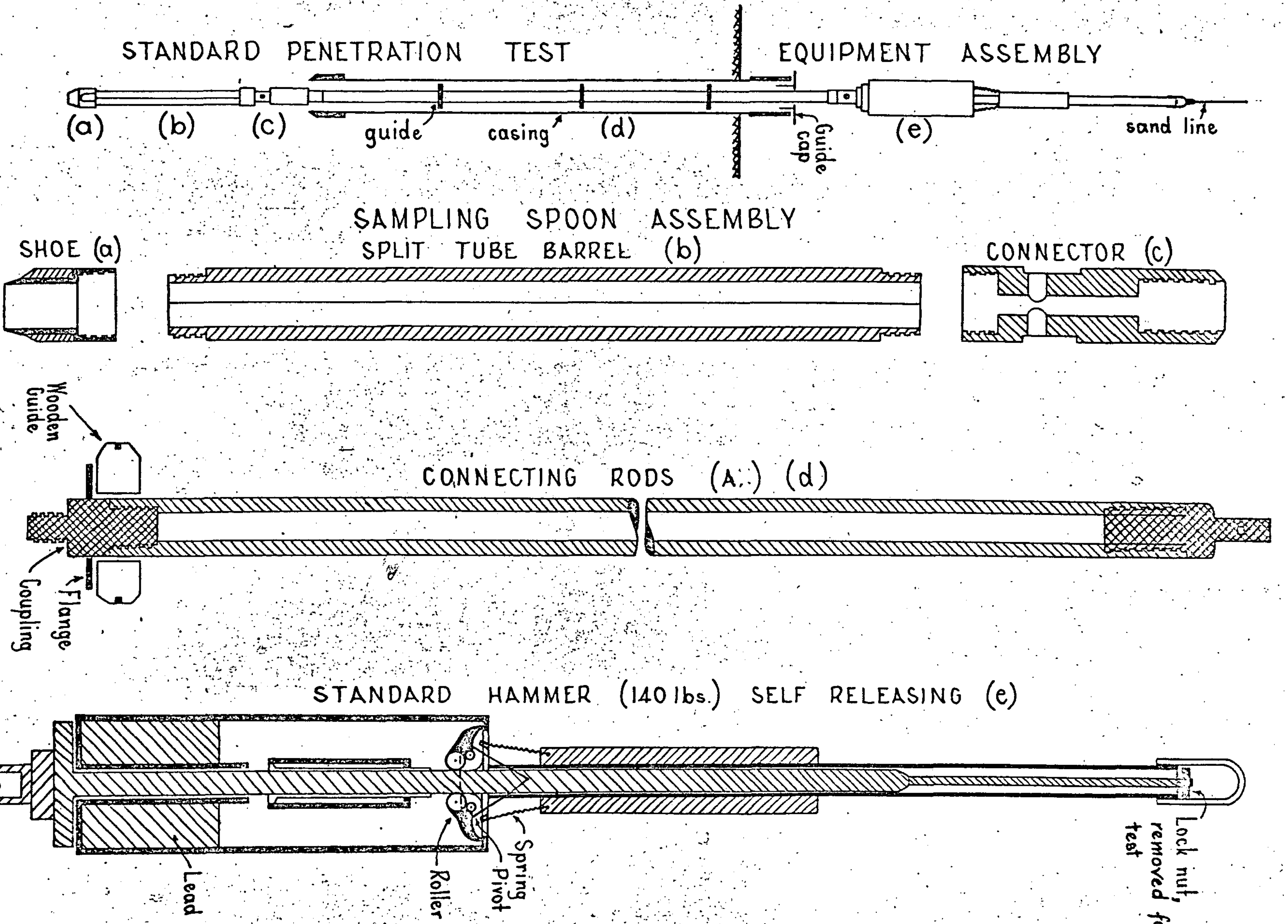
APPENDIX FIG. 3

ENGINEERING DIVISION	DEPARTMENT OF MINES - SOUTH AUSTRALIA	Scale:
Compiled: W.R.P.B	CABLE TOOL DRILLING LABELLING AND BOXING OF EXTRUDED SAMPLES	Date: 17 Dec. '69
Drn AMcD. Ckd.		Drg. No S7580 MD



APPENDIX , FIG. 4

ENGINEERING DIVISION	DEPARTMENT OF MINES - SOUTH AUSTRALIA	Scale: Half and Full size
Compiled: J. Trudinger	CABLE TOOL DRILLING THIN-WALLED "L" SAMPLE TUBE AND "B" SHOE	Date: 19 Feb '70
Drn. AMcD Ckd. L.V.W.		Drg. No S7636 MB



APPENDIX FIG.5

STANDARD PENETRATION TEST EQUIPMENT

DEPARTMENT OF MINES - SOUTH AUSTRALIA

ENGINEERING DIVISION

Compiled: W.R.P.B.

Drn. R.H. | Ckd.

Scale: Not to scale

Date: 22 Dec 1969

Drg. No S4420 MB

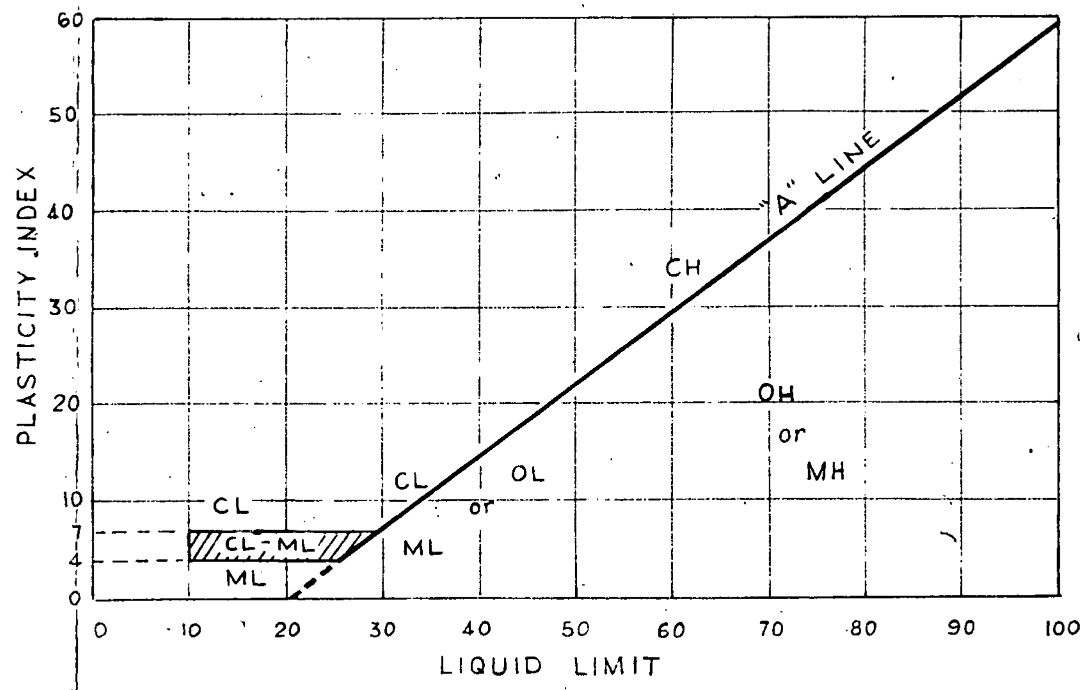
ENGINEERING GEOLOGY SECTION

SOILS CLASSIFICATION CHART

DEPARTMENT OF MINES SOUTH AUSTRALIA

FIELD IDENTIFICATION PROCEDURES (Excluding particles larger than 0.25 ft. and basing fractions on estimated weights)				GROUP SYMBOL	GROUP NAME and typical materials	LABORATORY CLASSIFICATION CRITERIA			
COARSE GRAINED SOILS More than 50% of material is larger than No. 200 B.S. Sieve size.	GRAVELS More than 50% of the coarse fraction is larger than 2mm. (retained on B.S.7 sieve)	CLEAN GRAVELS Little or no fines	Wide range in grain size and substantial amounts of all intermediate particle sizes	GW	GRAVEL, well graded; gravel sand mixtures, little or no fines	GRAIN SIZE CURVE to be used to identify soil fractions	Coarse grained soils classified on basis of percentage of fines, as follows: PERCENT OF FINES Less than 5: GRAVELS GW, GP; SANDS SW, SP. More than 12: GM, GC; SM, SC. 5 to 12: Borderline cases, use 2 symbols	$Cu = \frac{D_{60}}{D_{10}}$ Greater than 4; $Cc = \frac{(D_{30})^2}{D_{10} \cdot D_{60}}$ Between one and 3	
			Predominantly one size, or a range of sizes, with some intermediate sizes missing.	GP	GRAVEL, poorly graded; gravel sand mixtures, little or no fines.			Not meeting all gradation requirements for GW	
		DIRTY GRAVELS Appreciable amount of fines	Non-plastic fines - for identification see ML below.	GM	GRAVEL, excess silty fines; poorly graded gravel-sand-silt mixtures			Atterberg limits below "A" line or PI less than 4	Above "A" line with PI between 4 and 7 are borderline cases requiring use of dual symbols
			Plastic fines - for identification see CL below	GC	GRAVEL, excess clayey fines; poorly graded gravel-sand-clay mixtures			Atterberg limits above "A" line with PI greater than 7	
	SANDS More than 50% of the coarse fraction is smaller than 2mm. (passing B.S.7 sieve)	CLEAN SANDS Little or no fines.	Wide range in grain sizes, and substantial amounts of all intermediate particle sizes	SW	SAND, well graded; well graded sands, gravelly sands, little or no fines.			$Cu = \frac{D_{60}}{D_{10}}$ Greater than 6; $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ Between one and 3	
			Predominantly one size or a range of sizes, with some intermediate sizes missing.	SP	SAND, poorly graded; poorly graded sands gravelly sands, little or no fines			Not meeting all gradation requirements for SW	
		DIRTY SANDS Appreciable amount of fines	Non plastic fines - for identification see ML below	SM	SAND, excess silty fines; poorly graded sand-silt mixtures			Atterberg limits below "A" line or PI less than 4	Above "A" line with PI between 4 and 7 are borderline cases requiring use of dual symbols
			Plastic fines - for identification see CL below	SC	SAND excess clayey fines; poorly graded sand-clay mixtures.			Atterberg limits above "A" line with PI greater than 7	

FINE-GRAINED SOILS More than 50% of material is smaller than No. 200 B.S. sieve size.	FIELD INVESTIGATION PROCEDURES on fraction smaller than 0.4mm. (passing B.S. 36 sieve)						GROUP SYMBOL	GROUP NAME (and typical materials)
		SOIL CAST (wet soil)	SOIL THREAD	SHINE	DILATANCY	ODOUR	DRY STRENGTH		
	SILTS AND CLAYS Liquid limit less than 50	Forms fragile cast Cracks form when kneaded while moist	Thick crumbly thread; easily broken	None to very dull	Distinct	Not significant	None to slight	ML	SILT SOIL, low plasticity; inorganic silts and very fine silty or clayey sands, rock flour.
		Cast maybe handled freely without breaking. Can be kneaded moist without cracking. Material adheres to the hand.	Thread can be pointed as fine as a lead pencil, but is fragile.	Moderate	None to slight	Not significant	Moderate	CL	CLAY SOIL, low plasticity; inorganic clays of low to medium plasticity, gravelly clays, sandy clays silty clays, lean clays
		Cast fragile to cohesive material will adhere somewhat to the hand.	Soft, weak thread.	None to very dull	Slight to distinct	Decayed organic matter	Low	OL	ORGANIC SOIL low plasticity; organic silts and silt clays of low plasticity
	SILTS AND CLAYS Liquid limit more than 50	Moderately plastic and cohesive. Material adheres somewhat to the hand	Weak to medium thread. May be crumbly.	Dull	None to slight	Not significant	Moderate Powdered soil feels floury	MH	SILT SOIL, high plasticity; inorganic silts, micaceous or diatomaceous fine sandy or silty soils elastic silts.
		Very plastic and cohesive. Material very sticky to the hand. Greasy to to touch.	Very tough thread Can be rolled to a pin point.	Very glossy	None	Strong earthy.	High to very high. Cannot be powdered by finger pressure	CH	CLAY SOIL, high plasticity; inorganic clays of high plasticity, fat clays
		Plastic and cohesive. Feels slightly spongy Greasy to touch.	Weak to medium thread. Often soft and fibrous	Moderate to very glossy	None	Decayed organic matter	Moderate to high. Powdered soil may be fibrous.	OH	ORGANIC SOIL, high plasticity; organic clays of medium to high plasticity.
HIGHLY ORGANIC SOILS	Readily identified by colour, odour, spongy feel and frequently by fibrous texture.						Pt	PEATY SOIL; Peat and other highly organic soils.



PLASTICITY CHART
FOR LABORATORY CLASSIFICATION OF FINE GRAINED SOILS

NOTE : BOUNDARY CLASSIFICATIONS : Soils possessing characteristics of two groups are shown as a combination of two group symbols, e.g. GW-GC, well graded gravel with clay binder.

Based on "The Unified Soil Classification System" United States Department of the Interior, Bureau of Reclamation "Earth Manual" First Edition, Denver COLORADO 1960

APPENDIX

64-246
MG

FIG. 6

TRIM LINE

APPENDIX B

Amdel Report

Paul A. Rogers.

amdel
The Australian Mineral Development Laboratories

Flemington Street, Frewville, South Australia 5063
Phone 79 1662, telex AA82520

Please address all correspondence to the Director
in reply quote: ME 1/2/0

A32/71

31 May 1971

The Technical Information Officer
Depatment of Mines
Rundle Street Post Office, Box 38
ADELAIDE SA 5000

REPORT: ME 5066/71

YOUR REFERENCE:	Application dated 19 May 1971
MATERIAL:	Clay
LOCALITY:	Hundred of Adelaide N.H.S.
IDENTIFICATION:	CH1 A193/71, CH1 A194/71
DATE RECEIVED:	20 May 1971
WORK REQUIRED:	Sieve analysis and Atterberg limits

Investigation and Report by: C. Biggs, G. Reid and R.B. Clissold

Officer in Charge,
Mineral Engineering Section: G.A. Dunlop

G. A. Dunlop

for F.R. Hartley
Director

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PROCEDURE

Two samples of clay were received for sieve analysis and Atterberg limit determinations. The samples were broken up, then dried in a low temperature oven and representative portions of each obtained by riffling for the sizing and Atterberg limit determinations.

The sizing analyses on each sample after initially wet splitting on 200 mesh BSS and rescreening the dried plus 200 mesh fraction, using a Pascal Inclyno Sieve Shaker for 15 minutes are shown in Table 1.

The plus 36 mesh BSS material was removed by hand screening from each of the samples for Atterberg limit determinations on the minus 36 mesh fraction as specified in British Standard 1377.

The results are shown in Table 2 and Figures 1 and 2. All samples were disposed of as instructed.

Results were phoned to Mr P. Rogers on 28 May 1971 as instructed.

Sample No.	Depth (ft.)
A 193/71	8 to 9
A 194/71	15 to 16

Table 1

Micron Size	Equivalent Mesh BS	Cumulative % Passing	
		A 193/71	A 194/71
420	36	94.44	96.68
300	52	93.12	95.38
150	100	90.43	92.33
75	200	84.35	85.66

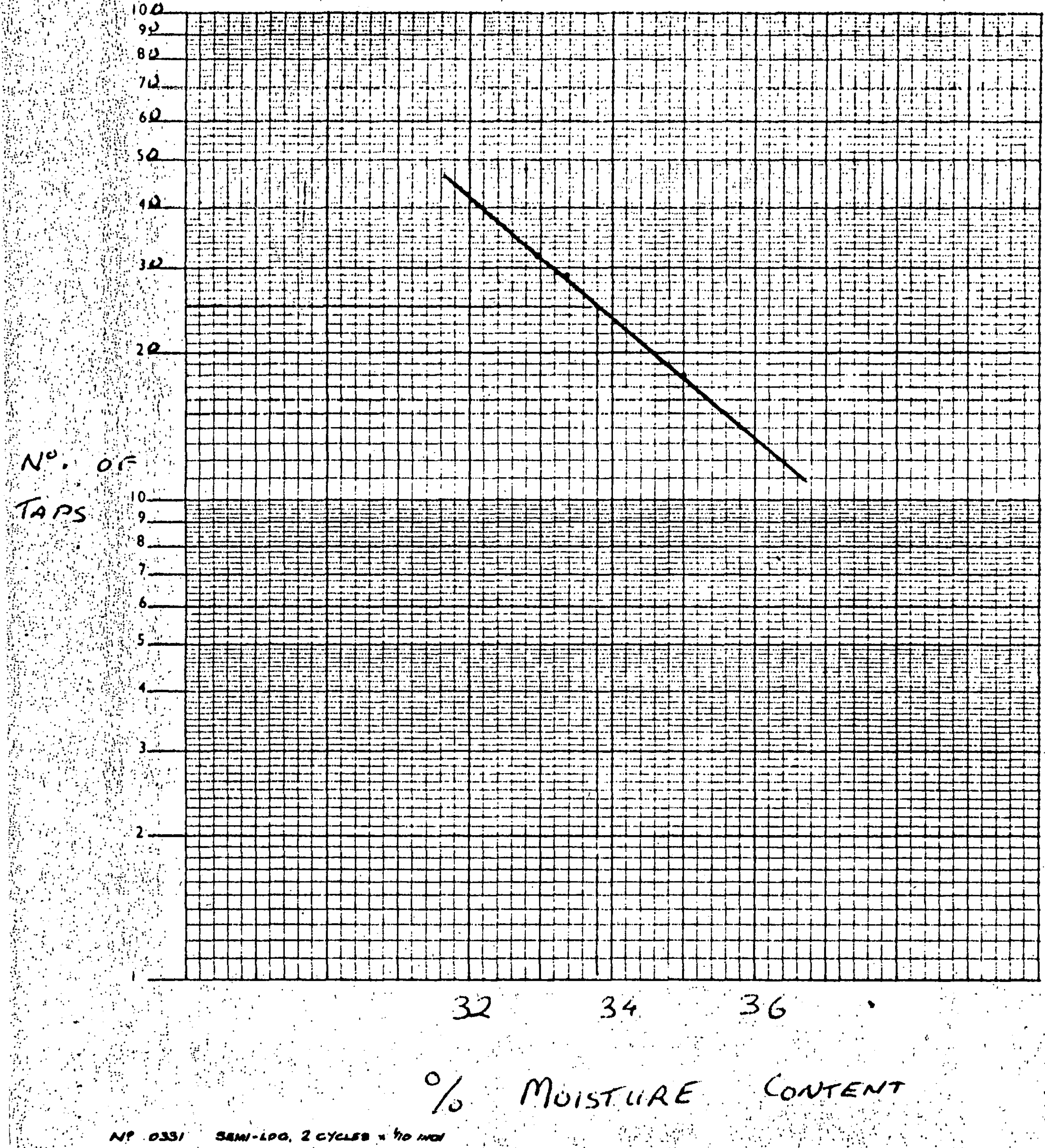
Table 2

Sample Number	Liquid Limit	Plastic Limit	Plasticity Index
A 193/71	33.8	15.8	18.0
A 194/71	34.2	15.3	18.9

1/2/0 - 5066/71

SAMPLE: A 193/71

FIG I



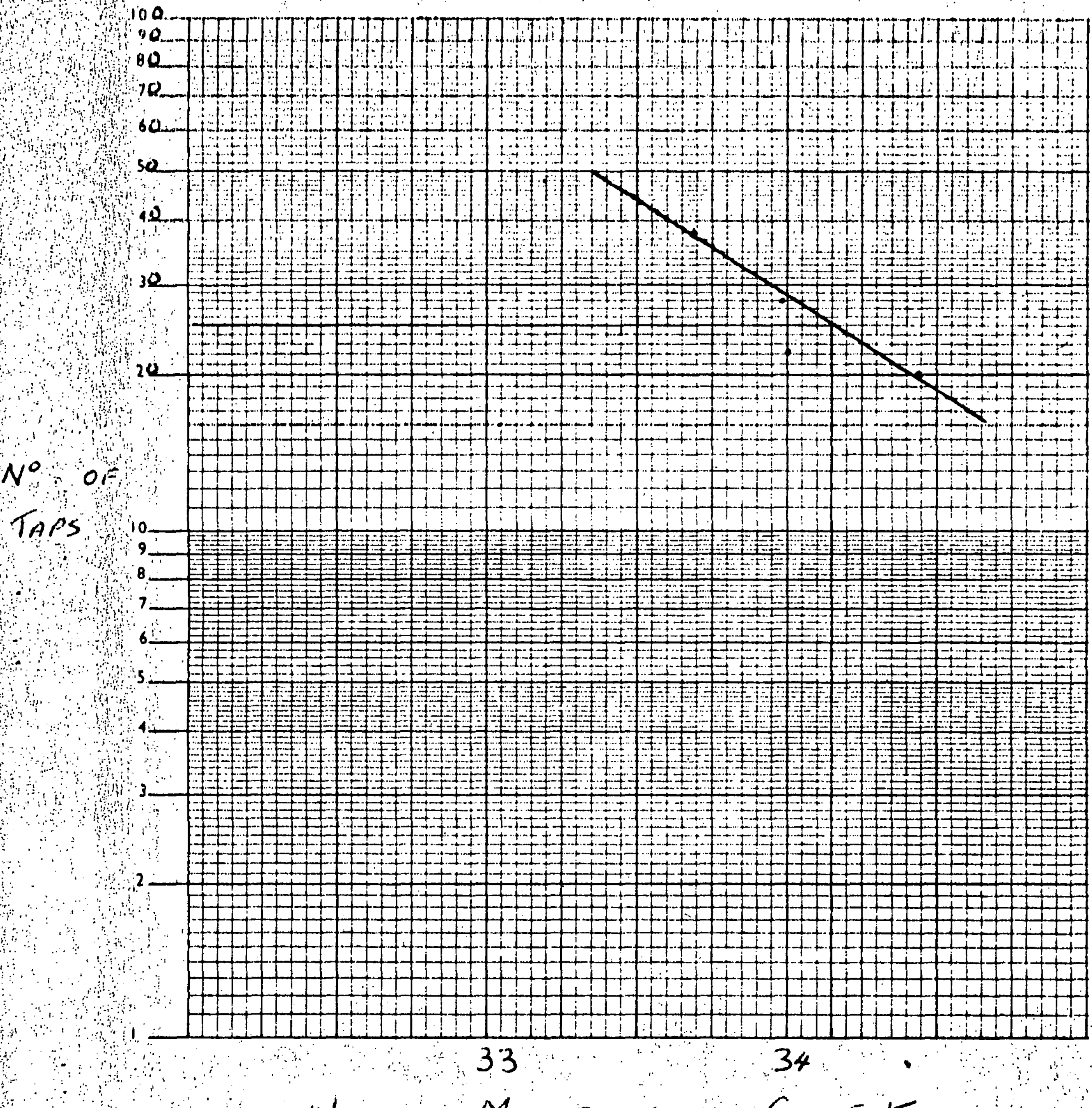
LIQUID LIMIT 33.8

PLASTIC LIMIT 15.8

PLASTICITY INDEX 18.0

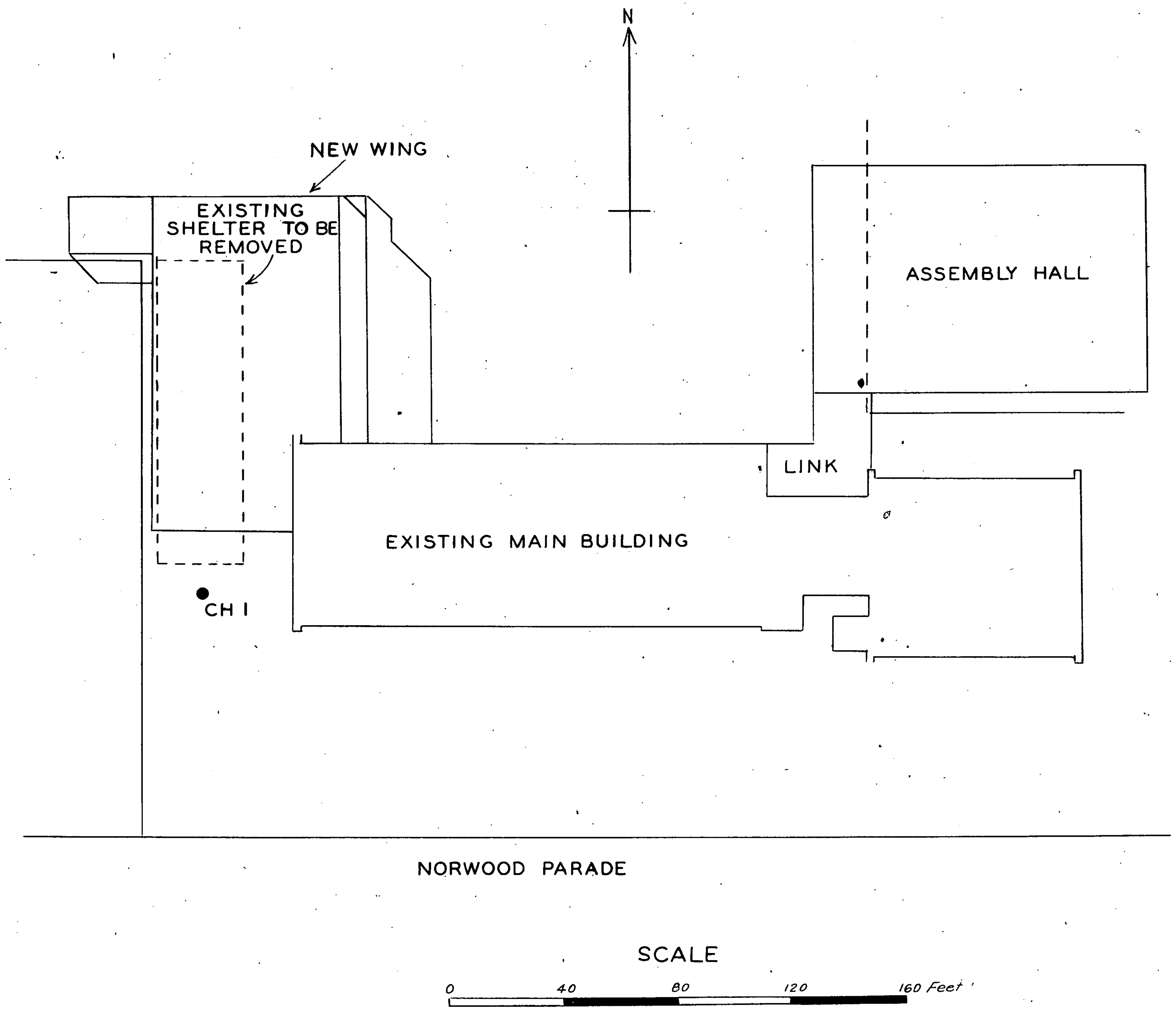
1/2/0 - 5066/71

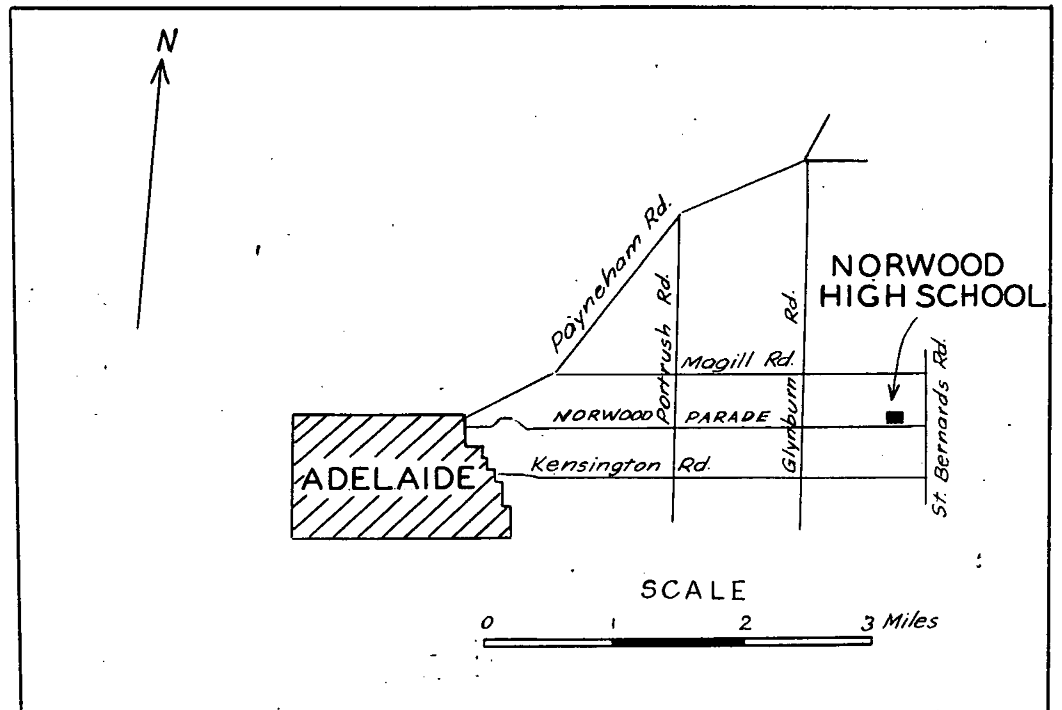
SAMPLE: A 194/71 Fig II



Nº 0331 SEMI-LOG, 2 CYCLES × 110 MM

LIQUID LIMIT 34·2
PLASTIC LIMIT 15·3
PLASTICITY INDEX 18·9





LOCALITY PLAN

FIG. 1

ENGINEERING GEOLOGY SECTN.		**DEPARTMENT OF MINES – SOUTH AUSTRALIA**	Scale: *As shown*
Compiled: *P. Rogers*		NORWOOD HIGH SCHOOL EXTENSIONS SEC. 286 – HD. ADELAIDE LOCATION OF DRILL HOLE CH. 1	Date: *22·6·71*
Drn. *D.W.W.*	Ckd. L.V.W.		Drg. No. 71-493 *Ha 6*