SECTION 46

DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY
ENGINEERING DIVISION

PROPOSED BUILDING - CHEST CLINIC, NORTH ~~ADELAIDE~~ TCE
TOWN ACRE 28, HD. ADELAIDE

FOUNDATION INVESTIGATIONS

DESIGN STAGE

Client: Public Buildings Department

by

R.F. JEUNE
GEOLOGIST
ENGINEERING GEOLOGY SECTION

Rept.Bk.No. 71/182

10th November, 1971.

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FIGURES

Rept.Bk.No. 71/182
G.S. No. 4751
D.M. No. 961/70

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SUMMARY AND CONCLUSIONS

Two cable tool drill holes, 60.5 and 66 ft. deep have been put down at the site of a proposed 2 storey building adjacent to North Terrace, Adelaide. These indicated a succession up to 55 ft. thick of clays, silts, sands and gravel (possible alluvial deposits of the old River Torrens) overlying at least 8 ft. of sand (Carisbrook Sand). A zone of lime accumulation of variable strength, and about 10 ft. thick, occurs immediately beneath the topsoil. The clays beneath this zone are of moderate plasticity at a moisture content approximately equal to plastic limit and are stiff. They appear to be subject to some shrinkage and swelling movements with changes in moisture content.

Groundwater was cut at several depths in each hole. The water cut at a depth of 8 to 9.5 ft. appears to be perched water, connected to the ground surface.

The clays beneath the zone of lime accumulation appear suitable for foundations, either for piers, or driven or cast-in-situ piles. No significant weaker soil horizons are likely to occur beneath this clay.

However, care should be taken during construction to prevent access of water into these clays as this could cause decrease in strength and also instability of any unsupported excavation walls.

INTRODUCTION

Two cable-tool foundation investigation holes were drilled by Mines Department personnel to Public Buildings Department purchase order C145295. Locations are shown in Figure 1. These holes were requested in order to determine foundation conditions beneath a proposed 2 storey building to be constructed at the site as a Chest Clinic.

Hole CH1 drilled between 8th and 13th October, 1971 reached a depth of 66 ft. Hole CH 2 drilled between 13th and 18th October, 1971 reached 60.5 ft. Sealed tube samples were recovered and standard penetration tests performed in both holes at nominal 5 ft. intervals. By arrangement with the client, the Geomechanics Division of the C.S.I.R.O. retained selected samples for investigation into soil suction phenomena. Geological logs of each hole are included in the Appendix.

REGIONAL GEOLOGY

The Adelaide geological sheet (1:63,360 series) shows the site to be located on the Para Fault Block, with 10 to 20 ft. of recent alluvial clays and sands overlying approximately 400 ft. of Pleistocene mottled clays, sands and gravels. A small area of Tertiary sandy limestone is mapped immediately north of the site. Recent flood plain deposits are shown within the valley of the Torrens River.

SITE GEOLOGY

Topography

The site is flat, and covered by buildings, gardens, lawn, and gravel paths. Several large trees are growing near the rear boundary fence.

Soil and Rock Types

All geological observations were limited to examination of cores from the 2 bores.

The geological succession as indicated by the drill cores is summarized in Table 1.

TABLE 1

Geological Succession

Depth (ft.) from	Depth (ft.) to	Thickness (ft.)	Age	Description
0	4 to 5	4 to 5	Recent	Fill and topsoil
4 to 5	Approx.15	Approx.10	Pleistocene to Recent	Zone of lime accumulation
Approx.15	37.5 to 42	24 to 27	Pleistocene to Recent	Silty clay, mottled
37.5 to 42	57 to 58.5	15 to 20	Pleistocene to Recent	Interbedded clays, silts and sands
57 to 58.5	Greater than 60 to 67	Greater than 8	?Plio-Pleistocene	Sand (?Carisbrook Sand)

The soils between depths of 5 and 58.5 ft. are thought to be alluvial deposits related to the old Torrens River, but may be slightly atypical soils of the Hindmarsh Clay Formation.

GROUNDWATER

Details of ground water observations made during drilling are shown in Table 2.

TABLE 2

Details of Ground Water Observations

Hole	Water Cut ft.	Static Level ft.	Estimated Flow galls/hr	pH	Salinity p.p.m.
CH 1	8	7.5	50	8.0	1385
"	39	28	100	8.0	1900
"	50	28	100	7.5	1900
"	58	28	100	8.0	2155
CH 2	9.5	9.5	50	8.0	1900
"	43	29	100	8.0	2755
"	55	29	100	8.0	3100

The perched water table between 8 ft. and 9.5 ft. appears to be in directed communication with the surface and could be expected to show a seasonal rise and fall. Suitable allowances should be made in designs incorporating basements, and in the planning of excavations. All deeper waters encountered rose considerably when tapped, and all stabilized at substantially the same level. However, salinities and pH values suggest that they may not all be directly interconnected.

DISCUSSION

Recent fill and topsoil

These are rather variable gravelly and sandy silts and clays, in part organic. This unit has probably been substantially modified by man, and its disturbed and variable nature renders it unsuitable for foundations.

Zone of lime accumulation

This is a zone of calcareous silt, silty sand, and gravel. The presence in hole CH 2 of large (7cm) angular, tabular fragments of strong calcrete,

coupled with relatively high resistance to penetration, suggests that lenses of strong (Table 3) calcrete may be present, but are likely to be irregular in distribution. The lower layers are saturated, but the texture of the whole unit is such as to suggest that some collapse may occur under other than very slight loads.

The irregular distribution of lime and of calcrete and the possibility of collapse under load suggests this unit is unsuitable foundations.

Mottled silty clay

This is a stiff grey and orange brown mottled silty clay with occasional thin lime accumulations along joint planes, and associated with bedding planes. The upper 1 to 2ft. is slightly calcareous. Occasional slickensided shear planes, and a weakly developed fine nutty structure suggest that some expansion and shrinkage may be taking place with changes in moisture content.

Since correlation with the Hindmarsh Clay Formation, which occurs beneath much of the Adelaide City Area, and the engineering properties of which are well-known, is uncertain, it is suggested that the relevent physical properties of this material should be checked by laboratory tests on the sealed tube samples.

Interbedded clays, silts, and sands

These are dominantly grey clays, silts, and sands, in part micaceous. Comparisons between holes CH1 and CH2 show only a general similarity in sequences, suggesting that individual beds may be rather variable and discontinuous.

TABLE 3

CLASSIFICATION OF ROCK CONDITIONS AND STRENGTH OF ROCK SUBSTANCE

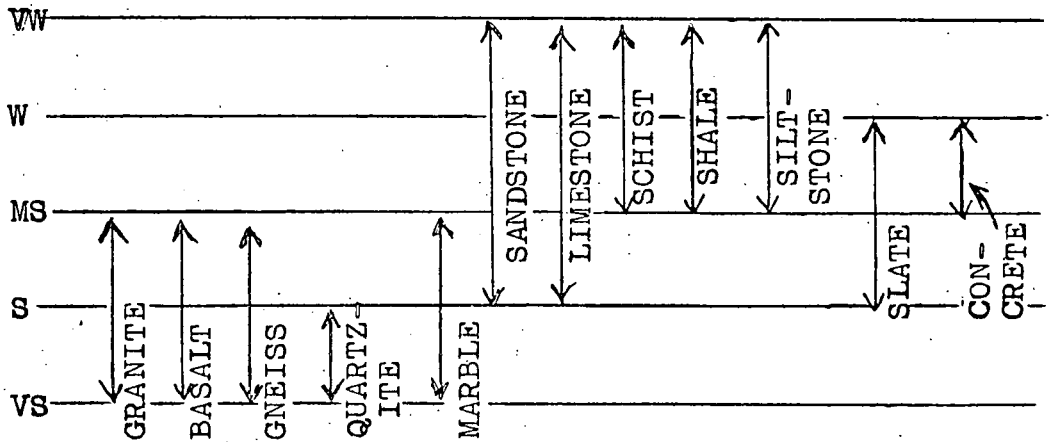
1. ROCK CONDITION TERMS

TERM	ABBRN	DEFINITION
Fresh	(F)	Substance shows no effects of chemical decomposition.
Chemically Decomposed	(D)	Substance is affected by chemical decomposition, but the exact process is not obvious.
Chemically Weathered	(W)	Substance shows effects of chemical decomposition processes which have occurred due to surface and near-surface agencies such as air and groundwater.
Chemically Altered	(A)	Substance shows effects of chemical decomposition processes which have occurred due to plutonic or volcanic fluids.
Extremely Decomposed	(XD)	Substance has been reduced to material which shows fabric of original rock, but which can be remoulded, i.e. soil substance. (Classified by Unified System).
Extremely Weathered	(XW)	
Extremely Altered	(XA)	

2. CLASSIFICATION OF ROCK SUBSTANCES BY UNCONFINED COMPRESSIVE STRENGTH

TERM	ABBRN	UNCONFINED COMPRESSIVE STRENGTH (Kg/sq.cm)	(lb/sq.in)
Very weak	VW	<70	$\lesssim 1000$
Weak	W	70 - 200	1000 - 3000
Medium strong	MS	200 - 700	3000 - 10,000
Strong	S	700 - 1800	10,000 - 25,000
Very strong	VS	>1800	$>25,000$

RANGE OF STRENGTHS OF SOME COMMON ROCK SUBSTANCES IN THE FRESH STATE*



*Samples of fresh rock tested to Australian Standard. For rocks showing planar anisotropy the long axis of the sample is normal to fabric planes.

3. EXAMPLES OF USE OF CLASSIFICATION

Geological Name	Rock Condition Term	Strength Term
Granite	Fresh	Strong
Granite	Weathered	Medium Strong
Schist	Fresh	Weak
Schist	Altered	Very Weak

Sands - (?Carisbrook Sand)

This is a dirty sand with rare thin gravel bands, intercepted at the bottom of both holes. This unit is likely to extend for several more feet and no weak horizons are likely to occur.

RFJ:CMH
10.11.1971

R F Jeune per WDB
R.F. JEUNE
GEOLOGIST
ENGINEERING GEOLOGY SECTION

APPENDIX

Logs of Cable Tool Drill Holes CH 1 & CH 2,

and explanatory notes.

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 -ASSAB tube cadmium plated
"L" type 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
- .....Type of material

(Printed vertically)

- .....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

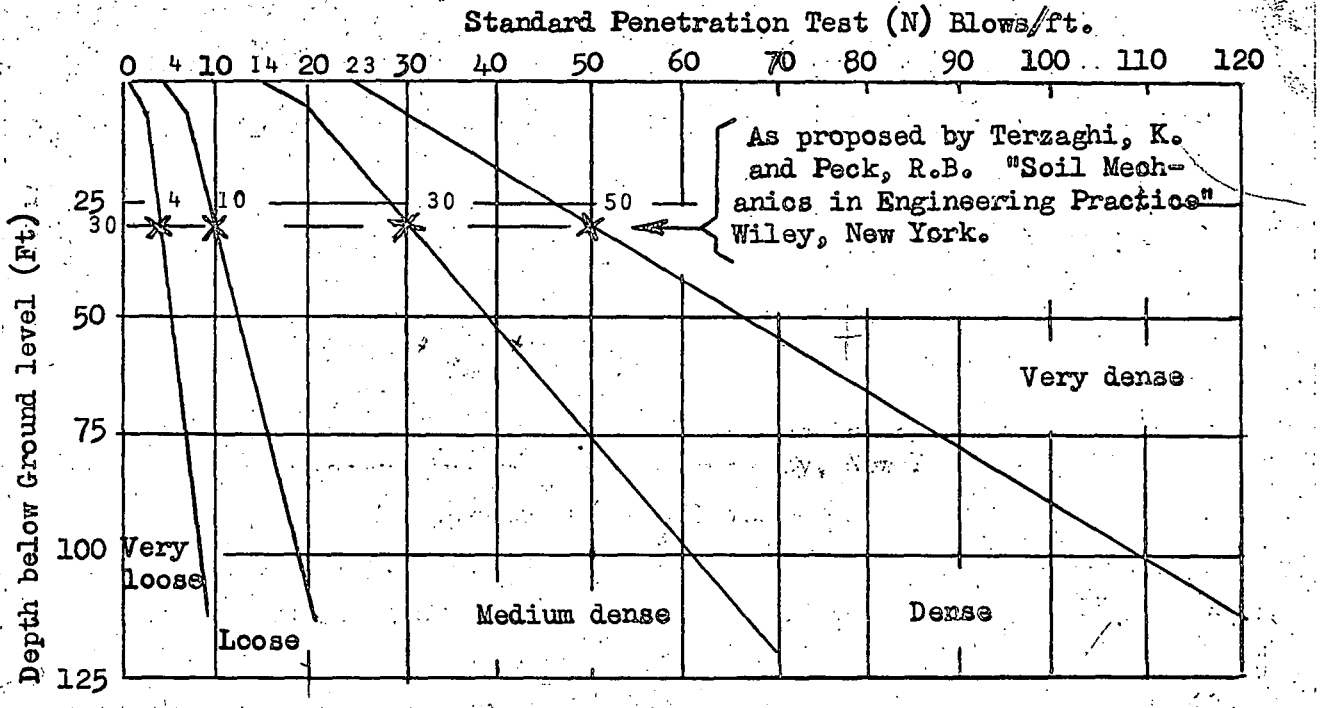
COMPACTNESS	SYMBOL	N
Loose	Ls	0 to 8
Moderately compact	MC	8 to 15
Compact	C	15 to 30
Very Compact	VC	greater than 30

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

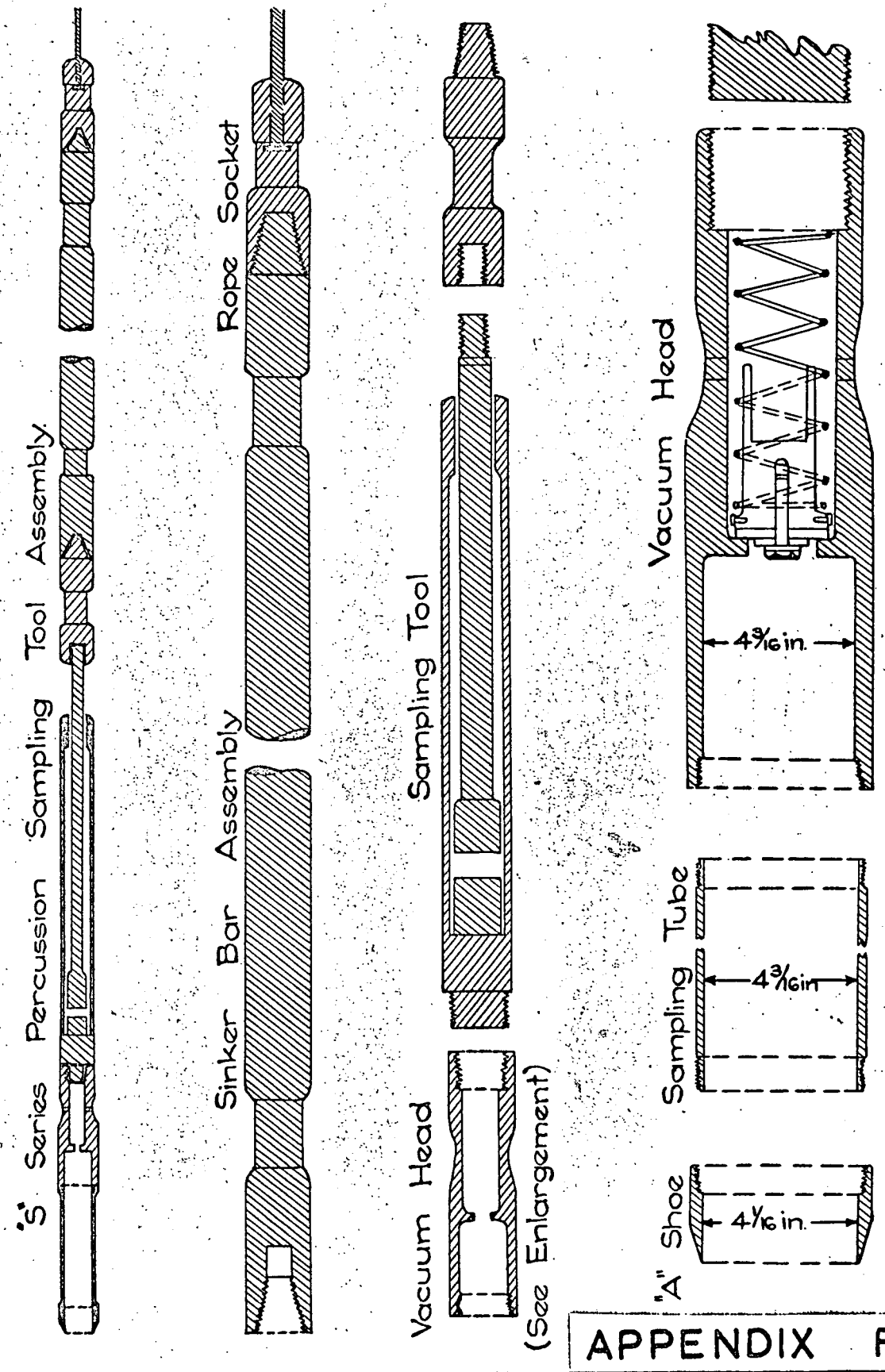


Based on Gibbs, H.J. & Holtz, W.G. (1957) "Research on Determining the Density of Sands by Spoon Penetration Testing" Vol. I Proc. 4th Int. Conf. SM & FE, London.

REFERENCES

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

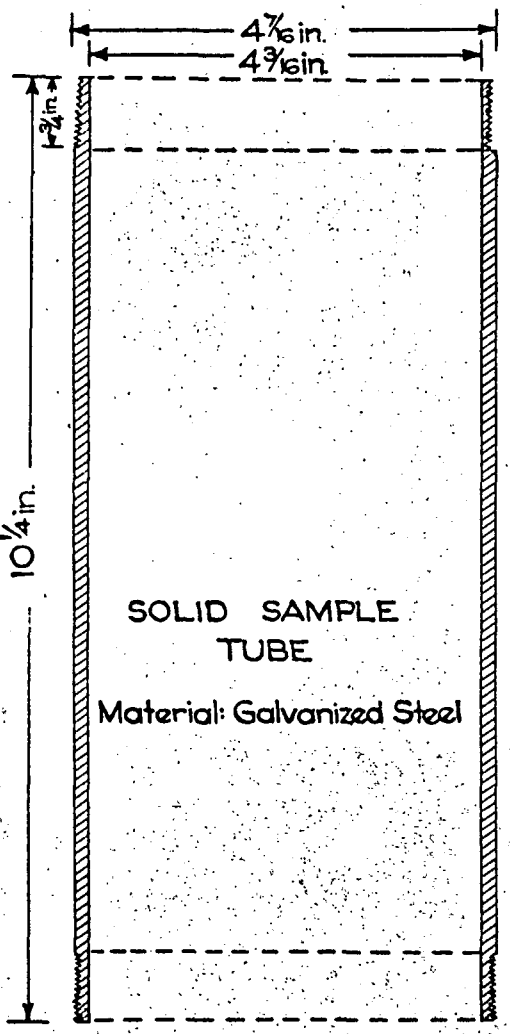
GIBBS, H.T. and HOLTZ, W.G., 1957. Research on Determining the Density of Sands by Spoon Penetration Testing. Proc. 4th Inter. Conf. SM & FE, London, Vol. 9.

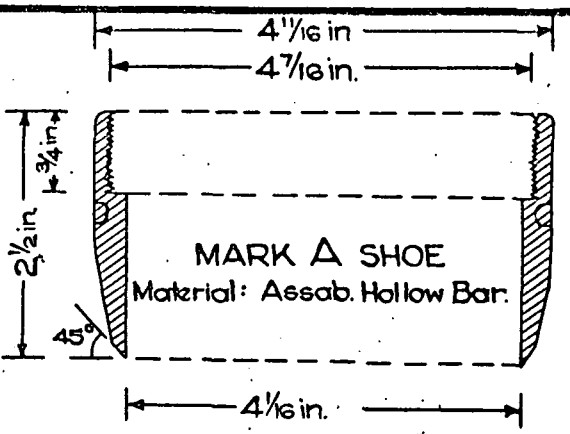


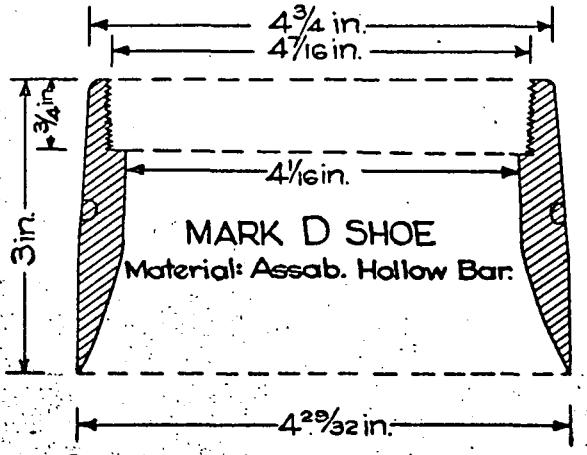
APPENDIX FIG. 1

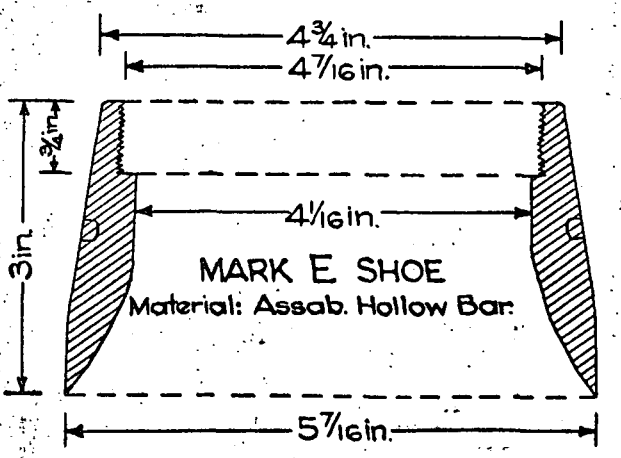
DEPARTMENT OF MINES — SOUTH AUSTRALIA

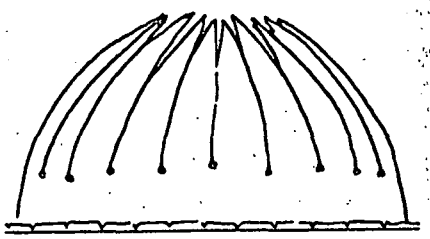
ENGINEERING GEOLOGY SECTION	Drn. DHS	CABLE-TOOL DRILLING SAMPLING TOOL ASSEMBLY WITH "S" SERIES SHOES	SCALE: NOT TO SCALE
	Tcd. AMSD		S 4416 MB
	Ckd. L.V.W.		
SENIOR GEOLOGIST	Exd. DAJ		DATE: 21 Oct '69









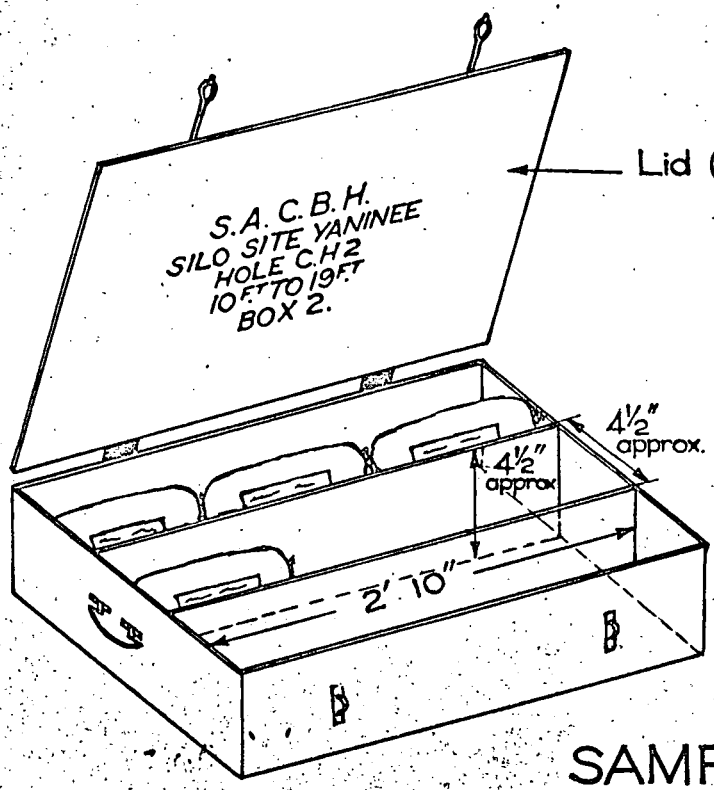


(Copper Basket Retainer)

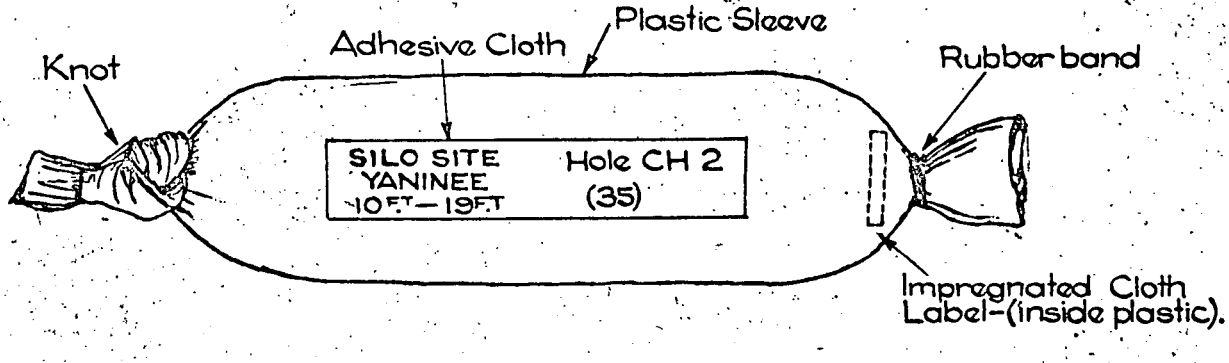
APPENDIX FIG. 2

DEPARTMENT OF MINES — SOUTH AUSTRALIA

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



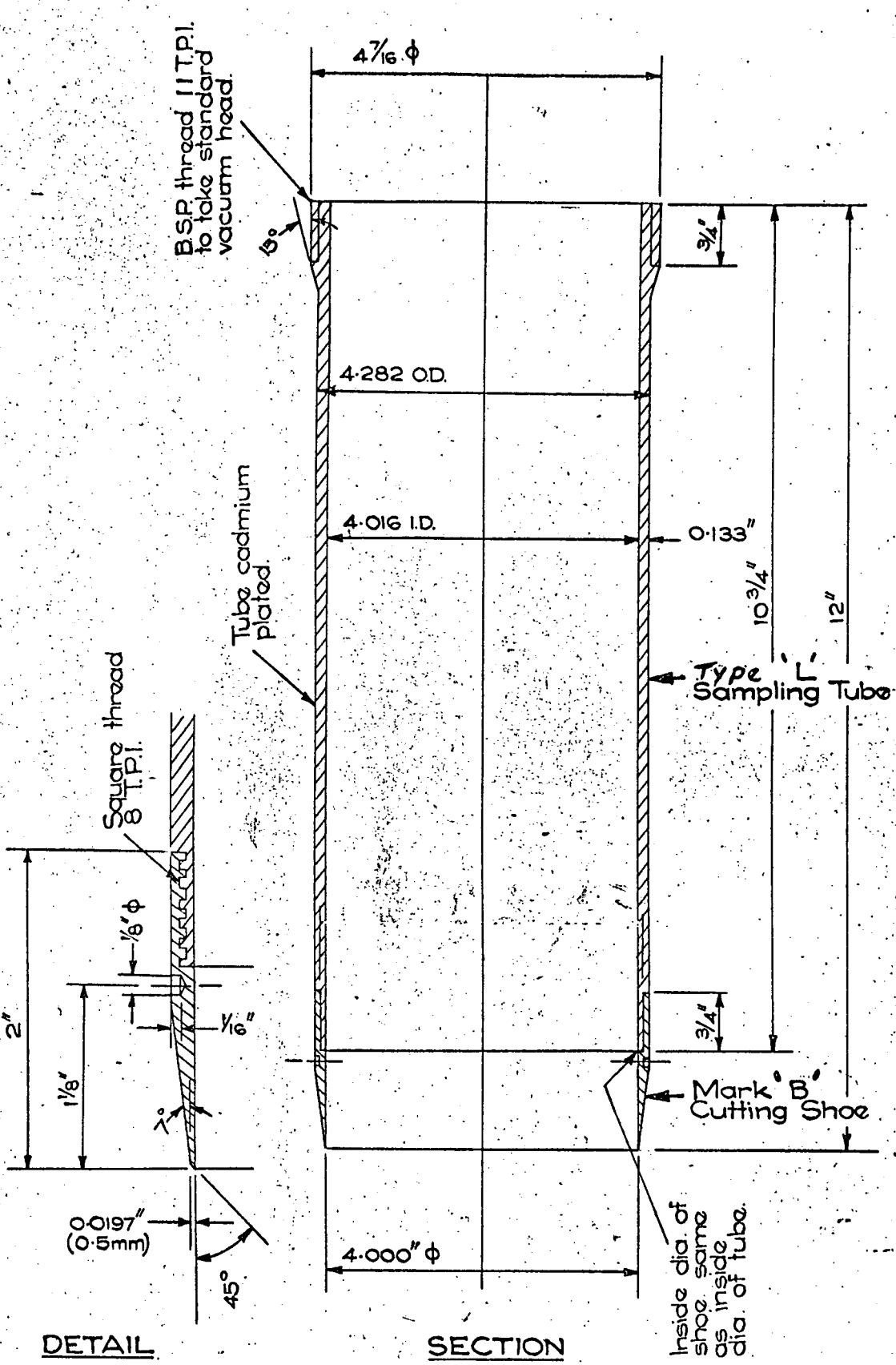
SAMPLE BOX



EXTRUDED SAMPLE SEALED IN PLASTIC SLEEVE.

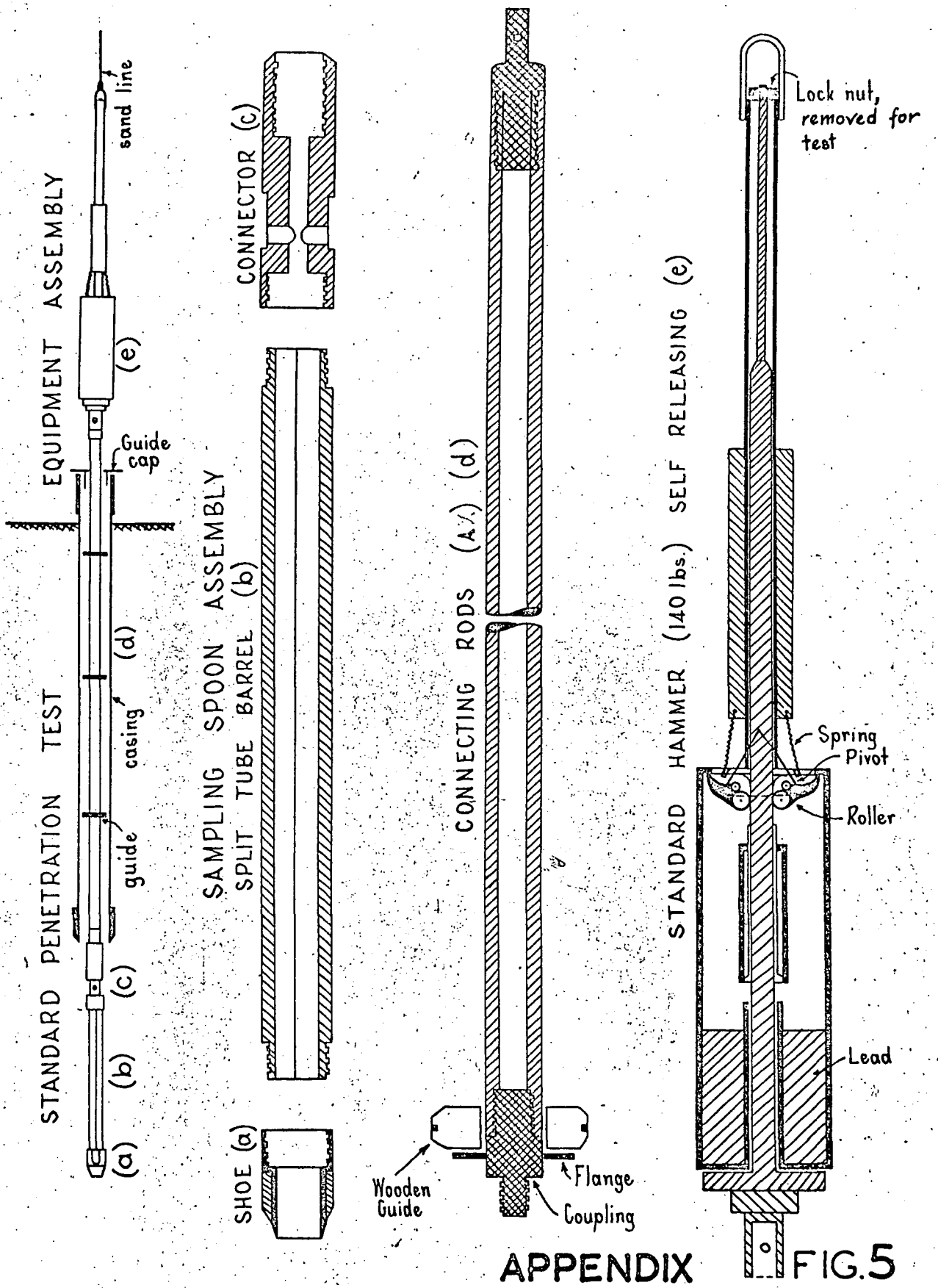
APPENDIX FIG. 3

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 AMSD. 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. AM°D Ckd. L.V.W.		Drg. No 57636 MB.



APPENDIX FIG.5

ENGINEERING DIVISION	DEPARTMENT OF MINES - SOUTH AUSTRALIA	Scale: Not to scale
Compiled: W.R.P.B.	STANDARD PENETRATION TEST EQUIPMENT	Date: 22 Dec 1969
Drn. R.H. Ckd.		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
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
			Predominantly one size, or a range of sizes, with some intermediate sizes missing.	GP	GRAVEL, poorly graded; gravel sand mixtures, little or no fines.
		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
			Plastic fines – for identification see CL below	GC	GRAVEL, excess clayey fines; poorly graded gravel-sand-clay mixtures
	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.
			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
		DIRTY SANDS Appreciable amount of fines	Non plastic fines – for identification see ML below	SM	SAND, excess silty fines; poorly graded sand-silt mixtures
			Plastic fines – for identification see CL below	SC	SAND excess clayey fines; poorly graded sand-clay mixtures.

FIELD INVESTIGATION PROCEDURES
on fraction smaller than 0·4mm. (passing B.S. 36 sieve)

		SOIL CAST (wet soil)	SOIL THREAD	SHINE	DILATANCY	ODOUR	DRY STRENGTH	GROUP SYMBOL	GROUP NAME (and typical materials)
FINE GRAINED SOILS More than 50% of material is smaller than No. 200 B.S. sieve size.	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 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.

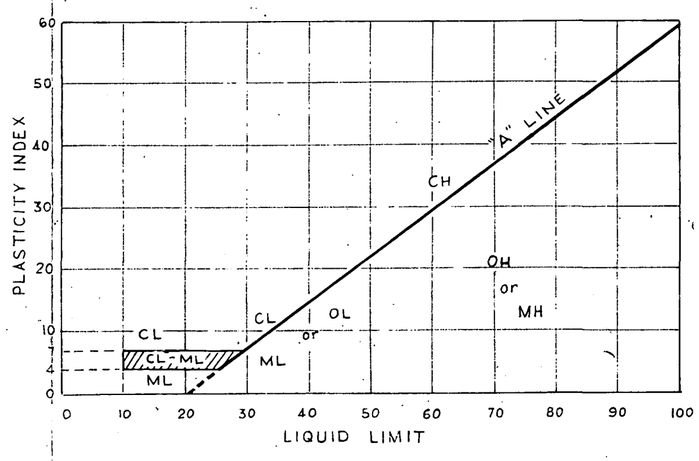
GRAIN SIZE CURVE to be used to identify soil fractions

LABORATORY CLASSIFICATION CRITERIA

Coarse grained soils classified on basis of percentage of fines, as follows

PERCENT OF FINES	GRAVELS	SANDS	Borderline cases, use 2 symbols
Less than 5	GW, GP	SW, SP	
More than 12	GM, GC	SM, SC	
5 to 12	Borderline cases, use 2 symbols		

$Cu = \frac{D60}{D10}$ Greater than 4 $Cc = \frac{(D30)^2}{D10 \times D60}$ Between one and 3		
Not meeting all gradation requirements for GW		
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	
Atterberg limits above "A" line with PI greater than 7		
$Cu = \frac{D60}{D10}$ Greater than 6 $Cc = \frac{(D30)^2}{D10 \times D60}$ Between one and 3		
Not meeting all gradation requirements for SW		
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	
Atterberg limits above "A" line with PI greater than 7		



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

FIG. 6

64-246
M.G.

TRIM LINE

DEPARTMENT OF MINES · SOUTH AUSTRALIA

LOG OF CABLE TOOL HOLE

PROJECT CHEST CLINIC NORTH TERRACE

FEATURE FOUNDATIONS

LOCATION GROUNDS OF HOUSE

TOWN ACRE 28

HUNDRED ADELAIDE

CO-ORDS

HOLE CH 1

SERIAL No.

R.L. Surface 40.5m FT.

R.L. Collar FT.

Datum

GEOLOGICAL NOTES AND CLASSIFICATION	R.L. (FEET) DEPTH	GRAPHIC LOG	GROUP SYMBOL	SOIL DESCRIPTION GROUP NAME Unified Soil Classification, U.S.B.R. Earth Manual 2nd Edition 1966	WATER LEVEL	MOISTURE CONTENT	Consistency Compct. Dens.*	FIELD TEST DATA: BLOWS PER FOOT 20 40 60 80	FIELD TEST DATA: SOILTEST P'TR'METER Units* 1 2 3 4
RECENT / FILL AND TOPSOIL: SILT AND CLAY, ORGANIC			ML	SILT SOIL, low plasticity. 20-30% Sand. Friable, black, moderate organic content.		D	Ls		
			CH	CLAY SOIL, high plasticity. Orange-brown, with scattered lime nodules up to 1cm.		≈PL	F		
			ML	SILT SOIL, low plasticity. Brown to red-brown. organic at top, lime nodules at base.		D	Ls		
CALCAREOUS SILT AND SILTY SAND - ZONE of LIME ACCUMULATION	5		ML	SILT SOIL, low plasticity. Brown-grey calcareous silt with strong lime nodules up to 2cm. at base.		D	Ls	SPT 8 Blows	
				8.10.71 WC ▶					
	10		SM	SAND, excess silty fines. Grey calcareous silty sand with scattered strong lime accretions up to 1cm. Slightly sticky when remoulded.		S	L	SPT 10 Blows	
				Gradational Change	?				
PLEISTOCENE - RECENT: MOTTLED GREY & ORANGE-BROWN SILTY CLAY. OCCASIONAL LIME ACCUMULATIONS ASSOCIATED WITH JOINTS, SHEAR PLANES, AND BEDDING PLANES	15		CL - CH	2ft. Zone. Slightly calcareous.					
				Vertical joint with roots.				SPT 11 Blows	
	20			CLAY SOIL, moderate plasticity. Nutty. grey, silty clay with orange-brown mottles.		≈PL	St	SPT 11 Blows	
	25			1cm. thick lime accumulation.				SPT 17 Blows	
				2cm. thick lime accumulation.					
	30			Shear plane, slickensided. Dip 20°				SPT 18 Blows	
				Shear plane, slickensided. Dip 30°					
	35			Joint plane, lime filled. Dip 45°					

TYPE OF SAMPLE

A shoe (SA)
D " (SD)
E " (SE)
G " (SG)
Sealed Tube - SAL
Standard Penetration Test-SPT

Water level, (date) 7 Dec. '66
WC ▶ Water cut
Casing

CONSISTENCY (Clays)	COMPACTNESS (Silts)	RELATIVE DENSITY (Sands)	MOISTURE CONTENT
VS. — Very Soft	Ls — Loose	VL — Very Loose	H — Humid
S — Soft	MC — Moderately Compact	L — Loose	D — Damp
F — Firm	C — Compact	MD — Medium Dense	M — Moist
St. — Stiff	VC — Very Compact	D — Dense	W — Wet
V. St. — Very Stiff		VD — Very Dense	S — Saturated
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. 2
TYPE RUSTON
DRILLER STURAK
START 8.10.71
FINISH 13.10.71

LOGGED BY R.F. JEUNE
DATE 18.10.71
TRACED D.W.W.
CHECKED W.R.P.B.

SHEET 1 OF 2

DRG No. S9546/1 Ha6

PF Nº S6676 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

LOG OF CABLE TOOL HOLE

HOLE CH 1

SERIAL No.

PROJECT CHEST CLINIC NORTH TERRACE

FEATURE FOUNDATIONS

LOCATION GROUNDS OF HOUSE

TOWN ACRE 28

HUNDRED ADELAIDE

CO-ORDS

R.L. Surface FT.

R.L. Collar FT.

Datum

GEOLOGICAL NOTES AND CLASSIFICATION	R.L. (FEET) DEPTH	GRAPHIC LOG	GROUP SYMBOL	SOIL DESCRIPTION GROUP NAME Unified Soil Classification, U.S.B.R. Earth Manual 2nd Edition 1966	WATER LEVEL & DATE	MOISTURE CONTENT	Consistency & Compact'y Density	FIELD TEST DATA: BLOWS PER FOOT 20 40 60 80	FIELD TEST DATA: SOILTEST P'TR'METER Units * 1 2 3 4
PLEISTOCENE - REGENT ALLUVIUM: INTERBEDDED CLAYS, SILTS, AND DIRTY SANDS, IN PART MICACEOUS. OCCASIONAL WEAK IRONPANS	35		CL-CH	As for Sheet 1.				SPT 18 Blows	
			ML-MH	SILT SOIL, moderate plasticity. Grey micaceous clayey silt with orange-brown mottles and rare strong iron accretions up to 6mm. WC		W	MC		
	40		CL-CH	CLAY SOIL, moderate plasticity. Grey silty clay with orange-brown mottles. Thin (1cm) basal ironpan		≈PL	St	SPT 12 Blows	
			ML-MH	SILT SOIL, moderate plasticity. Micaceous. Thin (2-3mm) fine sandy clay laminations.		W	MC		
	45		CL-CH	CLAY SOIL, moderate plasticity. Nutty, grey, silty clay with orange-brown mottles.		PL ≈	St	SPT 16 Blows	
	50				WC				
			SM	SAND, excess silty fines. Bedded orange & grey silty sands.		S	MD	SPT 19 Blows	
			ML	SILT SOIL, low plasticity. Laminated grey and orange-brown silts.		D	MC		
			CL-CH	CLAY SOIL, moderate plasticity. Grey. Thin silt laminations.		≈PL	St		
	55		ML-MH	SILT SOIL, moderate plasticity. Grey clayey silt.		D	MC	SPT 9 Blows	
			SM	SAND, excess silty fines. Light grey silty fine sand, 4mm laminations.		W	MD		
			ML-CL	SILT SOIL & CLAY SOIL, low plasticity. Grey. 1cm laminations. Weak band ironpan WC		W	MC		
?PLIO-PLEISTOCENE ?CARISBROOKE SAND: DIRTY SAND RARE THIN GRAVEL BANDS.	60			Thin (1cm) gravel band.					
			SM	SAND excess silty fines. Orange-brown silty fine sand.		S	MD	SPT 10 Blows	
	65			— END OF HOLE 67ft. —					

3

20 1

2

TYPE OF SAMPLE

A shoe (SA)
D " (SD)
E " (SE)
G " (SG)
Sealed Tube - SAL
Standard Penetration Test - SPT

Water level, (date) 7 Dec. '66
WC Water cut
Casing

CONSISTENCY (Clays)

VS. — Very Soft
S — Soft
F — Firm
St — Stiff
V St. — Very Stiff
H. — Hard

COMPACTNESS (Silts)

Ls — Loose
MC — Moderately Compact
C — Compact
V C — Very Compact

RELATIVE DENSITY (Sands)

VL — Very Loose
L — Loose
MD - Medium Dense
D — Dense
VD — Very Dense

MOISTURE CONTENT

H — Humid
D — Damp
M — Moist
W — Wet
S — Saturated
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. 2
TYPE RUSTON
DRILLER STURAK
START 8·10·71
FINISH 13·10·71

LOGGED BY R.F. JEUNE
DATE 18·10·71
TRACED D.W.W.
CHECKED W.R.P.B.

SHEET 2 OF 2

DRG No. S9546a/1 Ha6

PF Nº S6676 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

LOG OF CABLE TOOL HOLE

PROJECT CHEST CLINIC
NORTH TERRACE
FEATURE FOUNDATIONS
LOCATION. GROUNDS OF HOUSE
TOWN ACRE 28
HUNDRED. ADELAIDE
CO-ORDS

HOLE CH 2
SERIAL No.
R.L. Surface. 41.5 m FT
R.L. Collar . FT.
Datum

GEOLOGICAL NOTES AND CLASSIFICATION	R.L. (FEET) DEPTH	GRAPHIC LOG	GROUP SYMBOL	SOIL DESCRIPTION GROUP NAME Unified Soil Classification, U.S.B.R. Earth Manual 2nd Edition 1966	WATER LEVEL	CASING	MOISTURE CONTENT	Consistency Compct. Dens'y	FIELD TEST DATA: BLOWS PER FOOT 20 40 60 80 / SOILTEST P'TR'METER Units * 1 2 3 4
RECENT — FILL AND TOPSOIL: SILT AND SANDY SILT, ORGANIC			ML	SILT SOIL, low plasticity. Friable brown silt 30% sand and gravel to 1cm.			D	Ls	
			ML	SILT SOIL, low plasticity. Friable red-brown to orange-brown clayey silt. Roots and burrows common in upper 12". Lime accretions, strong, up to 2cms, abundant in lower 24"			D	Ls	
CALCAREOUS SILTY SAND AND GRAVEL — ZONE OF LIME ACCUMULATION, POSSIBLY WEAK CALCRETE	5		GM	GRAVEL, excess silty fines, calcareous gravel, strong, up to 7cms, in calcareous, silty sand matrix.			D	Ls	S.P.T. 31 Blows
	10		SM	Gradational change — 14·10·71 WC — SAND, excess silty fines. 20% calcareous gravel up to 2cms. Grey, calcareous gravelly sand in silt matrix			S	Ls	
	15		SC	Gradational change — SAND, excess clayey fines. 20% calcareous gravel up to 2cms. Grey calcareous gravelly sand in highly plastic clayey matrix			S	Ls	
PLEISTOCENE — RECENT: MOTTLED GREY AND ORANGE-BROWN SILTY CLAY. OCCASIONAL LIME ACCUMULATIONS ASSOCIATED WITH JOINTS, SHEAR PLANES, AND BEDDING PLANES				Gradational Change — 1 ft. Upper Zone slightly calcareous	?				S.P.T. 6 Blows
	20			Shear plane, slickenslided, Dip 20°					
				41·5 / 32·5					
	25		CL-CH	CLAY, SOIL, moderate plasticity. Nutty grey silty clay with orange-brown and red-brown mottles			≈PL	St	S.P.T. 10 Blows
				Shear plane, slickenslided, Dip 45°					S.P.T. 9 Blows
	30			18·10·71					
				← 1 ft. Zone dark brown clay					S.P.T. 15 Blows
	35								

TYPE OF SAMPLE
A shoe (SA)
D " (SD)
E " (SE)
G " (SG)
Sealed Tube - SAL
Standard Penetration Test - SPT

Water level, (date) 7 Dec. '66
WC Water cut
Casing

CONSISTENCY (Clays)
VS. — Very Soft
S — Soft
F — Firm
St. — Stiff
V. St. — Very Stiff
H. — Hard

COMPACTNESS (Silts)
Ls — Loose
MC — Moderately Compact
C — Compact
V C — Very Compact

RELATIVE DENSITY (Sands)
VL — Very Loose
L — Loose
MD - Medium Dense
D — Dense
VD — Very Dense

MOISTURE CONTENT
H — Humid
D — Damp
M — Moist
W — Wet
S — Saturated
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. 2
TYPE RUSTON
DRILLER STURAK
START 13-10-71
FINISH 18-10-71

LOGGED BY R.F.JEUNE
DATE 20-10-71.
TRACED DJM
CHECKED WRPB

SHEET 1 OF 2
DRG. No. S9551 Ha6

PF Nº S6676 MB

DEPARTMENT OF MINES · SOUTH AUSTRALIA

LOG OF CABLE TOOL HOLE

HOLE CH 2

SERIAL No.

PROJECT CHEST CLINIC
NORTH TERRACE

FEATURE FOUNDATIONS

LOCATION GROUNDS OF HOUSE

Town Acre 28

HUNDRED ADELAIDE

CO-ORDS

R.L. Surface FT.

R.L. Collar FT.

Datum

GEOLOGICAL NOTES AND CLASSIFICATION	R.L. (FEET) DEPTH	GRAPHIC LOG	GROUP SYMBOL	SOIL DESCRIPTION GROUP NAME Unified Soil Classification, U.S.B.R. Earth Manual 2nd Edition 1966	WATER LEVEL & CASING	MOISTURE CONTENT	Consistency Compct. Density	FIELD TEST DATA: BLOWS PER FOOT 20 40 60 80	FIELD TEST DATA: SOILTEST P'TR'METER Units * 1 2 3 4
PLEISTOCENE – RECENT / ALLUVIUM	35		CL-CH	← 2ft. Zone of lime accumulation As for Sheet 1.				S.P.T. 31 Blows	
	40							S.P.T. 26 Blows	
				Gradational Change SILT SOIL, moderate plasticity Grey micaceous clayey silt, orange-brown mottled	WC	W	MC		
INTERBEDDED CLAYS, SILTS, AND DIRTY SANDS, IN PART MICACEOUS	45		ML-MH						
			CL-CH	CLAY SOIL, moderate plasticity Nutty, grey, silty clay		≈PL	St		
			SM	SAND, excess silty fines Grey micaceous silty fine sand with thin (1cm) bands of grey, moderately plastic clay		W	MD	S.P.T. 12 Blows	
	50			0.5ft. Basal zone of grey micaceous clayey silt, moderately compact				S.P.T. 17 Blows	
			CL-CH	CLAY SOIL, moderate plasticity Nutty, grey, silty clay		≈PL	St		
	55		ML-MH	SILT SOIL, moderate plasticity Grey micaceous clayey silt		W	MC	S.P.T. 11 Blows	
?PLIO-PLEISTOCENE / ?CAPESBROOKE SAND			SM	SAND, excess silty fines. Grey and orange brown. micaceous silty fine sand	WC	W	MD		
DIRTY SAND, RARE PEBBLES	60		SP	SAND, poorly graded. Micaceous quartz sand with rare pebbles END OF HOLE 60ft.		S	MD		

TYPE OF SAMPLE
A shoe (SA)
D " (SD)
E " (SE)
G " (SG)
Sealed Tube - SAL
Standard Penetration Test-SPT

Water level, (date) Dec. '66
WC Water cut
Casing

CONSISTENCY (Clays)
VS. — Very Soft
S — Soft
F — Firm
St. — Stiff
V. St. — Very Stiff
H. — Hard

COMPACTNESS (Silts)
Ls — Loose
MC — Moderately Compact
C — Compact
V.C — Very Compact

RELATIVE DENSITY (Sands)
VL — Very Loose
L — Loose
MD-Medium Dense
D — Dense
VD — Very Dense

MOISTURE CONTENT
H — Humid
D — Damp
M — Moist
W — Wet
S — Saturated
LL — Liquid Limit
PL — Plastic Limit

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

ENGINEERING GEOLOGY SECTION

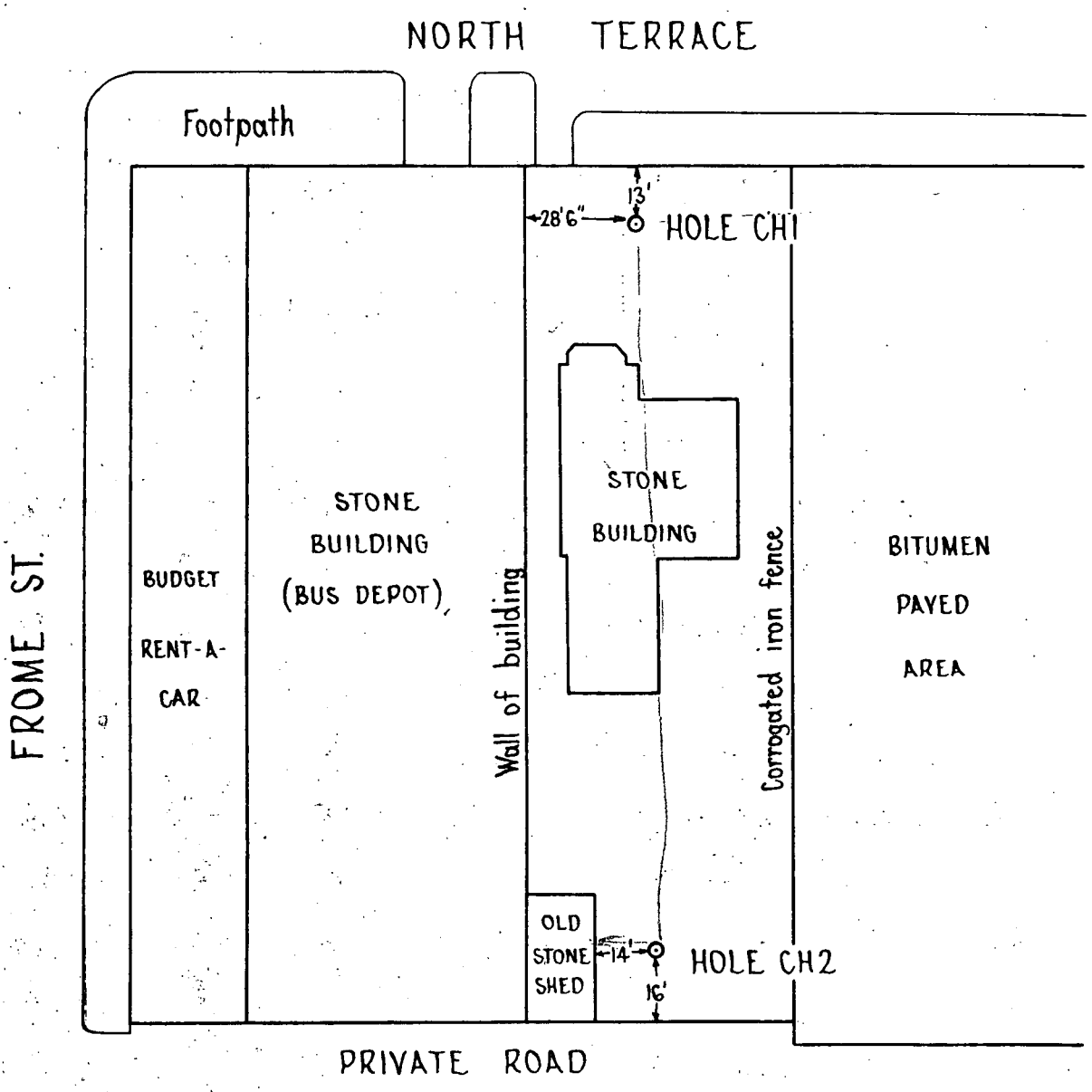
DRILL No. 2
TYPE RUSTON
DRILLER STURAK
START 13-10-71
FINISH 18-10-71

LOGGED BY R.F JEUNE
DATE 20-10-71
TRACED DJM
CHECKED WRPB

SHEET 2 OF 2

DRG No. S9551-a Ha6

P.F. Nº S6676 MB



SCALE IN METRES

0 10 20 30 40

0 40 80 120

SCALE IN FEET

FIG. 1.

Compiled from S.A. Public Buildings Dept. Plan Nº 1132-Su-71

ENGINEERING GEOLOGY SECTION	**DEPARTMENT OF MINES — SOUTH AUSTRALIA**	Scale: As shown
Compiled: R. Jeune	CHEST CLINIC - NORTH TERRACE	Date: 27 Oct 1971
Drn. R.H. Ckd. R.F.J.	SITE PLAN	Drg. No. S9543 Ha5

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