

DEPARTMENT OF MINES
SOUTH AUSTRALIA

WAYMOUTH ST., TELEPHONE EXCHANGE

RB 66/128

GEOLOGICAL INVESTIGATIONS - PROGRESS REPORT NO. 2

DESIGN STAGE

Y/A 172, Rd. 44/10/65

Client: Commonwealth Department of Works

by

J.E. FEAR
GEOLOGIST
ENGINEERING GEOLOGY SECTION

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Rep. No. 66/128
G.S. No. 3989
D.M. No. 1109/65

9th May, 1968

**DEPARTMENT OF MINES
SOUTH AUSTRALIA**

Rept. No. 66/128
S.S. No. 3989
D.M. 1109/65

**WYMOUTH STREET TELEPHONE EXCHANGE
GEOLOGICAL INVESTIGATIONS - PROGRESS REPORT NO. 2**

DESIGN STAGE

T/A 199, H.A. Adelaide

Client: Commonwealth Department of Works

INTRODUCTION

Further drilling to determine foundation conditions at the proposed Wymouth Street Telephone Exchange were requested in a letter from the Director of Works dated 5th February. It was requested that this work be carried out in liaison with Neilson Pty. Ltd., who were engaged by the Department of Works as Engineering Soils Consultants to carry out laboratory testing on the samples obtained during drilling at the site.

Results of previous preliminary geological investigations involving 2 drill holes (CH 1 and 2) are contained in Progress Report No. 1 (Ref. 1).

The proposed building is to occupy an area of 212ft. by 78ft. and will be of fifteen storeys, including two storeys below ground level to a depth of 32 ft.

Four cable tool drill holes (CH 3 to 6) were drilled during the present investigation. These were tube sampled throughout with sealed tube samples taken every 5ft. Each hole was taken to the limit of cable tool drilling, usually at about 50ft. below ground surface, and then extended by diamond drilling.

Geological logs of the holes are included in Appendix A. Levels shown on the logs are based on contours shown on the City of Adelaide 4 chains to 1 inch plan, and are accurate only to the nearest foot.

Results of holes CH 1, 2, 3 and 5 are summarized on Fig. 2.

This report discusses the results of the drilling in the two stages of investigation, and also from excavations elsewhere in the city area.

SITE GEOLOGY

Soil and Rock Types

The results of recent drilling in four holes CH3 to CH6, confirm the rather uniform near horizontal succession found in the holes CH1 and CH2. However, the top of the Hallett Cove sandstone ranges from 43ft. to 53ft., below the ground surface in the holes logged. Results are summarized in Table I.

TABLE I

Depth (ft.) From To	AGE	UNIT	DESCRIPTION
0 3			FILL material, gravel, sand and clay mixture.
3 4			CLAY SOIL, medium plasticity. Red-brown, and containing slight amounts of lime sand in pockets.
4 10			SILT SOIL, high plasticity. Light brown. Extremely calcareous with considerable amounts of lime sand and gravel.
10 30			CLAY SOIL, high plasticity. Green grey, yellow and red mottled with variable fine sand content.
30 34			SAND/SILT SOIL, excess clayey fines and variable number of silty lenses. Fine to coarse grained sand. Grey, with red brown and ochre yellow mottling in part.

TABLE I (Contd.)

Depth (ft.) From To		AGE	UNIT	DESCRIPTION
36	(43) (53)	PLEISTOCENE TO RECENT	HINDMARSH CLAY	CLAY SOIL, high plasticity, slightly silty and sandy. Grey green with yellow mottling. Increasing lime silt content near base.
-----Erosion Surface-----				
(43) (53)	(75) (77)	UPPER PLIOCENE	HALLETT COVE SANDSTONE	SANDSTONE, fine grained, fossiliferous, white to buff coloured with calcareous cement. The upper 6 to 12ft. is mainly a lime gravel with silt - clay matrix.
(75) (77)	(82) (86)	OLIGOCENE	PT. WILLUNGA BEDS	CLAY SOIL, low plasticity, becoming more silty and sandy with depth. Green grey with yellow mottling.
(82) (86)	90			SAND, fine grained, silty. Grey-brown, calcareous.
90	134	Eocene	BLANCHE POINT SOFT MARLS	SILT SOIL, low plasticity, sandy. Increasing sand content towards base. Grey.
134	150		BLANCHE POINT BANDS MARLS	CUTTINGS ONLY - Glauconitic marl fragments in silt matrix.

Holes 2 to 6 suggest two distinct layers in the Hallett Cove Sandstone, as follows:-

Layer A

This is the upper 6 to 14ft., and consists in the main of up to 80% strong white calcareous sandstone separated by pockets of stiff clay up to 10cm. in diameter, and some silty lenses up to 4ft. thick.

This layer probably represents a weathered zone at the top

of the sandstone.

Layer D.

This is about 18ft. thick and is dense calcareous sandstone containing irregular solution cavities and numerous near horizontal fractures, and some near vertical cemented joints. The major solution cavities are concentrated along these joint planes. Weak limestone gravel bands also occur, ranging in thickness from 0.5 to 3ft. Core losses probably represent cavities in the limestone or lenses of sandy material washed away during drilling.

Groundwater

The main groundwater table was cut within the Hallett Cove Sandstone at about 59ft. below ground level. In holes CH 3 to CH 6 the sand or silt horizon of the Hindmarsh Clay was damp, but there was no inflow. Water was cut at a depth of 1ft. in holes CH 3 and CH 6. This water is probably from leaking pipes and drains in the area. In all holes the upper clay horizon between 5 and 10ft. was moist. This could be due to perched water tables associated with 'gilgai' structures (Ref. 2) which have become partially dried out due to the exceptionally dry season.

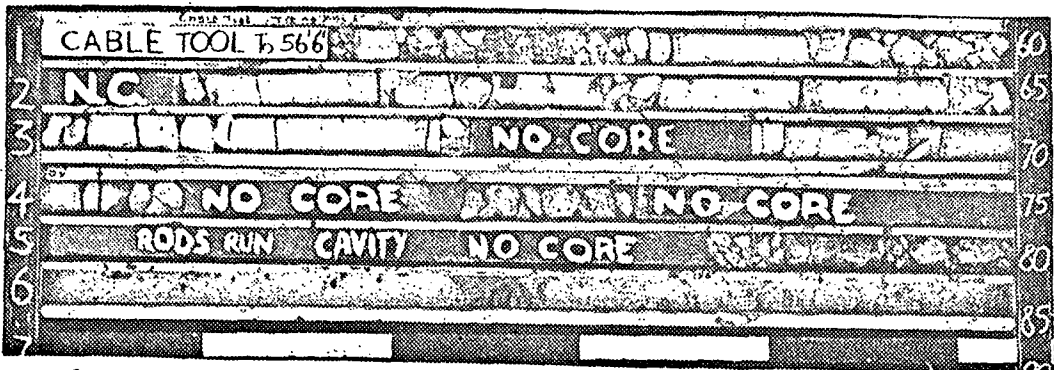
DISCUSSION

Hindmarsh Clay

Drilling results and experience at other sites, suggest that these clays are fairly uniform in lateral extent (Fig. 2). They are highly plastic (CH) soils, stiff or very stiff, and usually at moisture content close to their plastic limit.

The clay is intersected by two sets of near-vertical joints roughly at right angles to each other, spaced about 5cm apart, which tend to divide the mass into a series of vertical columns. Other less regular low dipping (30° to 45°) joints occasionally occur.

PLATE I



TA. 199
Hd Adcl.

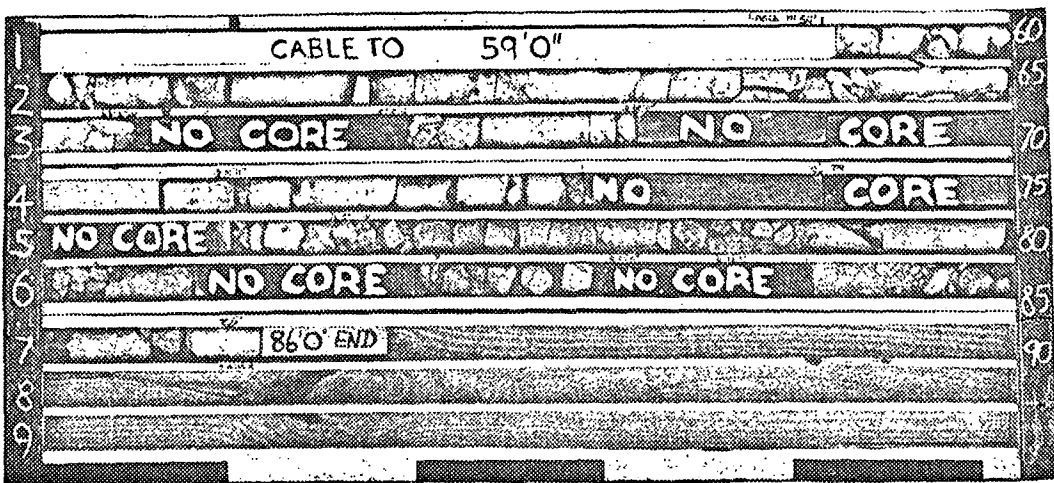
Neg No. 17411 Roll 110

Waymouth St., Telephone Exchange

Diamond Drill Core

Hole CH 3

PLATE 2



TA 199.

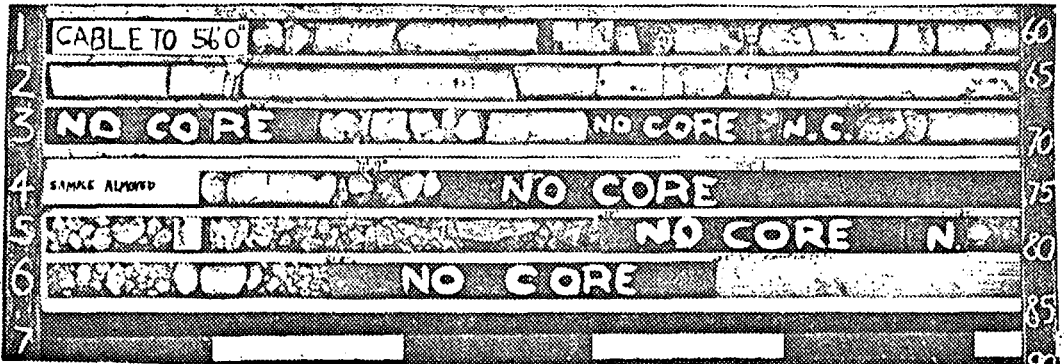
17412 Roll 110.

Waymouth St. Telephone Exchange

Diamond Drill Core

Hole CH 4

PLATE 3



TA 199.

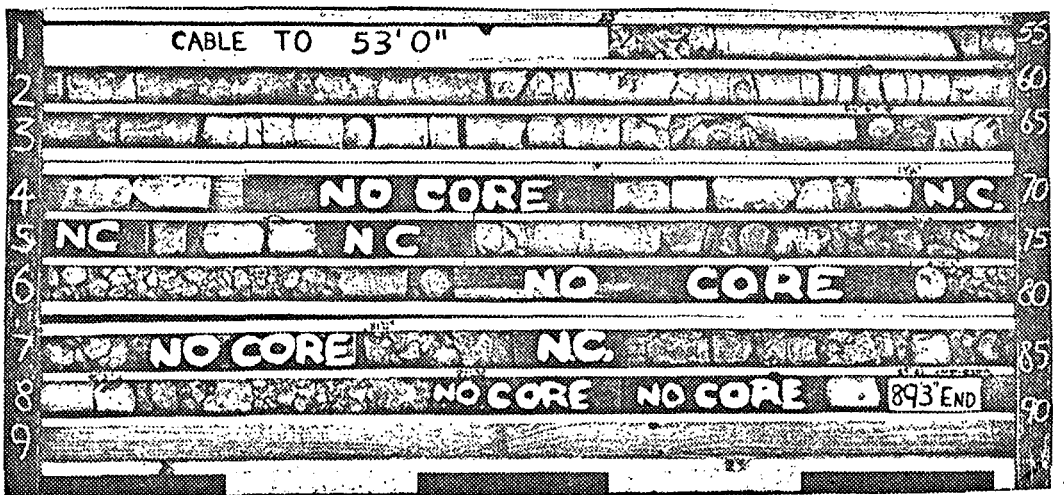
Neg No 17413

Waymouth St., Telephone Exchange

Diamond Drill Core

Hole CH 5

PLATE 4



TA 199.

Neg. No. 17414.

Waymouth St. Telephone Exchange

Diamond Drill Core

Hole CH 6

The upper 10ft. of clay is limy and is considerably weaker than the underlying clay. It is probable that the upper surface of the clay is irregular and deformed into a series of mounds and depressions (gilgai structures)(Ref. 2). These depressions often contain pools of perched groundwater.

The sand, clayey sand, or clayey silt horizon about 30ft. below the ground surface is dense to medium dense.

The following notes are made based on experience in similar materials elsewhere in the Adelaide City area.

.... Auger drilling is feasible through the Hindmarsh Clay formation.

Casing is generally required as any water cut can weaken the clays and cause collapse (Ref. 3).

.... Excavation can be readily carried out in the Hindmarsh Clay Formation by mechanical equipment. The joints control the overall strength of the clay, which may be significantly lower than that obtained in the laboratory by testing of small clay samples (Ref. 4). In most cases of failure of excavation walls in the city, failure has occurred along pre-existing joint planes. However, in most of these failures, water has been allowed to seep into the joints, thus weakening the clay mass further. Seepage of water from "gilgai" structures is often a major cause of these failures.

.... Permanent drainage of water from leaking pipes and perched water tables is usually desirable in buildings with basements.

Hallett Cove Sandstone

All holes penetrated the base of this formation, and showed a total thickness of Hallett Cove Sandstone formation of about 25ft.

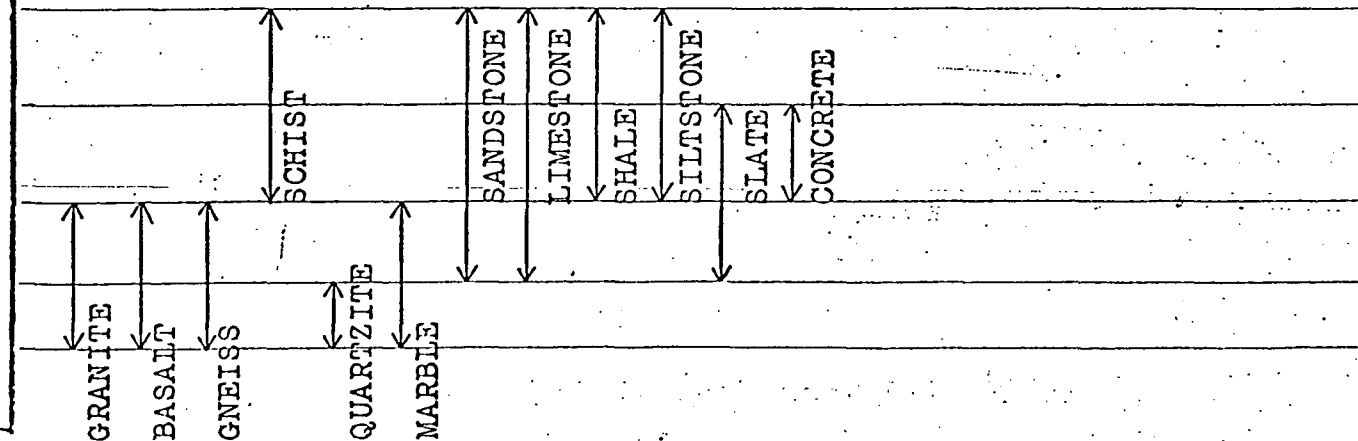
Observations at other sites in the city, and variations between each drill hole at the site, especially Holes 3 and 4, indicate that the sandstone is extremely variable both laterally and vertically. The rock substance ranges from very weak to strong (Table 2), and the rock

TABLE 2.

CLASSIFICATION OF CLAY SOILS AND ROCK SUBSTANCES
BY UNCONFINED COMPRESSIVE STRENGTH.

	TERM	ABBREVIATION	UNCONFINED COMPRESSIVE STRENGTH (Kg/sq.cm)
SOIL PROPERTIES Disintegrates, or can be remolded, in water.	Very soft (clay)	VS	less than 0.25
	Soft "	S	0.25 - 0.5
	Medium "	M	0.5 - 1.0
	Stiff "	St	1.0 - 2.0
	Very Stiff "	V.St	2.0 - 4.0
	Extremely stiff clay	E.St	greater than 4.0
Boundary Zone Substances			
ROCK PROPERTIES Do not disintegrate, cannot be remolded, in water.	Very weak (rock)	VWR	less than 70
	Weak "	WR	70 - 200
	Medium Strong "	MSR	200 - 700
	Strong "	SR	700 - 1800
	Very strong "	VSR	greater than 1800

Range of strengths of some Common Rock Substances, in the Fresh State



mass is weakened by joints, solution cavities, clay seams or pockets, and lenticular beds of silt and sand.

The upper surface of the sandstone is also highly irregular in shape. Buried erosional pinnacles and sink holes are common. One large sinkhole approximately 20ft. in diameter was discovered during pier boring at the Public Library Site, Kintore Avenue, (Ref. 3),

The following notes are made based on experience in similar materials elsewhere in the Adelaide city area:-

.... Piers have been founded in the Hallett Cove Sandstone, usually at the top of Layer B. As the material in this formation is usually very variable, it is advisable to prove the presence and thickness of sandstone at each pier site usually of visual examination and drilling at each pier base during construction (Ref. 3).

.... Belling in Layer A by machine has not been possible and hand mining methods have been used.

.... Cement grouting has been used in an attempt to strengthen the Hallett Cove Sandstone. Generally, it has been of doubtful value due to clay and fine sand in joints and cavities, preventing the penetration of grout. The grout takes can vary considerably depending on the number of solution cavities and fissures intersected.

Pt. Willunga Beds

All holes intersected this formation at a depth of about 76ft., The succession is mainly firm to stiff clay grading at depth to a compact sand, with a few strong line gravel and limestone bands up to 1ft. thick. Core losses probably represent weaker sandy and silty material washed away during drilling.

Blanche Point Marls

The formation was only intersected in hole CH1, and consists of two members. The upper "Soft" Member consists of moderately compact silt with bands of sand up to 10 ft. thick near the base. The underlying "Banded" Member was too strong for the tube sampler and only cuttings were recovered during drilling. Most of the cuttings were fragments of moderately strong glauconitic marl.

Joanne H. Fryar

JHF:CC
9.5.1968

J.H. FRYAR
GEOLOGIST
ENGINEERING GEOLOGY SECTION

REFERENCES

1. ALLCHURCH, P.D., 1966. Proposed Communications Building, Weymouth St., Adelaide. Geological Investigations Progress Report No. 1.
2. ALLCHURCH, P.D., Gilgao Structures in "mottled clays" beneath the City of Adelaide. Geol. Survey S. Aust. Quart. Geol. Notes No. 14.
3. ALLCHURCH, P.D., Karst Topography of the Hallett Cove Sandstone in the Adelaide City Area. Geol. Survey S. Aust. Quart. Geol. Notes No. 24.
4. PROF. SKEMPTON & LA ROCHELLE, The Bradwell Slip; A short term failure in London Clay. Geotechnique Vol. XV No. 3, 1965.
5. AMERICAN STANDARD BUILDING CODE. Requirements for Excavations and Foundations. Appendix, p. 18, clause 2.1 A.S.C.E. Manuals of Engineering Practice No. 32. (A.S.A. Document A56. 1 - 1952).

APPENDIX A

**LOGS OF CABLE TOOL HOLES
AND EXPLANATORY NOTES**

APPENDIX A

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 "s" series sampling tools. (Figs. 1 and 2).

Sampling Procedure

SA Samples

SA samples are obtained by driving an "S" tube, fitted with a Mark A shoe, into the material to be sampled. The number of blows per foot of penetration of the sampling tube, are recorded by the driller. The sample, or core, is extruded from the sampling tube using an hydraulic ram. The extruded core is sealed in a plastic bag and stored in a core box with a label, showing depth of sample and number of blows per foot of penetration. The hole is reamed out after each sample with a Mark E shoe.

SAL Samples

Sealed tube samples, for laboratory testing, are taken at various intervals during drilling.

The drilling procedure is similar to that for obtaining SA Samples, but in order to completely fill the sampling tube, it is driven 1.5ft. into the material to be sampled. On removal from the drill hole, both ends of the sampling tube are sealed with paraffin wax and screwed caps are fitted to the tube. The sealed tubes are labelled as in Fig. 3.

Standard Penetration Test

The standard Penetration Test (Ref. 1) is used to test the in situ density of sands and to give an indication of the consistency of clays, and compactness of silts.

The equipment is illustrated in Fig. 4 and consists of a 2in. diameter, sampling spoon (tube) and a hammer of standard weight (140lbs.)

With the equipment assembled as in Fig. 4 the hammer is allowed to fall on to the drill rods until the sampling shoe has penetrated 6in. 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 (Ref. 2), (Fig 5)

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

..... Geological age	}	printed vertically
..... Soil unit name		
..... 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 (q_u) made with a Soiltest Penetrometer, are recorded. The readings are plotted as a histogram. The Soiltest Penetrometer only gives true values of q_u when used in clays in which $\phi = 0$.

REFERENCE

1. TERZAGHI, K. and PECK, R.B. 1948. Soil Mechanics in Engineering Practice. John Wiley and Sons.
2. UNITED STATES DEPARTMENT OF THE INTERIOR BUREAU OF RECLAMATION 1966. Earth Manual, 2nd Edition.

DESCRIPTIVE TERMS

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 thumb but penetrated only with great effort	8 to 15
Very Stiff	V. St	2.0 to 4.0	Readily indented by thumb nail	5 to 30
Hard (Extremely stiff)	H	over 4.0	Indented with diffi- culty 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 $\geq$ LL	Moisture Content near liquid limit
MC < LL	" " less than "
MC > PL	" " greater than plastic limit
MC $\geq$ PL	" " Near " "
MC $\leq$ PL	" " less or equal to " "
MC < PL	" " less than " "
MC $\ll$ PL	" " much less than " "

2. SILT SOILS

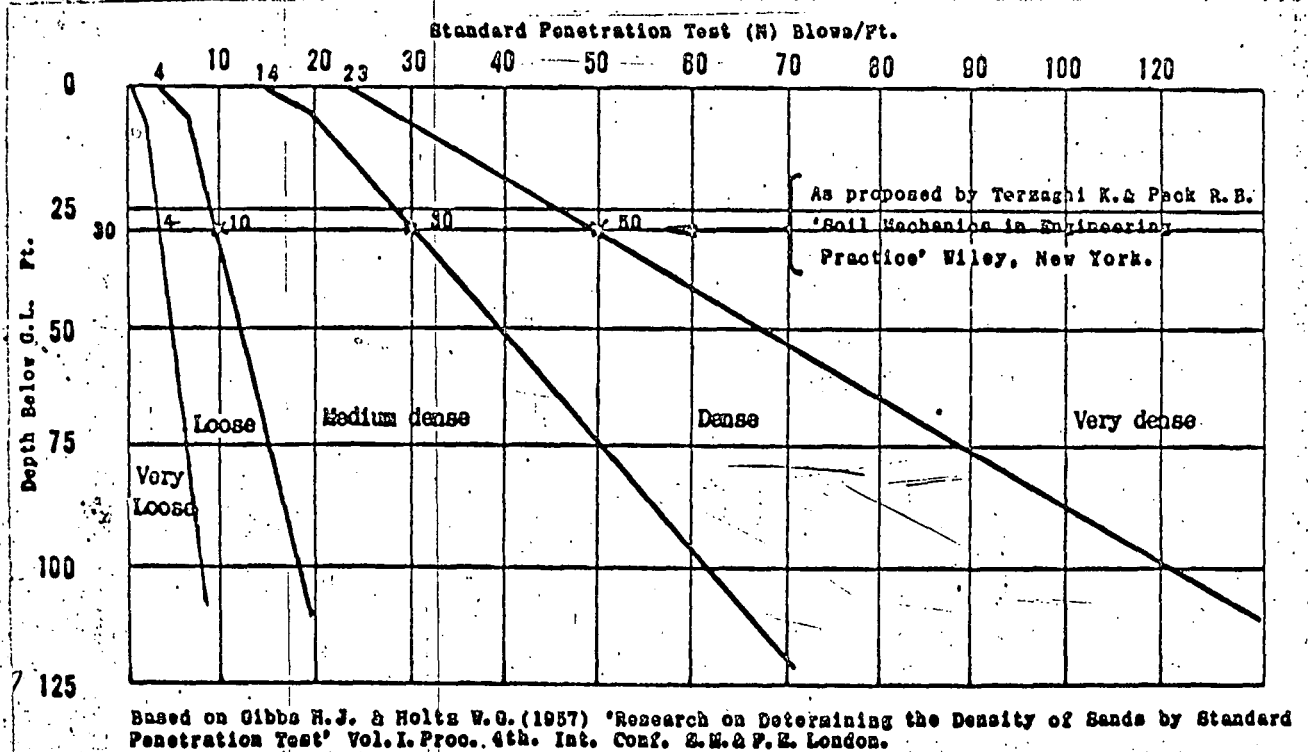
COMPACTNESS	SYMBOL	N
Loose	L	0 to 8
Moderately compact	MC	8 to 15
Compact	C	15 to 20
Very Compact	VC	greater than 30

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 (Ref. 1) bearing in mind the limitations of the method as discussed by Gibbs and Holtz (Ref. 2). 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



REFERENCES

1. Terzaghi K, and Peck, R.B. 1948 "Soil Mechanics in Engineering Practice". Wiley, New York.
2. Gibbs, H.T. and Holtz W.G. 1957 Research on determining the density of sands by standard penetrations tests. Proc. 4th Int. Conf. SM & FE, London Vol.9

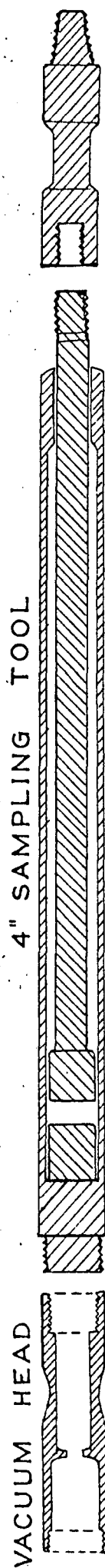
"S" SERIES PERCUSSION SAMPLING TOOL ASSEMBLY



SINKER BAR ASSEMBLY



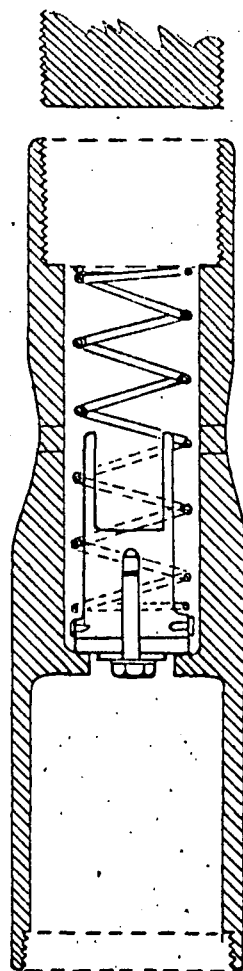
4" SAMPLING TOOL



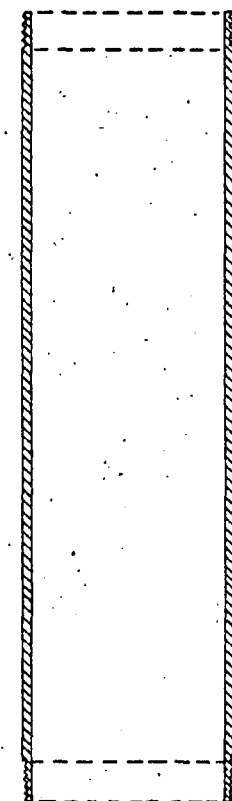
VACUUM HEAD

(VIDE ENLARGEMENT)

4" VACUUM HEAD



4" SAMPLE TUBE



"A" SHOE

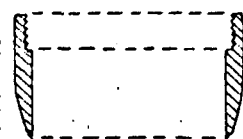


FIG. 1.

APPENDIX A

DEPARTMENT OF MINES — SOUTH AUSTRALIA

ENGINEERING
GEOLOGY
SECTION

Drn. R.D.S.

Tcd. R.D.S.

DIRECTOR
OF
MINES

Ckd. D.H.S.

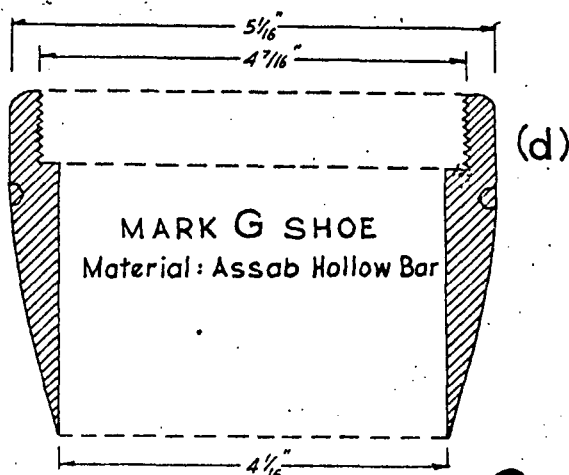
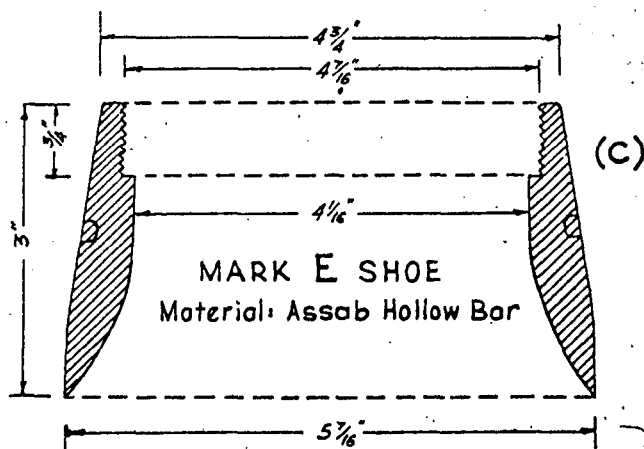
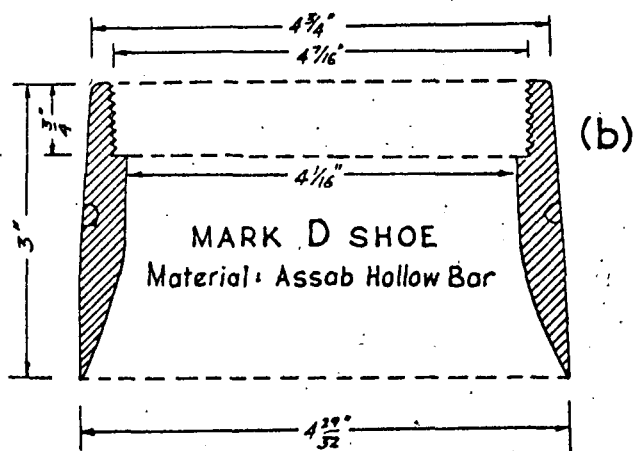
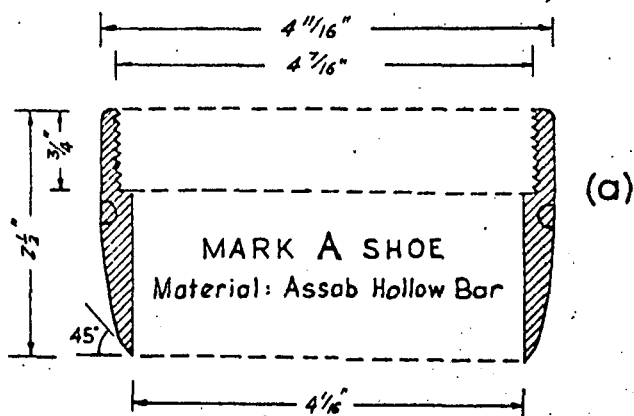
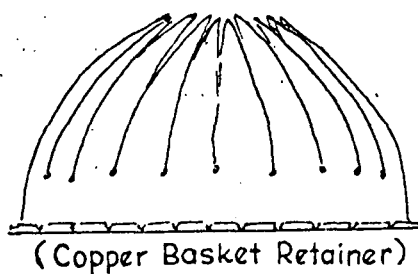
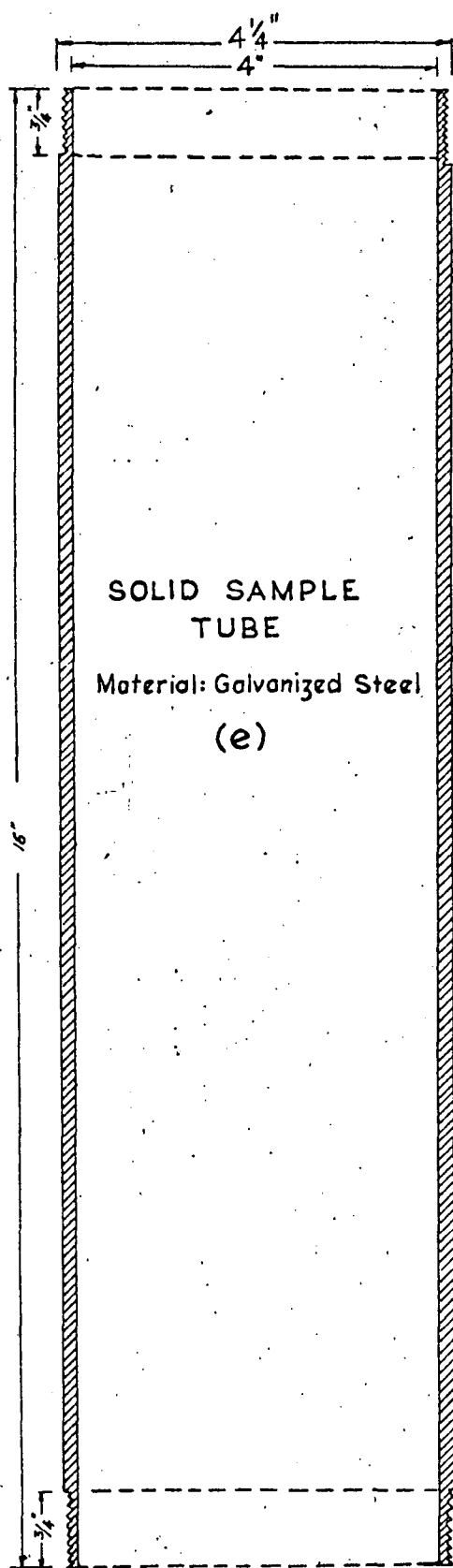
Exd.

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

SCALE: NOT TO SCALE

S4416
MB

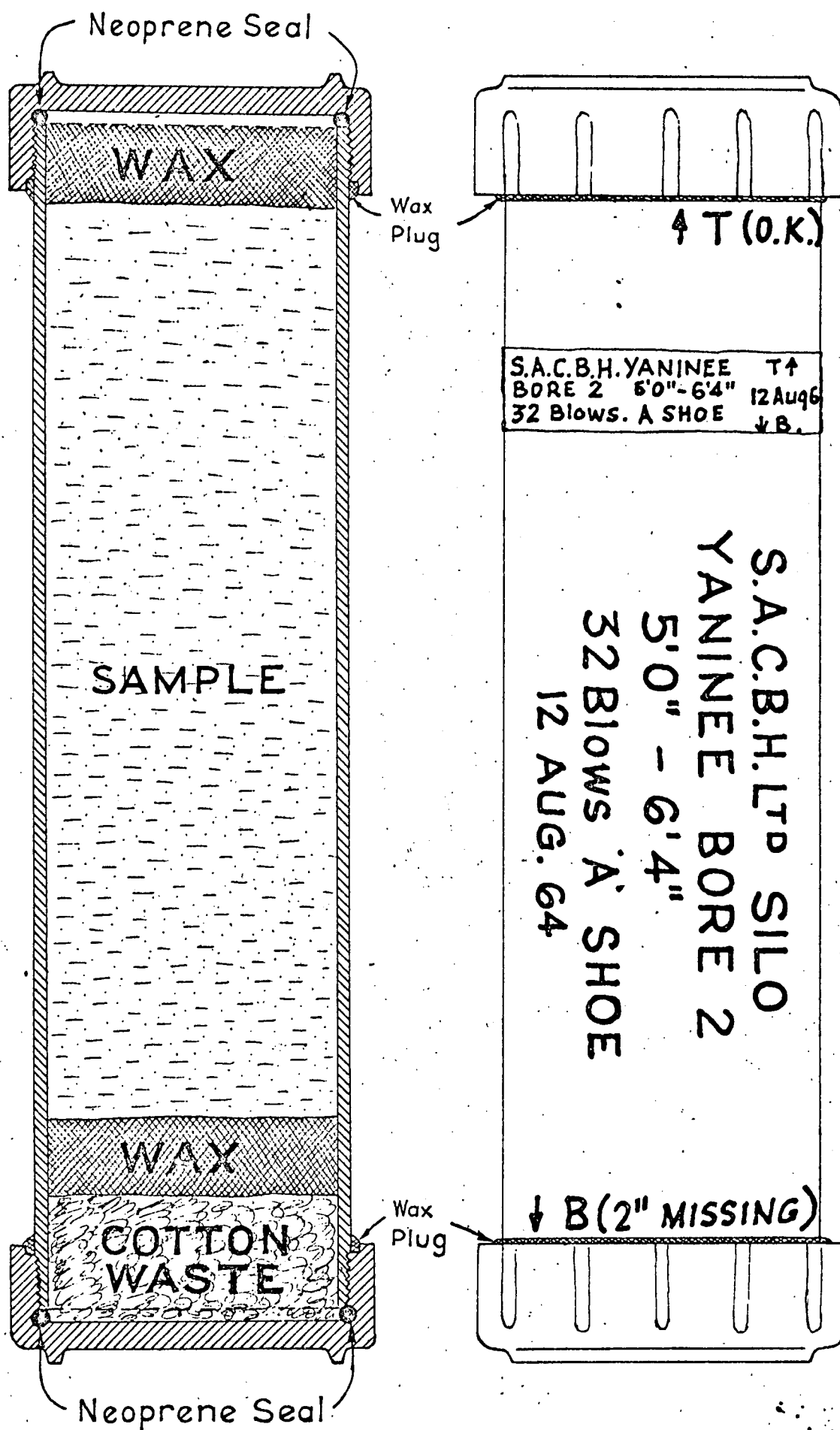
DATE: 29 June 65



APPENDIX A FIG. 2

DEPARTMENT OF MINES — SOUTH AUSTRALIA

ENGINEERING GEOLOGY SECTION	Drn. R.D.S.	CABLE-TOOL DRILLING S SERIES SAMPLING TUBE AND SHOES	SCALE: NOT TO SCALE
	Tcd. R.D.S.		
	Ckd. D.H.S.		S 4418
	Exd.		MB. DATE: 29 June 65



APPENDIX A FIG. 3

DEPARTMENT OF MINES — SOUTH AUSTRALIA

ENGINEERING
GEOLOGY
SECTION

DIRECTOR
OF
MINES

Drn. R.D.S.

Tcd. R.D.S.

Ekd. A.H.S.

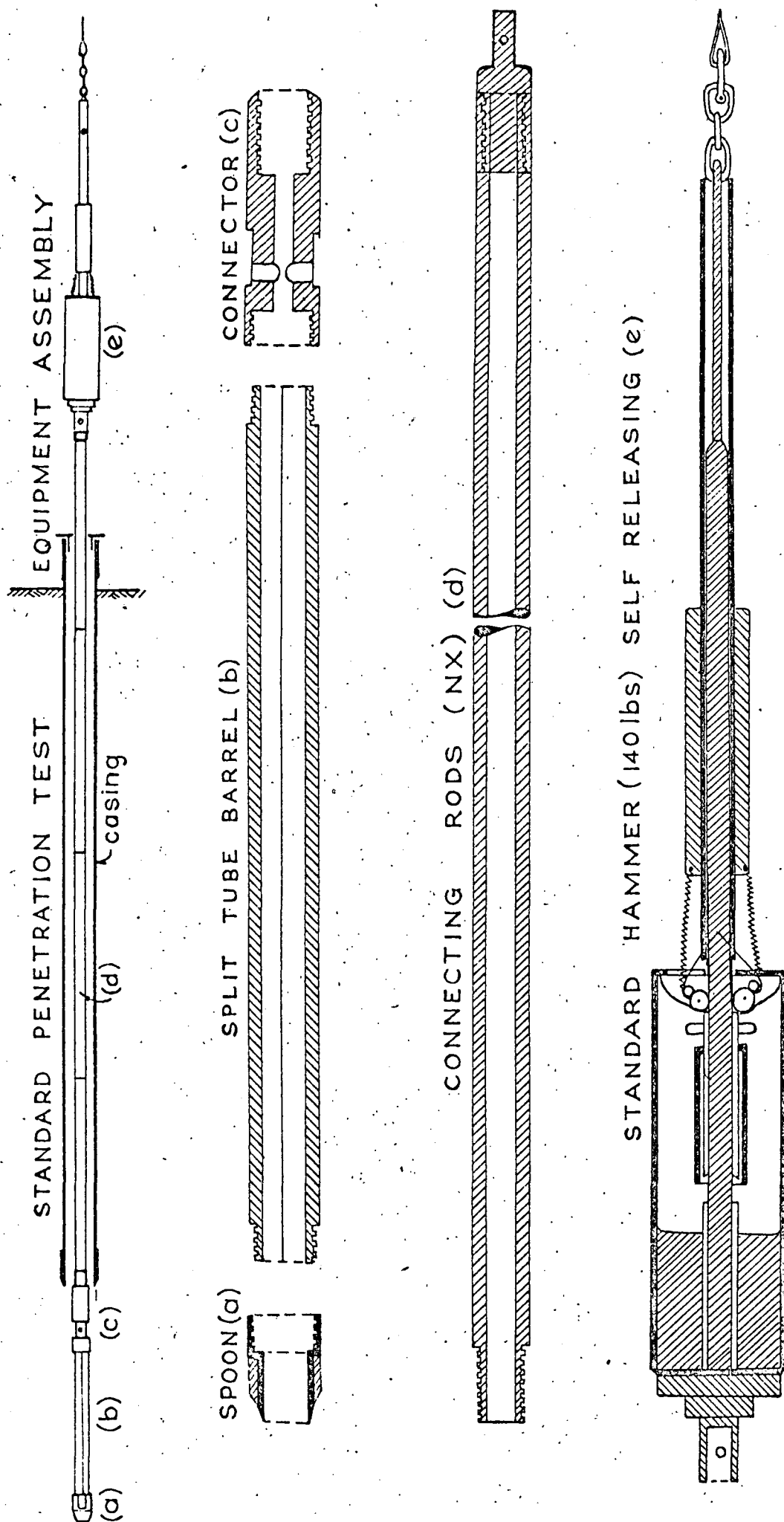
Exd.

CABLE-TOOL DRILLING
SEALED TUBE
SAMPLE

SCALE: NOT TO SCALE

S4419
MB

DATE: 29 JUNE 65



APPENDIX A FIG. 4

DEPARTMENT OF MINES — SOUTH AUSTRALIA

ENGINEERING
GEOLOGY
SECTION

Drn. R.D.S.

Tcd. R.D.S.

Ckd. b.H.S.

Exd.

CABLE TOOL DRILLING
STANDARD PENETRATION
TEST EQUIPMENT

SCALE: NOT TO SCALE

S4420
M.B.

DATE: 29 June 65

DIRECTOR
OF
MINES

LOG OF PERCUSSION DRILL HOLE

SHEET 1 OF 2

PROJECT P.M.G. BUILDING

Hired Dept. of Works.

LOCATION WAYMOUTH ST. ADELAIDE

Sect A 199 Hd ADELAIDE

FEATURE FOUNDATIONS

Depth 150ft. R.L. ^{approx.} 251 Coords

SOIL TYPE		CASING R.L.(FEET)	DEPTH (FEET)	GRAPHIC LOG	GROUP SYMBOL	SOIL DESCRIPTION		CONSISTENCY REL. DENSITY MOISTURE CONTENT WATER LEVELS	PENETRATION DATA						
GEOLOGICAL DESCRIPTION						GROUP NAME			BLOWS/FOOT 20 40 60 80 100	Hand Penetrometer Units. 1 2 3 4 5					
PLEISTOCENE TO RECENT "MOTTLED CLAYS"		16"			CL	CLAY SOIL, sandy. Numerous gravel fragments.		F		Too friable to record.					
					CL- GC	CLAY SOIL, low plasticity, silty to sandy. 30% GRAVEL.		F							
						CLAY SOIL, high plasticity silty. Light green-gray, brown, yellow-brown mottled.									
			10		CH	light green-gray, yellow and brick-red mottled.		STIFF							
			20						4.5+						
					SC	SAND, fine grained, excav silty fines, clayey in part. Light gray, yellow, red mottled.		DENSE							
			30		CL	CLAY SOIL, low plasticity, very silty to sandy. Light gray, yellow, red-brown.		STIFF							
					CH	CLAY SOIL, high plasticity slightly silty. Light green-gray, yellow-brown mottled.		VERY STIFF							
			40					MOIST							
					GM- GC	GRAVEL, well graded, 2- 30 mm. size. Offwhite. Contains up to 30% SILT soil, low plasticity and pockets greenish-gray clay.		GRAVEL - HARD MATRIX STIFF.	Drilled.		Clay mainly 4.0 - 4.5				
UPPER PLIOCENE HALLET COVE SANDSTONE					GW	GRAVEL, well graded. 60- 80% fragments up to 0.5ft. Contains 20% SILT SOIL, low plasticity, pockets green- ish-gray clay.									
			60			Cuttings mainly coarse sand and gravel frag- ments, few silt and clay fines. Offwhite, yellow-brown.									
			70			Cuttings mainly SAND, well graded, fine to coarse grained. Light brown. Contains up to 30% GRAVEL fragments ≥ 10 mm.				Drilled. Slush Pump Samples only.					
						Cuttings mainly GRAVEL fragments up to 25mm. with few silt and sand fines.									
U. EOCENE.....OLIGOCENE BLANCHE POINT PT. WILLUNGA BEDS SOFT MARLS.			80		ML	SILT SOIL, low plasticity, clayey. Light green-gray, yellow-brown mottled.		F M S W		Too friable to record.					
					SM	SAND, fine grained, silty. Light brown to light yellow- brown and gray mottled.		C.							
			90		ML	SILT SOIL, low plasticity, sandy at top, clayey lower. Light gray, yellow-brown, blue-gray mottled.		F							
					ML	SILT SOIL, low plasticity, finely sandy. Gray to mid-gray.		St to D			Too friable to record.				
TYPE OF SAMPLE		HYDROLOGY		CONSISTENCY		REL. DENSITY		MOISTURE		Plant No 2		Logged		R.D. Steel	
Open Tube		Water cut		VS-Very Soft		VL-Very Loose		H-Humid		Type Ruston		Date		Sept. 65	
Sealed Tube		Static level		S-Soft		L-Loose		D-Damp		Driller. A. Sturak		Drawn		R.D.S.	
Auger barrel		Supply		F-Firm		C-Compact		M-Moist		Started. Aug 65		Traced		R.D.S.	
Slush pump		Analysis (ppm)		St-Stiff		D-Dense		W-Wet		Finished. 13 Aug 65		Checked			
Casing		Water level. (Date)		VSt-Very Stiff		VD-Very Dense		S-Saturated		PLAN 54881		Vertical Scale		10ft. to 1in.	
				H-Hard						No 6					

HOLE NO.	
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99	99
100	100

SHEET 2 OF 2

Hirer DEPT. OF WORKS

Sec. 7A 199 Hd ADELAIDE

Depth 150 ft. R.L. ^{approx} 251 Coords

SOIL TYPE		CASING RL. (FEET)	DEPTH (FEET)	GRAPHIC LOG	GROUP SYMBOL	SOIL DESCRIPTION GROUP NAME	CONSISTENCY REL. DENSITY	MOISTURE CONTENT	WATER LEVELS	PENETRATION DATA										
GEOLOGICAL DESCRIPTION										BLOWS/FOOT	Hand Penetrometer Units									
										20	40	60	80	100	1	2	3	4	5	
UPPER EOCENE BLANCHE POINT SOFT MARLS.	Marine and estuarine silt and sands. In part carbonaceous glauconitic and pyritic. Mainly poorly fossiliferous.	6"			ML	SILT SOIL, low plasticity finely sandy. Gray to mid-gray														
			110		ML	SILT SOIL, low plasticity Dark gray. 10% fragments up to 10mm.														
			120		SP	SAND, fine to medium grained. Grayish. 5% grains up to 2mm.														
					ML	SILT SOIL, low plasticity finely sandy, slightly clayey Gray. Few gravel fragments														
			130		SW	SAND, well graded, fine to coarse grained. Grayish. 5% grains up to 2mm. size.														
BANDED BLANCHE POINT MARLS	Marine glauconi- tic shelly marls, with hard bands of spicular calcareous siltstone.		140			Cuttings mainly gravel fragments 2 to 5mm. with possibly 20% SILT SOIL, low plasticity. Dark gray.														
			150			END OF HOLE 150ft.														
TYPE OF SAMPLE		HYDROLOGY		CONSISTENCY		REL. DENSITY		MOISTURE		Plan No. 2		Logged		R.D. Sta.						
Open Tube		Water cut	VS-Very Soft	VL-Very Loose	H-Humid	Type Ruston		Date		Sapt. 65										
Sealed Tube		Static level	S-Soft	L-Loose	D-Damp	Driller A. Sturak		Drawn		R.D.S.										
Auger barrel		Supply	F-Firm	C-Compact	M-Moist	Started Sept 65		Traced		R.D.S.										
Slush pump		Analysis (ppm)	SH-Stiff	D-Dense	W-Wet	Finished Oct 65		Checked		O.H.S.										
Casing		Water level (Date)	VST-Very Stiff	VD-Very Dense	S-Saturated	PLAN No. S4881a		Vertical Scale		10ft. to 1in.										
			H-Hard			No. Ha 6														

LOG OF PERCUSSION DRILL HOLE

SHEET 1 OF 2

PROJECT P.M.G. BUILDING

Hirer DEPT OF WORKS.

LOCATION WAYMOUTH ST. ADELAIDE.

Sect A199 Hd. ADELAIDE.

FEATURE FOUNDATIONS.

Depth 77.5 ft R.L. 251 Coords

SOIL TYPE GEOLOGICAL DESCRIPTION	CASING R.L. (FEET)	DEPTH (FEET)	GRAPHIC LOG	GROUP SYMBOL	SOIL DESCRIPTION GROUP NAME	CONSISTENCY REL. DENSITY	MOISTURE CONTENT	WATER LEVELS	PENETRATION DATA				
									BLOWS/FOOT				
									20	40	60	80	100
Fill: Heterogeneous solid fill fragments	6 in				CLAY SOIL, low plasticity contains up to 60% GRAVEL frags. up to 0.3 ft.	C	F						
Calcareous clay.				CL	CLAY SOIL, low plasticity. Red-brown.	F	V. MOIST.						
Quartz sand.				SW									
Contaminated mottled, clays calcareous				CH	SAND, well graded, medium-coarse grained. Light-greyish. Few silt & clay fines.								
Numerous slicken sides. Bright sheens on structural units.		10		CH	CLAY SOIL, high plasticity silty, finely sandy in part. Light blue-grey. Few gravel fragments								
		20			CLAY SOIL, high plasticity Light green-grey, yellow and reddish mottled.								
		30		CL	CLAY SOIL, low plasticity Sandy. Green-grey yel low-brown, red-brown.								
		40		CH	CLAY SOIL, high plasticity. Light green-grey, light and dark yellow brown mottled.								
EROSION SURFACE				SC	SAND, fine grained, excess silty and clayey fines. Light green-grey.								
		50		GM	GRAVEL, mainly irregular fragments up to 2.5 in. size, with 30% SILT SOIL, low plasticity, offwhite and up to 30% CLAY. SOIL, low plasticity. Green-grey.								
		60	Diamond Drilling										
		70			50 ft to 77.5 ft diamond drilling. See drawing S 4882a.								
					END OF HOLE 77.5 ft.								

TYPE OF SAMPLE

HYDROLOGY

CONSISTENCY

REL. DENSITY

MOISTURE

Plant No 2

Logged

RDS.PDA

Open Tube

Water cut

VS-Very Soft

VL-Very Loose

H-Humid

Type Ruston

Date

Sept 65

Sealed Tube

Static level

S-Soft

L-Loose

D-Damp

Driller A. Sturak

Drawn

RDS.

Auger barrel

Supply

F-Firm

C-Compact

M-Moist

Started 24 Aug 65

Traced

A.M.C.D.

Slush pump

Analysis (ppm)

Stiff

D-Dense

W-Wet

Finished 25 Aug 65

Checked

Casing

Water level

VS-Very Stiff

VD-Very Dense

S-Saturated

PLAN

S 4882

Vertical Scale

1 in = 10 ft.

(Date)

H-Hard

DOCKET.....

SERIAL No.....

PROJECT PM G BUILDING

FEATURE FOUNDATIONS

LOCATION WAYMOUTH ST. ADELAIDE

DEPARTMENT OF MINES — SOUTH AUSTRALIA

GEOLOGICAL LOG OF DRILL HOLE

CO-ORDINATES HUNDRED ADELAIDE

SECTION TA 199

HOLE No 2

SHEET 2 OF 2

R.L. 251 FT.

DIRECTION — °

ANGLE FROM HORIZONTAL 90 °

ROCK TYPE A DEGREE OF WEATHERING SHOWN IN CORE	DESCRIPTION OF CORE OR CUTTINGS WHERE CORE LOST	CORE LOSS LIFT % 20 50	CORE SIZE DEPTH RL. FT	LOG	FRACTURE LOG 1 4 15 64 1 2 8 82	STRUCTURES JOINTS, VEINS, SEAMS, FAULTS, CRUSHED ZONES	% DRILL WATER LOSS 50	WATER PRESSURE TESTS PERMEABILITY IN LUDECH UNITS

UPPER PLIOCENE
HALLETT COVE SANDSTONE

Mainly Calcareous sandstone.

Gravel, Limestone in sandy clay matrix.
Calcareous sandstone to limestone. Off white to cream coloured fine grained. Blocks in matrix.
Minor limonite staining. Grey-green clay pockets common.
Calcareous sandstone, dense, fine to medium grained. Fossiliferous.
Coarse grained quartz cemented with CaCO₃.
NO CORE
Calcareous sandstone, Off-white, very porous.
Coarse grained poorly cemented.
NO CORE
Calcareous sandstone medium grained, very porous. Very fossiliferous, becoming yellow coloured with increase in fossils.
NO CORE
Yellow sandy clay with limestone fragments.
NO CORE

High to complete.
High
Mainly slight with some high to med.
Mainly fresh some high

50
55
60
65
70
75

NMLC

Angular to rounded, up to 0.05 ft. diam. Average 0.03 ft.
Bedding generally indistinct.
Rubbly
Rubbly
Rubbly.
Dendritic manganese staining.
Rock fractured into thin horizontal laminae average 2-5mm thick.
Solution cavities common.
Numerous small solution cavities up to 10 m.m. diameter.
Thin clay seams 0.01 ft thick
Rock Rubbly.

Not applicable

END OF HOLE
77.5 ft.

LEGEND

Strong rock.

⊙

Fossil

DRILL No. 24

TYPE F1000

DRILLER J. JENSEN

COMMENCED 7 Sept 65

COMPLETED 8 Sept 65

EXPLANATION

CASING IN HOLE DURING CHILLING

WATER LEVEL IN DRILL HOLE (DATE)

FRACTURE LOG
1 4 16 64 Breaks in core per foot or Diameter of fragments in feet.
12 3 3/4 16 Inches Equivalent
1 25 06 015 Feet Diameter

ENGINEERING AND SOILS
GEOLOGY SECTION.

LOGGED BY P.D.A. 8 Sept 65

DRAWN BY P.D.A.

CHECKED BY D.K.S.

DRAWING No. S.A. 882a H.

200—8.04 8116

PROJECT **P.M.G. Building**
TELEPHONE EXCHANGE
 FEATURE **FOUNDATIONS**
 LOCATION **WAYMOUTH ST ADELAIDE**

LOG OF CABLE TOOL HOLE

SECTION **T/A. 199**
 HUNDRED **ADELAIDE**
 CO-ORDS

HOLE NO **3**
 SERIAL No.
 R.L. Surface **251** FT.
 R.L. Collar **12057.00** FT.
 Datum **100.80 ft.**

SOIL TYPE GEOLOGICAL DESCRIPTION	R.L. (FEET) DEPTH	GRAPHIC LOG	GROUP SYMBOL	SOIL DESCRIPTION GROUP NAME Unified Soil Classification, U.S.B.R. Earth Manual 1st Edition 1963.	WATER CONTENT MOISTURE CONTENT Consistency Comp. Dens.	FIELD TEST DATA BLOWS PER FOOT 20 40 60 80	SOILTEST P.T.R. METER UNITS 1 2 3 4
Gravel is angular sandstone and siltstone fragments.	250			FILL: Gravel sand and clay mixture. Gravel fragments up to 5 cm.			
Extremely calcareous. Gravel sand & silt are lime. Few chalky lime pockets up to 5 cm. and some black iron oxide nodules up to 1 mm. Two sets of steeply dipping joints approx. at right angles & occasional low angle joints at approx. 30°. Red mottling begins → Sand is subangular quartz. End of red mottling clay band → Two sets of high angle joints open to 2 mm. Chalky lime pockets up to 6 cm. size. OLD EROSION SURFACE	245		CL	CLAY SOIL, medium plasticity. Red brown. Est. 5% lime sand pockets up to 1 mm. with rounded rare quartz grains.			
	240		MH-CH	SILT SOIL, high plasticity, clayey, finely sandy in part. Light brown, est. 50% earthy lime & 20% gravel fragments.			
	235		CH	CLAY SOIL, high plasticity. Green grey, yellow & red mottled. Variable fine sand content.			
	230			Increasing red brown sand in pockets approx. 30%			
HALLETT COVE SANDSTONE	220		SC	SAND excess silty and clayey fines. Fine to coarse grained. Grey, red brown and ochre - yellow mottled.			
	210		CH	CLAY SOIL, high plasticity Est. 5% sand, slightly silty. Grey green with yellow mottling and some lime pockets near 45 ft.			
	200		GC	GRAVEL, excess clayey fines Est 10% clay in pockets, grades to Rock with rare highly plastic green grey clay pockets up to 3 cm.			

TYPE OF SAMPLE

A shoe (SA)
 D " (SD)
 E " (SE)
 G " (SG)
 Sealed Tube -
 A shoe - 5AL
 Standard Penetration Test - SP

Water level (date)
 WCP
 Water cut

CONSISTENCY
 VS. - Very Soft
 S - Soft
 SF - Soft to Firm
 F - Firm
 F St. - Firm to Stiff
 St. - Stiff
 V St. - Very Stiff
 H - Hard

COMPACTNESS
 Ls - Loose
 MC - Moderately Compact
 C - Compact
 VC - Very Compact

RELATIVE DENSITY
 VL - Very Loose
 L - Loose
 MD - Medium Dense
 D - Dense
 VB - Very Dense

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

ENGINEERING GEOLOGY SECTION

DRILL No. **2**
 TYPE **Ruston**
 DRILLER **A. Sturak**
 START **11 Mar 68**
 FINISH **6 Apr 68**
 SHEET **1 OF 2**

LOGGED BY **J. H. Fryar**
 DATE **22nd Mar 68**
 TRACED **B. S. G.**
 CHECKED **W. J. G.**
 DRG No. **S 6473**
 HaG

PROJECT **P.M.G. BUILDING.**
TELEPHONE EXCHANGE.

LOG OF CABLE TOOL HOLE

SECTION **T/A 199.**
HUNDRED **ADELAIDE**HOLE
NO

3

SERIAL No.

R.L. Surface **251** FT.R.L. Collar **251** FT.Datum **100.80**FEATURE **FOUNDATIONS.**LOCATION **WAYMOUTH ST. ADELAIDE.**

CO-ORDS

SOIL TYPE GEOLOGICAL DESCRIPTION	R.L. (FEET) DEPTH	GRAPHIC LOG	GROUP SYMBOL	SOIL DESCRIPTION GROUP NAME Unified Soil Classification, U.S.B.R. Earth Manual 1st Edition 1963.	WATER LEVEL CEILING	MOISTURE CONTENT	Consistency Compact, Dense	FIELD TEST DATA	
								BLOWS PER FOOT 20 40 60 80	SOILTEST P.T. METER UNITS 1 2 3 4
UPPER PLEISTOCENE HALLETT COVE SANDSTONE Marine, calcareous, fossiliferous. While to buff colored, dense fine grained sandstone. Weakly cemented. Some hard horizons, also lumps up to 15 cm. with lenses and pockets of calcareous silt and green grey clay.	200		GC	ROCK with rare highly plastic green grey clay pockets up to 3 cm.					
	55		MH	GRAVEL, excess clayey fines Est. 40% clay in pockets.					
			GC	SILT soil, high plasticity. Green gray with white earthy lime pockets up to 4 cm. Est. 15% gravel.					
			GM	GRAVEL, excess clay & silt fines. Est. 30% green grey clay matrix.					
UPPER PLEISTOCENE HALLETT COVE SANDSTONE Marine, calcareous, fossiliferous. While to buff colored, dense fine grained sandstone. Weakly cemented. Some hard horizons, also lumps up to 15 cm. with lenses and pockets of calcareous silt and green grey clay.	60			Est. up to 40% highly plastic green grey clay in pockets.					
	65			Core in sticks 0.1 to 0.8 ft. mainly 0.6 ft. long core fragments appear to have broken along clay seams in places.					
	70			Irregular low angle and vertical jointing.					
	75			Large solution cavities up to 4 cm. wide					
OLIGOCENE PI WILLUNGA BEDS Marine & estuarine soft glauconite & lime silt with gravel size shell fragments and sand size glauconite.	80		CL	Core fragments up to 0.1 ft. with sand in cavities. CLAY SOIL, low plasticity. Silty grey, green with yellow mottling. Vertical & horizontal joints open up to 2 mm.					
	85								
	90								
	95								

TYPE OF SAMPLE		CONSISTENCY	COMPACTNESS	RELATIVE DENSITY	MOISTURE CONTENT	ENGINEERING GEOLOGY SECTION	
A shoe (SA)		VS. — Very Soft	LS — Loose	VL — Very Loose	H — Humid	DRILL No. 2	LOGGED BY J. H. FRYAR
D " (SD)		S — Soft	MC — Moderately Compact	L — Loose	D — Damp	TYPE A. Sturak	DATE 22nd Mar '68
E " (SE)		SF — Soft to Firm	C — Compact	MD — Medium Dense	M — Moist	DRILLER A. Sturak	TRACED B. S. G.
G " (SG)		F — Firm	VC — Very Compact	D — Dense	W — Wet	START 11 Mar '68	CHECKED 22/03/68
Sealed Tube		F St. — Firm to Stiff		VD — Very Dense	S — Saturated	FINISH 6 Apr '68	
A shoe = BAL		St. — Stiff			LL — Liquid Limit	SHEET 2 OF 2	DRG No. S 6473 a
Standard Penetration Test - SPT		V. St. — Very Stiff			PL — Plastic Limit		Ha 6
		H — Hard					

PROJECT *P.M.G. BUILDING
TELEPHONE EXCHANGE.*

LOG OF CABLE TOOL HOLE

FEATURE *FOUNDATIONS*SECTION *T/A 199*LOCATION *WAYMOUTH ST. ADELAIDE*HUNDRED *ADELAIDE*

CO-ORDS

HOLE
NO

4

SERIAL No.

R.L. Surface, *251* .FT.R.L. Collar *2 W. 95 T Pt. Adel.* .FT.Datum *100.80 ft.*

SOIL TYPE GEOLOGICAL DESCRIPTION	R.L. (FEET) DEPTH	GRAPHIC LOG	GROUP SYMBOL	SOIL DESCRIPTION GROUP NAME Unified Soil Classification, U.S.B.R. Earth Manual 1st Edition 1963.	WATER LEVEL	CUTTING MOISTURE CONTENT	Consistency Compct. Dens.	FIELD TEST DATA	
								BLOWS PER FOOT 20 40 60 80	SOILTEST P.T.R. METERS UNITS 1 2 3 4
<i>Gravel is angular sandstone and siltstone fragments.</i>	250			<i>FILL gravel sand & clay mixture. Gravel fragments up to 5 cm.</i>					
<i>Extremely calcareous Gravel, sand and silt are lime</i>	5		CL	<i>CLAY SOIL, Medium plasticity. Red brown. Few lime sand pockets up to 1 mm.</i>					
	10		MH CH	<i>SILT SOIL, high plasticity clayey, finely sandy in part. Light brown, est. 50% earthy lime and 20% gravel fragments.</i>					
	15		CH	<i>CLAY SOIL, high plasticity. Green grey, yellow and red mottled. Variable fine sand content.</i>					
	20			<i>Increasing red brown mottled sandy pockets.</i>					
<i>Red mottling begins →</i>	25								
<i>Two sets of steeply dipping joints nearly at right angles and occasional low angle joints at about 30°. Joints open up to 1 mm. and slickensided</i>	30		SC- ML	<i>SAND, excess silty and clayey fines. Fine grained light grey with some red brown & ochre yellow mottling in part. Contains silty horizons up to 1.5 ft. thick.</i>					
<i>Sand is subangular quartz.</i>	35		CH	<i>CLAY SOIL, high plasticity. Est. 5% sand. Silty. Grey green with yellow mottling.</i>					
<i>End of red mottling. →</i>	40								
<i>Two sets of high angle joints open to 1 mm.</i>	45								
	50								

TYPE OF SAMPLE	CONSISTENCY	COMPACTNESS	RELATIVE DENSITY	MOISTURE CONTENT	ENGINEERING GEOLOGY SECTION	
A Shale (SA)	VS — Very Soft	LT — Loose	VL — Very Loose	H — Humid	DRILL No. <i>2</i>	LOGGED BY <i>J. H. Fryar</i>
D " (SD)	S — Soft	MC — Moderately Compact	L — Loose	D — Damp	TYPE <i>RUSTON</i>	DATE <i>25th Mar 68</i>
E " (SE)	SF — Soft to Firm	F — Firm	MD — Medium Dense	M — Moist	DRILLER <i>A. Sturak</i>	TRACED <i>B. S. G.</i>
G " (SG)	F — Firm	C — Compact	D — Dense	W — Wet	START <i>14th Mar 68</i>	CHECKED <i>MOORE</i>
Sealed Tube A Shoe — SAL	F St. — Firm to Stiff	V C — Very Compact	VD — Very Dense	S — Saturated	FINISH <i>15th " 68</i>	
Standard Pene- tration Test — SPT	St. — Stiff			LL — Liquid Limit	SHEET <i>1</i> OF <i>2</i>	DRG No. <i>S 6474</i>
DEAL SE02CA	V. St. — Very Stiff			PL — Plastic Limit		<i>No 6</i>
	H — Hard					

PROJECT **P.M.G. BUILDING**

LOG OF CABLE TOOL HOLE

HOLE
NO

4

SERIAL No.

FEATURE

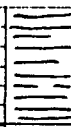
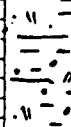
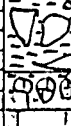
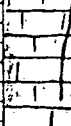
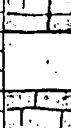
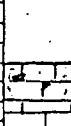
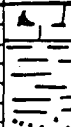
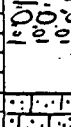
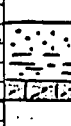
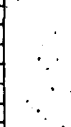
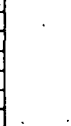
FOUNDATIONS.SECTION **T/A 199**HUNDRED **ADELAIDE**R.L. Surface **251** FT.

LOCATION

WAYMOUTH ST ADELAIDE

CO-ORDS

R.L. Collar **Lowest pt Adal** FT.
Datum **= 100.80 ft.**

SOIL TYPE GEOLOGICAL DESCRIPTION		R.L. (FEET) DEPTH	GRAPHIC LOG	GROUP SYMBOL	SOIL DESCRIPTION GROUP NAME Unified Soil Classification, U.S.B.R. Earth Manual 1st. Edition 1963.	WATER LEVEL C.B. LEVEL	MOISTURE CONTENT	Consistency	FIELD TEST DATA			
									BLOWS PER FOOT 20 40 60 80		SOILTEST P.T.R.METER UNITS 1 2 3 4	
UPPER PLEISTOCENE HALLETT COVE SANDSTONE. Marine, fossiliferous white to buff colored, fine grained sandstone. Hard & dense. Weakly cemented.	OLD EROSIONAL SURFACE	200		CH	As above							
	Sand is subrounded quartz. Some iron-stained gravel size nodules. Limey silt pockets and lenses up to 8 cm.	55		ML-CH	SILT SOIL, medium plasticity. Est. 30% fine sand. Light green grey with darker clayey lenses.							
	Gravel is angular limey fragments up to 8 cm.	60		GC-GM	GRAVEL, excess clayey and silty fines. Est. 20% highly plastic light green grey silty clay in pockets.							
	Minor solution cavities. No Core.	65			Core sticks 0.1 to 0.6 ft, mainly 0.5 ft. long. Prominent irregular vertical joints.							
OLIGOCENE BEDS PT WILLUNGA BEDS Marine & estuarine soft glauconitic & lime silt with gravel size shell fragments & sand size fragments glauconite.	Macro fossils	70			Minor solution cavities							
	MW-HW Sandy horizon	75			Numerous solution cavities up to 2 cm. wide & 3 cm. long are randomly distributed.							
	No core.	80		CL	Core sticks mainly 0.2 ft. long.							
	Macro fossils	85		SC ML	CLAY SOIL, low plasticity silty and becoming more sandy with depth. Green grey with yellow mottling. One set of vertical joints open to 2 mm. and also near horizontal jointing. Shrinkage cracks open to 1 mm.							
	Sand and gravel is limestone gravel band	170			SAND, fine grained, light grey, brown calcareous grading to SILT SOIL, low plasticity, sandy with lime, gravel fragments up to 4 cm.							
	No Core.	175										
	MW-HW horizon	180										
	No Core.	185										
Limestone containing 20% glauconitic sand.		190										
Jointing												
Solution cavities												
strong to very strong rock												

TYPE OF SAMPLE	CONSISTENCY	COMPACTNESS	RELATIVE DENSITY	MOISTURE CONTENT	ENGINEERING GEOLOGY SECTION	
A, thoe (SA)	VH - Very Soft	Lo - Loose	VL - Very Loose	H - Humid	DRILL No. 2	LOGGED BY J. H. Fryar
D " (SB)	S - Soft	MC - Moderately Compact	L - Loose	B - Damp	TYPE A. Sturak	DATE 28th Mar 68
E " (SE)	SF - Soft to Firm	C - Compact	MD - Medium Dense	M - Moist	DRILLER A. Sturak	TRACED B. S. G.
G " (SG)	F - Firm	VC - Very Compact	D - Dense	W - Wet	START 14th Mar '68	CHECKED WROB
Sealed Tube - A Shoe - SAL	FSt - Firm to Stiff		VD - Very Dense	S - Saturated	FINISH 15th Mar '68	
Standard Penetration Test - SPT	St - Stiff			LL - Liquid Limit	SHEET 2 OF 2	DRG No. S 6474a
	VSt - Very Stiff			PL - Plastic Limit		
	H - Hard					

PROJECT **P.M.G. BUILDING.**
TELEPHONE EXCHANGE.

LOG OF CABLE TOOL HOLE

SECTION **T/A 199**HUNDRED. **ADELAIDE**

CO-ORDS

HOLE NO **5**

SERIAL No.

R.L. Surface, **251** FT.R.L. Collar **240.57** FT.
Datum = **100.8**FEATURE **FOUNDATIONS.**LOCATION **WAYMOUTH ST. ADELAIDE**

SOIL TYPE GEOLOGICAL DESCRIPTION	R.L. (FEET) DEPTH	GRAPHIC LOG	GROUP SYMBOL	SOIL DESCRIPTION GROUP NAME Unified Soil Classification, U.S.B.R. Earth Manual 1st Edition 1963.	WATER LEVEL	MOISTURE CONTENT	Consistency Comp. Limit	FIELD TEST DATA	
								BLOWS PER FOOT 20 40 60 80	SOILTEST P.T. METERS UNITS 1 2 3 4
Gravel is angular sandstone and siltstone fragments.	250			FILL: Gravel and sand mixture. Gravel fragments up to 0.3 ft.					
Fine jointing Extremely calcareous Gravel, sand and silt are lime and limestone. Two sets of steeply dipping joints approx. 5 cm. apart. Red mottling starts Sand is quartz, subangular to angular, iron stained. End of red mottling. Chalky lime pockets up to 3 cm. Some red mottling. Lime pockets up to 4 cm.	5		CL	CLAY SOIL, medium plasticity. Red brown est. 5% limy sand pockets up to 1mm. with rounded quartz grains.					
			MH	SILT SOIL, High plasticity, clayey sandy in part. Off white. Est. 50% earthy lime & 20% gravel fragments.					
	10		CH	CLAY SOIL, high plasticity. Green grey, yellow and red mottled. Variable fine sand content.					
	15								
	20								
	25								
	30		SC	SAND, excess silty & clayey fines. Fine to coarse grained. Grey with red brown and ochre yellow mottling.					
	35		CH	CLAY SOIL, high plasticity est. 5% sand, slightly silty. Grey green with yellow mottling & some lime pockets near 46 ft.					
	40								
	45								
OLD EROSION SURFACE	50		GC	GRAVEL, excess clayey fines. Est. 20% grey green clay in pockets up to 9 cm. Gravel fragments are up to 8 cm. angular & off white.					

PLEISTOCENE TO RECENT
HINDMARSH CLAYHAILETT
COVE
SANDSTONE.

TYPE OF SAMPLE	CONSISTENCY	COMPACTNESS	RELATIVE DENSITY	MOISTURE CONTENT	ENGINEERING GEOLOGY SECTION	
A shoe (SA)	VS. - Very Soft	LS - Loose	VL - Very Loose	H - Humid	DRILL No. 2	LOGGED BY J. H. Fryer
D. " (SD)	S - Soft	MC - Moderately Compact	L - Loose	D - Damp	TYPE Ruston	DATE 20th Mar 68
E. " (SE)	SF - Soft to Firm	C - Compact	MD - Medium Dense	M - Moist	DRILLER A. Sturak	TRACED B.S.G.
G. " (SG)	F - Firm	VC - Very Compact	D - Dense	W - Wet	START 5th Mar '68	CHECKED 4/2/68
Sealed Tube - A shoe - SAL	F St. - Firm to Stiff		VD - Very Dense	S - Saturated	FINISH 19th Mar '68	
Standard Penetration Test - SPT	St. - Stiff			LL - Liquid Limit	SHEET 1 OF 2	BRG No. 8 6475
	V.St. - Very Stiff			PL - Plastic Limit		Ha6
	H - Hard					

PROJECT **P. M. G. BUILDING.**
TELEPHONE EXCHANGE.

LOG OF CABLE TOOL HOLE

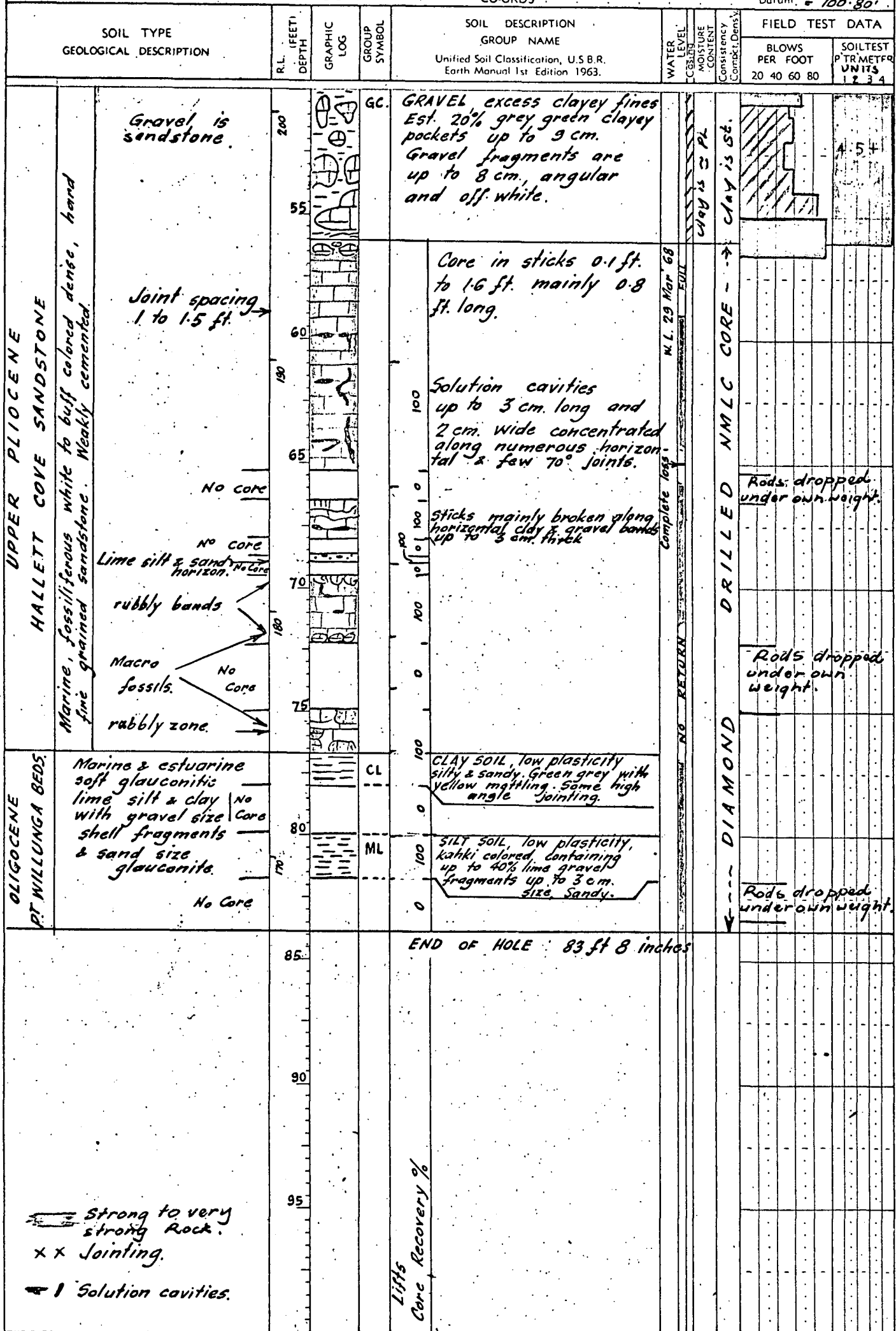
SECTION **T/A 199**FEATURE **FOUNDATIONS**HUNDRED **ADELAIDE**LOCATION **WAYMOUTH ST ADELAIDE**

CO-ORDS

HOLE
NO

5

SERIAL No.

R.L. Surface **251** FT.R.L. Collar **251** FT.
W. of St. Pt Adelaide
Datum = 100.80'

TYPE OF SAMPLE		CONSISTENCY	COMPACTNESS	RELATIVE DENSITY	MOISTURE CONTENT	ENGINEERING GEOLOGY SECTION	
A shoe (SA)	Water level, (date) 7 Dec '66 WC Water cut	VS. — Very Soft	Ls — Loose	VL — Very Loose	H — Humid	DRILL No. 2	LOGGED BY J. H. F.
D " (SD)		S — Soft	MC — Moderately Compact	L — Loose	D — Damp	TYPE Ruston	DATE 20th Mar. '68
E " (SE)		SF — Soft to Firm	F — Firm	MD — Medium Dense	M — Moist	DRILLER M. Sturak	TRACED B. S. G.
G " (SG)		F St. — Firm to Stiff	C — Compact	D — Dense	W — Wet	START 5th March '68	CHECKED 0.04.06
Sealed Tube — A Shoe — SAL		St. — Stiff	VC — Very Compact	VD — Very Dense	S — Saturated	FINISH 19th March '68	
Standard Penetration Test — SPT		V.St. — Very Stiff			LL — Liquid Limit	SHEET 2 OF 2	DRG No. S 6475 a
		H — Hard			PL — Plastic Limit		Ha 6

PROJECT *P. M. G. BUILDING*
TELEPHONE EXCHANGE.

LOG OF CABLE TOOL HOLE

TELEPHONE EXCHANGE. SECTION T/A 199
FEATURE FOUNDATIONS HUNDRED ADELAIDE
LOCATION. WAYMOUTH ST. CO-ORDS

R.L. Surface. **251** FT.
R.L. Collar **L.W. 057** FT.
Datum **PT. Adel = 100.8**

[illegible]

TYPE OF SAMPLE			CONSISTENCY	COMPACTNESS	RELATIVE DENSITY	MOISTURE CONTENT	ENGINEERING GEOLOGY SECTION		
A shoe (SA)	VS. — Very Soft		LS — Loose	VL — Very Loose	H — Humid	DRILL No. 2	LOGGED BY		
D " (SD)	S — Soft		MC — Moderately Compact	L — Loose	D — Damp	TYPE Ruston.	J. H. Fryar.		
E " (SE)	SF — Soft to Firm		C — Compact	MD — Medium Dense	M — Moist	DRILLER A. Sturak	DATE 25th Mar '68		
G " (SG)	F — Firm		VC — Very Compact	Dense	W — Wet	START 18th Mar '68	TRACED B. S. G.		
Sealed Tube - A Shoe - S.A.L.	F St. — Firm to Stiff		VD — Very Dense	Dense	S — Saturated	FINISH 19th Mar '68	CHECKED 11/003		
Standard Penetration Test - SPT	St. — Stiff			LL — Liquid Limit		SHEET 1 OF 2	DRG No. S 6476	Ha6	
	WCP Water cut	V.St. — Very Stiff			PL — Plastic Limit				
		H — Hard							

PROJECT **P. M. G. BUILDING**
TELEPHONE EXCHANGE

LOG OF CABLE TOOL HOLE

HOLE NO **6**

SERIAL No.

FEATURE **FOUNDATIONS**
LOCATION **WAYMOUTH ST**SECTION **T/A 199**
HUNDRED **ADELAIDE**
CO-ORDSR.L. Surface **251** FT.R.L. Collar **251** FT.
Datum **PT Adel = 100.8**

SOIL TYPE GEOLOGICAL DESCRIPTION	R.L. (FEET) DEPTH	GRAPHIC LOG	GROUP SYMBOL	SOIL DESCRIPTION GROUP NAME Unified Soil Classification, U.S.B.R. Earth Manual 1st Edition 1963.	WATER LEVEL	MOISTURE CONTENT	Consistency Compct. Density	FIELD TEST DATA BLOWS PER FOOT 20 40 60 80	SOILTEST PTR MET ² UNITS 1 2 3 4
UPPER PLEISTOCENE HALLETT COVE SANDSTONE Marine calcareous, fossiliferous, white to buff colored, dense, fine grained sandstone. Weakly cemented. Mainly moderately weathered with few highly weathered rubbly zones.	200		GC	As above.					
	195			Core sticks 0.1 to 1.2 ft. mainly 0.5 ft. long.					
	190			Shrinkage cracks in clay open up to 2 mm.					
	185			Some vertical and 45° joints; cemented. Joint fragments mainly broken along horizontal bedding planes. Minor solution cavities.					
	180			Solution cavities up to 2 cm. wide.					
OLIGOCENE PT WILLUNGA BEDS. Marine and estuarine soft glauconitic and lime silt, with gravel size shell fragments and sand size glauconite. Few limestone and gravel interbeds.	175		CL	CLAY SOIL, low plasticity, silty & sandy. Green grey with yellow mottling. Shrinkage cracks opening to 1 mm.					
	170		GC ML	SILT SOIL, generally low plasticity with occasional highly plastic clayey horizons. Light yellow to light grey brown. Fine SAND at 82 ft. & also a few rock & gravel interbeds.					
	165		SC						
	160		CH MH						
	155		SC	SAND, fine grained Grey brown.					
	150			Solution cavities up to 3 mm long.					
	145			END OF HOLE 89 ft 3 inches.					
	140								
	135								
	130								

TYPE OF SAMPLE	CONSISTENCY	COMPACTNESS	RELATIVE DENSITY	MOISTURE CONTENT	ENGINEERING GEOLOGY SECTION	
A - Shale (SA) D - " (SD) E - " (SE) G - " (SG) Sealed Tube - A Shoe - SAL Standard Penetration Test - SPT	VS - Very Soft S - Soft SF - Soft to Firm F - Firm F St - Firm to Stiff St - Stiff V.St - Very Stiff H - Hard	Ls - Loose MC - Moderately Compact C - Compact VC - Very Compact	VL - Very Loose L - Loose MD - Medium Dense D - Dense VD - Very Dense	H - Humid D - Damp M - Moist W - Wet S - Saturated LL - Liquid Limit PL - Plastic Limit	DRILL No. 2 TYPE RUSTON DRILLER A. Sturak START 18th Mar. 68 FINISH 19th Mar. 68 SHEET Z. OF 2	LOGGED BY J. H. Fryar DATE 25th Mar 68 TRACED B. S. G. CHECKED W. R. B. DRG No. S6476 a No 6

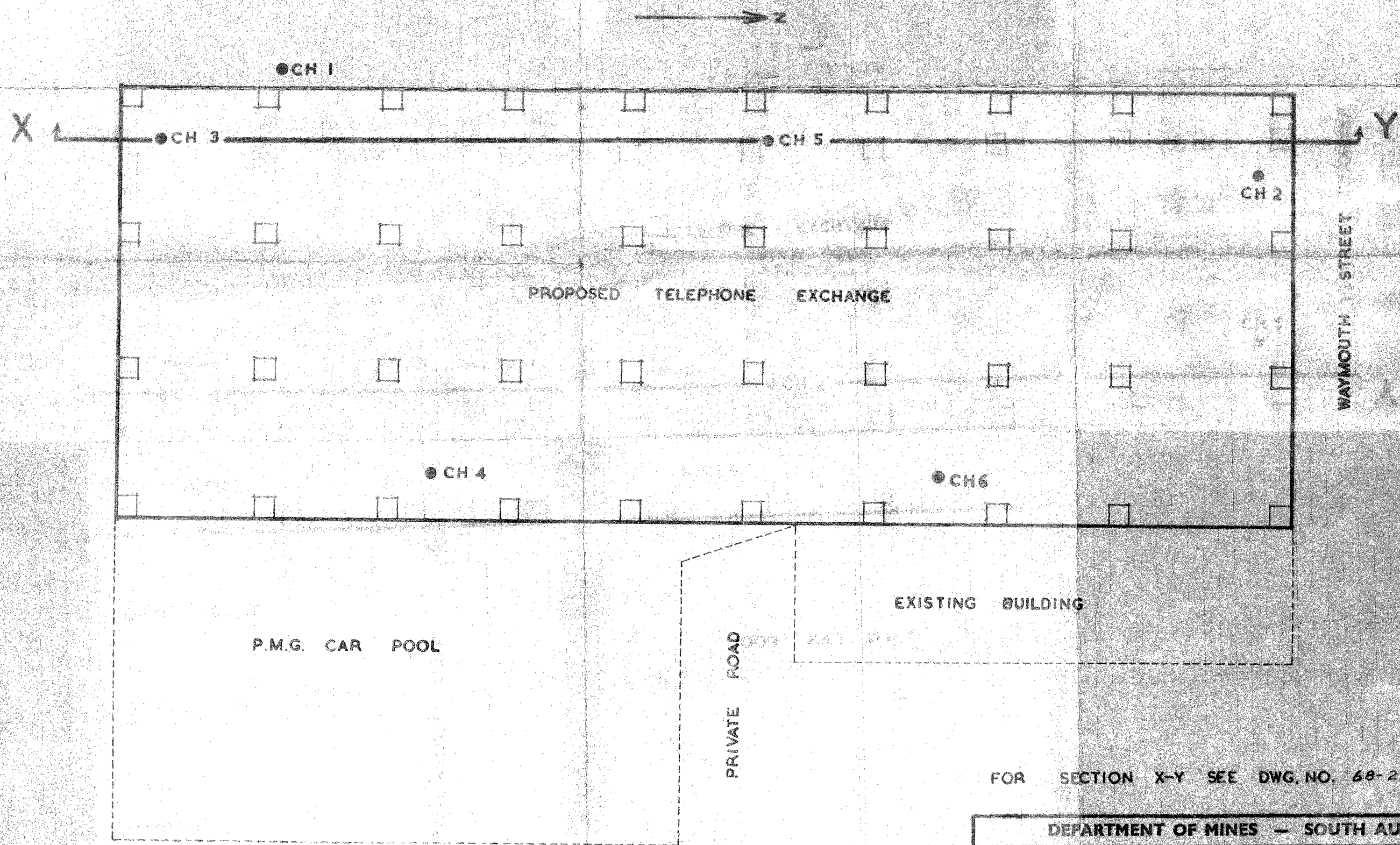


FIG. 1.

FOR SECTION X-Y SEE DWG. NO. 68-297

DEPARTMENT OF MINES — SOUTH AUSTRALIA			
WAYMOUTH STREET TELEPHONE EXCHANGE			
LOCATION OF DRILLHOLES			
ENGINEERING GEOLOGY SECTION	<i>J. H. Fryer</i> GEOLOGIST	Drn. <i>[Signature]</i>	SCALE: AS SHOWN
		Fcd. <i>[Signature]</i>	68-197
		Chd. <i>J. H. Fryer</i>	Ha 6
		Exd. <i>[Signature]</i>	DATE: 7 March 68
Director of Mines	<i>N. R. Bennett</i> 8 May 68 SENIOR GEOLOGIST		

CH3

CH1
(PROJ.)

CH5

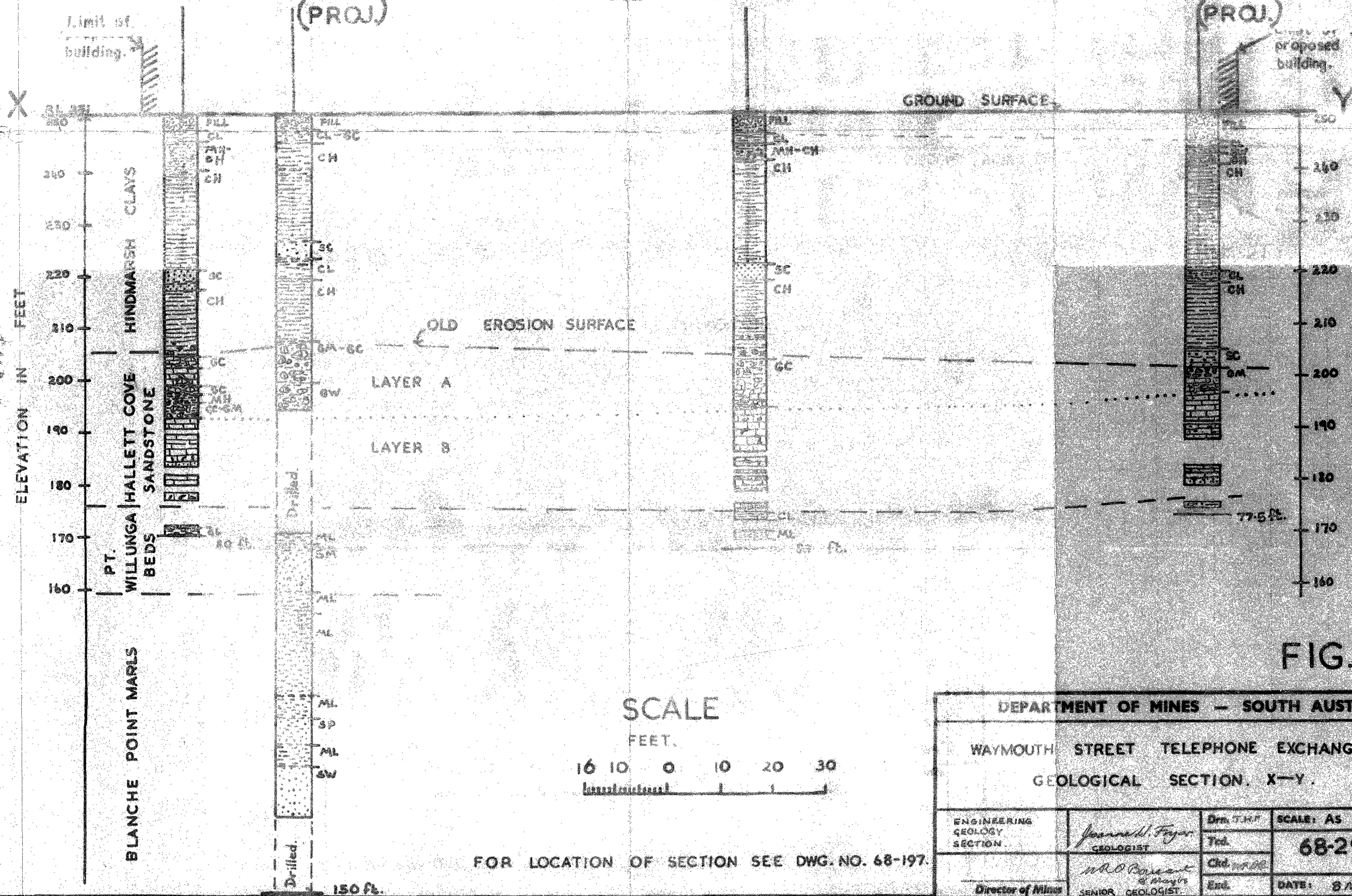
CH2
(PROJ.)

FIG. 2

