DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY

SOILS GEOLOGY SECTION.

REPORT ON SITE INVESTIGATION
PROPOSED PLANT EXTENSIONS
CHRYSLER AUSTRALIA LTD.
TONSLEY PARK
SECTION 63, HD. ADELAIDE

by

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Senior Geologist

Rept. Bk. No. 51/30
G.S.No. 1799
D.M.1315/60

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ABSTRACT

Three test bores were put down on a triangular pattern over the site. Bore No. 1 was stopped in hard gravel at a depth of 26 feet and Bores Nos. 2 and 3 were each carried to a depth of 30 ft.

A sequence of firm to very stiff silty and sandy clays, with some grit and gravel, was encountered. All bores terminated in gravelly material.

Whilst there is a general similarity in the materials encountered in all bores, there are marked differences in the degree of consolidation of the various strata from bore to bore, as indicated by the variations in the penetration figures.

The data available are not adequate for a proper assessment of the optimum depth and bearing capacity for the press foundations. Therefore 5 additional bores, each 20 ft. deep are recommended between Bores Nos. 1 and 2. Five undisturbed samples should be taken from each bore and tested in a soil mechanics laboratory.

For the deep trench running beneath the line of presses no problems are anticipated. Despite a very wet winter no free water was encountered in the bores, excepting in the top 18". Materials encountered are mainly finely sandy and very silty clays, ranging from firm to very stiff, which should stand well on excavation, without significant shrinkage or cracking.

INTRODUCTION

The investigation was carried out in response to a verbal request by Mr. R. Brock, of Chrysler Australia Ltd. and subsequently confirmed in writing.

It is proposed to construct extensions to the Tonsley Park plant of the above company. The principal feature of the new plant will be a row of heavy presses, each about 50 tons weight, equally spaced along a line of about 150 ft. length. Running beneath the full length of the row of presses will be a concrete lined trench about 12 ft. wide and 24 ft. deep.

The site is located on nearly level ground partly in a vineyard and partly in an adjacent almond orchard, within the property of Chrysler Australia Ltd., in the suburb of Tonsley Park. The appropriate map reference is Section 63, Hundred of Adelaide.

TEST BORE DATA

Three test bores were put down in a triangular pattern, the triangle being isosceles with a base of 150 ft. and a height also of 150 ft., the apex pointing easterly. Bore No. 1 is situated at the northern base angle, Bore No. 2 at the southern base angle and Bore No. 3 at the apex.

The plant used was a Ruston Type W 22, cable operated percussion boring plant.

Tube sampling technique was used throughout all bores. This involves driving a sharp, flared tube into the soil, usually 1 ft. at a time, withdrawing the tube and sample from the bore and then extruding the sample from the tube. Such samples are packed in order in a special core-box, marked and subsequently logged.

During the boring operation the number of blows required to cut each sample is recorded. These figures are converted, where necessary, to terms of blows per foot of penetration and shown in appropriate positions in the log. The striker-bar assembly delivers a blow which averages about 1000ft./lbs. However, since the penetration figures vary directly with the combined shear strength, compressive strength and friction value of the soil, no absolute value can be assigned to them. They are considered to be indicative to some extent of the relative degree of consolidation of the various strata in materials that are otherwise similar. In dissimilar materials these figures seem to vary directly with both the degree of consolidation and the degree of sandiness.

TEST BORE RESULTS

Logs of the test bores, incorporating the penetration data, are appended to this report.

Whilst there are general similarities in the materials intersected by all three bores, it will be observed that there is considerable variation in detail and correlation from bore to bore is not possible, with the probable exception of the lower gravel horizon.

All the materials encountered contain high proportions of silt and sand, with significant additional amounts of grit and gravel in places. Hence, the proportion of clay is relatively low and since it is not a strongly reactive type of clay, no significant seasonal shrinking and swelling movements are anticipated.

The variations in the physical character of the soil profile from bore to bore are best illustrated by referring to the penetration data. These are summarized below:-

BORE No. 1			BORE No. 2			BORE No. 3		
Depth From	To	Av. blows per ft.	Depth From	To	Av. blows per ft.	Depth From	To	Av. blows per ft.
0 -	1'	10	0'	-3'	14	0 -	4'	15
1'-	3'	38	3'	-10'	56	4	-21'	38
3'-	6'	18	10'	-18'	26	21'	-30'	70
6'-	17'	43	18'	-26'	22			
17'-	20'	28	26'	-29'	18			
20 -	26'	96	29'	-30'	31			

Again it is obvious that correlation between such widely spaced bores is not possible.

In view of the very wet season and the sandy nature of the materials encountered the water status of the soil was rather surprising. Free water was encountered in the top 12" to 18" of each bore, but below this the soil was only moderately moist to damp, becoming nearly dry in places. There are two principal reasons for this. Firstly, cultivation over a very long period compacts the soil immediately below cultivation level, giving rise to a densely compacted layer with a low permeability

to water. Secondly, grape vines and almond trees both have vigorous, extensive root systems and are avid water scavengers. The effect of these plants is to dessicate the soil, the hair rootlets sucking moisture from the pores, creating negative pore pressure which compacts the soil. Apparently, for these reasons, and perhaps others, large volumes of water never reach the sub-strata in this locality. This is further evidenced by the fact that the lower gravel layer is almost dry.

CONCLUSIONS AND RECOMMENDATIONS

The compact, silty to finely sandy nature of the material encountered, its comparatively low clay content and the absence of free water below the top 18" makes this an ideal medium in which to excavate the long, deep trench required. No significant soil movements are anticipated so that the ground should stand well, unsupported, during excavation and lining.

However, the variability in detail of the soil strata from bore to bore and similarly variable penetration data renders any attempt at correlation between such widely spaced bores meaningless. The variability is such that it is not possible to determine in all cases at what depth each press foundation should be seated, nor the safe bearing capacity of the soil at each position.

It is recommended that a further 5 bores, each 20 ft. deep, be constructed in line between Bore No. 1 and Bore No 2, the first bore to be 15 ft from Bore No. 1 and the others at 30 ft. centres therefrom. Five undisturbed samples should be taken from each bore and submitted to a soil mechanics laboratory for testing and assessment.

AAG:AGK
18/8/60

A.A. Gibson
Senior Geologist
SOILS GEOLOGY SECTION

PERCUSSION TEST BORE NO. 1

Bore Serial No: P.D. 553/61 **Docket:** DM 1315/60

Location: Tonsley Park

Hundred: Adelaide **Section:** 63 **R.L. at Collar:**

Purpose: Investigation of foundation conditions at site of proposed plant extensions.

Hirer: Chrysler Australia Ltd.

Plant: Ruston No. 24 **Driller:** W. D. Wilson

Nominal Bore Diameter: 6" **Core Diameter:** 4"

Total Depth:

Date Commenced: 22/7/60 **Date Completed:** 26/7/60

Logged by: A. A. Gibson

Depth From	To	Description	Penetration Depth From	To	Blows p/ft.
0'0" -	1'0"	Brown fine loam. Soft. Wet.	0' -	1'	10
1'0" -	2'6"	Reddish-brown very sandy clay with abundant slate fragments, some very coarse. Very stiff. Slightly friable. Moist.	1' -	2'	41
			2' -	3'	34
2'6"	4'0"	Red-brown, very sandy clay, with numerous grit-sized weathered slate fragments. Occasional coarser fragments. Firm. Friable. Moist.	3' -	4'	17
4'0" -	5'4"	Red-brown silty and finely sandy with occasional small stone fragments. Dull, earthy texture. Firm. Moist.	4' -	5'	16
5'4" -	6'0"	Reddish-brown and light brown, vaguely mottled, very silty and slightly sandy clay. Dull earthy texture. Very firm. Moist.	5' -	6'	21
6'0" -	6'2"	Red-brown, very sandy clay, with abundant gravel.			
6'2" -	8'0"	Reddishbrown silty and finely sandy clay, with limey grit fragments and some disseminated lime. Dull earthy texture. Very stiff. Moist.	6' -	7'	41
			7' -	8'	36
8'0" -	9'0"	As above, but with occasional coarse, irregular pockets of earthy lime (semi-cemented). Very stiff. Moist.	8'-9'		47
9'0" -	15'0"	Red-brown, yellowish-brown and light greenish-grey, irregularly mottled, very silty and finely sandy clay, with occasional coarse, semi-cemented pockets of earthy lime and scattered grit fragments. Very stiff to hard. Damp.	9'-	10'	50
			10'-11'		48
			11'-12'		41
			12-13'		37
			13'-14'		39
			14'-15'		41

Bore No. 1 (Continued).

Depth From	To	Description	Penetration Depth From	To	Blows p/ft.
15'0" -	16'0"	As above, but with abundant grit-sized weathered slate fragments.	15' -	16'	51
16'0" -	18'0"	Light yellowish-brown and pale grey, finely mottled, very silty and finely sandy clay, with scattered very dark brown iron oxide flecks. Very Stiff. Damp.	16'-	17'	40
			17' -	18'	27
18'0" -	19'0"	Reddish-brown, light red-brown and light greenish-grey mottled, slightly silty clay. very firm. Moist.	18' -	19'	21
19'0" -	21'0"	Light yellow-brown, light brown and pale grey, finely mottled, very silty and finely sandy clay, with frequent grit and fine gravel fragments. Very stiff. Moist to damp.	19' -	20'	36
			20' -	21'	62
21'0" -	26'0"	Multi-coloured, very finely mottled, very sandy clay to clayey fine sand, with abundant gravel fragments which become coarser withdepth. Very stiff to hard. Slightly moist to dry.	21' -	22'	86
			22' -	22'6"	106
			22'6"-	23'	96
			23' -	23'6"	124
			23'6"-	24'	86
			24' -	25'	91
			25' -	25'6"	70
			25'6"-	26'	61

END OF BORE.

PERCUSSION TEST BORE NO.2

Bore Serial No: P.D. 544/61 **Docket:** DM 1315/60

Location: Tonsley Park

Hundred: Adelaide **Section:** 63 **R.L. at Collar:**

Purpose: Investigation of foundation conditions at site of proposed plant extensions.

Hirer: Chrysler Australia Ltd.

Plant: Ruston No. 24 **Driller:** W. D. Wilson

Nominal Bore Diameter: 6" **Core Diameter:** 4"

Total Depth: 30'0"

Date Commenced: 18/7/60 **Date Completed:** 22/7/60.

Logged by: A. A. Gibson

Depth From	Depth To	Description	Penetration Depth From	Penetration Depth to	Blows p/ft.
0'0"	1'0"	Brown fine loam. Soft. Wet.	0'	1'	13
1'0"	3'9"	Dark red-brown, red-brown and grey-brown very finely mottled, finely sandy and very silty clay. Finely granular. Soft to very firm. Very moist to damp.	1'	2'	12
			2'	3'	16
			3'	4'	46
3'9"	5'0"	Very light red-brown, slightly clayey silt and fine sand. Hard. Dry. Friable with difficulty.	4'	5'	68
5'0"	7'0"	Red-brown to reddish-brown verysilty to finely sandy clay, with numerous coarse, irregular semi-cemented pockets of earthy lime. Occasional small stone fragments. Some grit. Very stiff. Damp.	5'	6'	51
			6'	7'	70
7'0"	10'0"	Reddish-brown, fine, very sandy and silty clay, with abundant fine, weathered slate grit, irregularly distributed. Occasional irregular, semi-cemented, earthy lime pockets. Very stiff. Damp.	7'	8'	46
			8'	9'	66
			9'	10'	41
10'0"	15'0"	Reddish-brown, yellowish-brown and greenish-grey, very finely mottled, very silty clay, with sparse grit and fine gravel fragments. Numerous very fine, dark iron oxide specks. Frequent semi-cemented pockets of earthy lime. Very firm. Damp.	10'	11'	31
			11'	12'	27
			12'	13'	19
			13'	14'	27
			14'	15'	22
15'0"	17'0"	Multi-coloured, very finely mottled, finely sandy and silty clay, with abundant grit fragments irregularly distributed. Stiff. Damp.	15'	16'	34
			16'	17'	24
17'0"	24'0"	Yellowish-brown and light greenish-grey, irregularly mottled, somewhat silty clay, with frequent coarse, irregular, semi-cemented earth lime pockets. Some gravel fragments from 17'-18'. Stiff. Moist.	17'	18'	32
			18'	19'	22
			19'	20'	23
			20'	21'	17
			21'	22'	23
			22'	23'	24
			23'	24'	21

Depth From	To	Description	Penetration Depth From	To	Blows p/ft.
24'0" -	26'0"	Orange-brown and light grey mottled, finely sandy and very silty clay. Stiff. Moist.	24'-25'		28
			25'-26'		22
26'0" -	29'0"	Light greenish-grey, yellow-brown and brick red mottled, finely sandy and silty clay. Occasional grit fragments. Firm. Moist.	26'-27'		16
			27'-28'		19
			28'-29'		20
29'0" -	30'0"	Multi-coloured, finely mottled, finely sandy and silty clay with numerous small gravel fragments, becoming abundant in last 2". Very stiff. Moist.	29'-30'		31

END OF BORE

PERCUSSION TEST BORE No. 3

Bore Serial No: PD 554/61 Docket: D.M.1315/60

Location: Tonsley Park

Hundred: Adelaide Section: 63 R.L. at Collar:

Purpose: Investigation of foundation conditions at site of proposed plant extensions.

Hirer: Chrysler Australia Ltd.

Plant: Ruston No. 24 Driller: W.D. Wilson

Nominal Bore Diameter: 6" Core Diameter: 4"

Total Depth: 30'0"

Date Commenced: Date Completed 28/7/60

Logged by: A.A. Gibson

Depth From		To		Penetration Depth From To	Blows p/ft
0'0"	-	10"	Brown fine loam, becoming reddish-brown with depth. Soft. Wet.	0'-1'	12
10"	-	1'4"	Coarse to fine gravel with interstitial loam and sandy clay. Wet.		
1'4"	-	2'0"	Dark red-brown, finely granular, finely sandy and silty clay with occasional gravel fragments. Firm. Moist.	1'-2'	15
2'0"	-	4'0"	Reddish-brown, vaguely mottled, very silty clay. Dull, earthy texture. Firm. Moist.	2'-3' 3'-4'	14 19
4'0"	-	6'0"	Light to pale reddish-brown, vaguely mottled, very silty clay. Very stiff. Moist.	4'-5' 5'-6'	38 35
6'0"	-	7'0"	Light creamy-brown, finely sandy and very silty clay, with some fine red-brown mottling and numerous fine grit fragments. Very stiff. Moist.	6'-7'	31
7'0"	-	9'0"	Red-brown and reddish-brown, finely mottled, finely sandy and very silty clay, with numerous small, semi-cemented, earth lime pockets. Very stiff. Moist.	7'-8' 8'-9'	28 38
9'0"	-	21'0"	Reddish-brown, brown and light greenish-grey, finely sandy and very silty clay, with numerous, semi-cemented earthy lime pockets to 16'0". Sparse lower. Very stiff. Moist.	9'-10' 10'-11' 11'-12' 12'-13' 13'-14' 14'-15' 15'-16' 16'-17' 17'-18' 18'-19' 19'-20' 20'-21'	37 35 39 43 39 44 40 46 34 35 45 34

Depth From	To	Description	Penetration Depth From	To	Blows p/ft.
21'0" -	26'6"	Multi-coloured, finely mottled, finely sandy and silty clay with abundant fine to coarse gravel, irregularly distributed. Some clayey sand pockets. Very stiff. Damp.	21' -	22'	91
			22' -	22'6"	104
			22'6"-	23'	106
			23' -	23'6"	108
			23'6"-	24'	68
			24' -	25'	66
			25' -	25'6"	118
			25'6"-	26'	76
			26' -	26'6"	68
26'6" -	30'0"	Multi-coloured, very finely mottled, silty and slightly sandy clay, with numerous very fine gravel fragments. Very stiff. Moist.	26'6"-	27'	42
			27' -	28'	38
			28' -	29'	53
			29' -	30'	40

END OF BORE.