DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY

SOILS GEOLOGY SECTION

REPORT ON SITE EXAMINATION
PROPOSED MALLALA AREA SCHOOL
PART SECTION 52, HUNDRED OF GRACE

by

R. I. Chugg
Geologist

30th May, 1961.

D.M. 1694/60

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ABSTRACT

Four test pits were examined in an investigation of the foundation conditions for the proposed Mallala Area School. The pits showed similar soil profiles: silty sandy loams becoming more clayey at depth. Lack of soil structure suggests that the soils are not very reactive to soil moisture variation. Strongly reinforced wide strip footings set down 1 ft. would accommodate problems of low compressive strength and slight differential settlement. The foundation area should be protected from surplus surface water by adequate drains and a wide impervious path around the school buildings.

REPORT ON SITE EXAMINATION

PROPOSED MALLALA AREA SCHOOL

PART SECTION 52, HUNDRED OF GRACE

INTRODUCTION

Approximately 11½ acres of nearly flat cultivated land about 1/3 miles southeast from Mallala is being considered as the site for an Area School.

At the request of the architect, John S. Chappel, an investigation of the foundation conditions was undertaken. The site was examined and the soil profiles in four 6 ft. deep test pits were described.

The proposed brick structure is to have 11 ft. high, 11 in. thick cavity walls, open web joists with 26 gauge steel deck roof and 3 in. thick precast concrete slab floors with 12 ft. suspensions.

TEST PITS

Descriptions of the soil profiles are appended to this report. Although there is some minor variation from pit to pit, conditions would appear to be substantially uniform in the area of proposed construction. A generalized and abbreviated soil profile is given as follows:

0 - 0'7" / 1'0"	Silty fine sandy loam.
0'7" / 1'0" - 1'5" / 1'10"	Silty fine sandy loam with abundant limestone nodules.
1'5" / 1'10" - 2'8" / 3'1"	Clayey loam with limey patches. Poorly developed granular to nutty structure.
2'8" / 3'1" - 4'7" / 5'2"	Silty or sandy clay with limey patches and ferruginous grit toward the base. Granular to nutty structure.
4'7" / 5'2" - 6'0"	Silty clay with ferruginous grit and limey nodules.

GENERAL GEOLOGY

A thickness of more than 100 ft. of Quaternary terrestrial flood plain and stream deposits overlie Tertiary limestones, clays and sands. Bore data in the area suggests that the upper 50 ft. of Quaternary sediments are generally damp to moist, silty fine sandy clays with patches of earthy lime and limey nodules. Discontinuous, generally water bearing sandy and gravelly strata frequently occur below 50 ft.

FOUNDATION CONDITIONS

Cyclic Soil Swelling and Shrinking:

Well developed soil structures, indicative of strong seasonal vertical soil movement, were not observed in the test pits. A granular to nutty structure is reasonably well developed only below about 3 ft. from the surface and at this depth natural seasonal soil moisture variation is expected to be small. Provided care is taken to prevent the saturation of the soil in the vicinity of the footings, vertical soil movements do not constitute a serious problem.

Bearing Capacity:

The compressive strength of the soil is considered to be low, particularly under saturated conditions. However, since the loadings are not great, a wide strip footing set 1 ft. below the soil surface should be adequate.

Settlement:

The continuity of the soil horizons suggests that any differential settlement which might occur would follow from variations in loadings and differences in soil moisture content rather than from variations in the soil profile. Objectionable stresses in the structure due to differential settlement should be avoidable with the use of a strongly reinforced wide footing

if the soil moisture content near the footings is kept reasonably constant.

CONCLUSIONS

It is concluded that the soil is not subject to more than small seasonal shrinking and swelling movements. The foundation area around the footings should be protected from excessive moisture variation in order to keep such movements to a minimum and to prevent excessive settlement or loss in shear strength.

The compressive strength is low and a wide strip footing set into soil profile should accommodate the conditions. The footing should be strongly reinforced to give added strength so as to withstand any small movements which might occur.

RECOMMENDATIONS

A strip footing set 1 ft. below the soil surface is recommended. It should be a minimum of 12 in. thick (preferably 14 in.) and strongly reinforced. Suggested dimensions are:

External Walls: 12 in. (min.) deep, 24 in. wide, reinforced by ten ½ in. diameter rods (5 top, 5 bottom).

Internal Walls: 12 in. (min.) deep, 20 in. wide, reinforced by eight ½ in. diameter rods (4 top, 4 bottom)

All surplus surface water and roof run-off should be carried well away from the foundations in properly constructed drains of adequate capacity. Lawns and gardens must be kept well away from the foundations and overwatering should be avoided. A wide concrete, or some other impervious pavement, surrounding the structure would assist in maintaining constant soil moisture conditions in the foundation area.

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APPENDIX

TEST PIT A - GEOLOGICAL LOG

MALLALA AREA SCHOOL SITE

0'0" - 0'7" / 1'2"	Grey brown silty fine sandy loam with some limestone nodules. Friable.
0'7" / 1'2" - 1'5"	Light brown limey silty sandy loam with abundant limestone nodules. Friable.
1'5" - 2'11"	Light brown silty clay with abundant pale grey limey patches and limestone nodules. Clay content increasing with depth. Granular structure at the top merging to a nutty structure at the base with no apparent sheen on the unit faces.
2'11" - 4'8"	Brown and red-brown slightly silty fine sandy clay with pale grey small limey pockets, nodules and calcified roots becoming less abundant with depth. Dark red-brown ferruginous staining near the base. Nutty structure with a moderate sheen on some unit faces.
4'8" - 5'2"	Yellowish brown and red-brown fine sandy silty clay with some ferruginous grit and dark red-brown mottling. Poorly developed granular to nutty structure.
5'2" - 6'0"	Red-brown slightly silty clay with a granular structure. A moderate sheen on unit faces. Light sparse irregular cracking. Slightly damp to-day.

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TEST PIT B - GEOLOGICAL LOG

HALLALA AREA SCHOOL SITE

0'0" - 0'7"	Light grey-brown silty fine sandy loam with a few soft pale grey limestone nodules. Friable.
0'7" - 1'6"	Light greyish brown silty fine sandy loam with abundant limestone nodules.
1'6" - 2'8"	Light brown clayey loam with abundant limey patches and limestone nodules and some ferruginous and siliceous angular grit. Friable in part at the top, becoming clayey toward the bottom. Poorly developed granular to nutty structure with no apparent sheen on unit faces.
2'8" - 3'3"	Brown sandy clay with abundant light creamy brown limey patches. Some ferruginous and siliceous grit and limestone nodules.
3'3" - 4'3"	Red-brown silty clay mottled with dark red-brown ferruginous staining and light creamy brown limey clay patches. Nutty structure with a dull sheen on some unit faces. Very light irregular cracking. Hard.
4'3" - 5'0"	Red-brown silty clay mottled with dark red-brown ferruginous staining and light creamy brown limey clay patches. Becoming more limey with depth. Ferruginous, siliceous and limey grit and small pebble sized nodules and fragments. Slightly damp. Poorly developed granular to nutty structure with no apparent sheen on unit faces. Compact but slightly friable.
5'0" - 6'0"	Light brown limey clay with patches of brown slightly sandy silty clay and numerous limey and ferruginous nodules. Damp. Friable in part but generally compact.

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TEST PIT C - GEOLOGICAL LOG

MALLALA AREA SCHOOL SITE

0'0" - 0'10"	Light grey-brown silty fine sandy loam with a few soft and hard pale grey limestone nodules. Friable.
0'10" - 1'10"	Light grey-brown silty sandy loam with abundant limestone patches and nodules. Friable.
1'10" - 3'1"	Light brown clayey loam with abundant limey patches and limestone nodules and some ferruginous and siliceous angular grit. Friable in part at the top, becoming clayey toward the bottom. Poorly developed granular to nutty structure with no apparent sheen on unit faces.
3'1" - 4'10"	Light brown and red-brown fine silty clay with numerous light creamy brown limey patches. Granular to nutty structure with a dull sheen on occasional unit faces. Numerous limey nodules and some ferruginous and siliceous grit sized nodules and fragments becoming more numerous with depth. Dry at top becoming moist toward the base. Hard. Compact. Very light irregular cracking.
4'10" - 6'0"	Light reddish and yellowish brown silty fine sandy clay with a few limey nodules and some ferruginous grit. No apparent structure or cracking. Compact but slightly friable.

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TEST PIT D - GEOLOGICAL LOG

MALLALA AREA SCHOOL SITE

0'0"	- 0'9"	Light greyish brown silty sandy loam with some grit and pebble sized limestone nodules. Friable.
0'9"	- 1'8"	Light brown fine sandy loam with grit to cobble sized limestone nodules. Friable.
1'8"	- 2'11"	Light brown silty sandy clay, becoming less silty and sandy with depth. Abundant pale grey limey patches containing limestone nodules. Poorly developed granular to nutty structure. Friable in part.
2'11"	- 4'7"	Light and dark reddish and yellowish brown mottled slightly sandy clay with sparse limey nodules, calcified roots and ferruginous grit. Nutty structure with a moderate sheen on some unit faces. Damp toward the base. Very light sparse irregular cracking.
4'7"	- 6'0"	Light and dark red-brown mottled silty clay with ferruginous grit and numerous limey nodules toward the base. Poorly developed granular to nutty structure with a moderate sheen on some unit faces. Slightly damp. Cracking not apparent.

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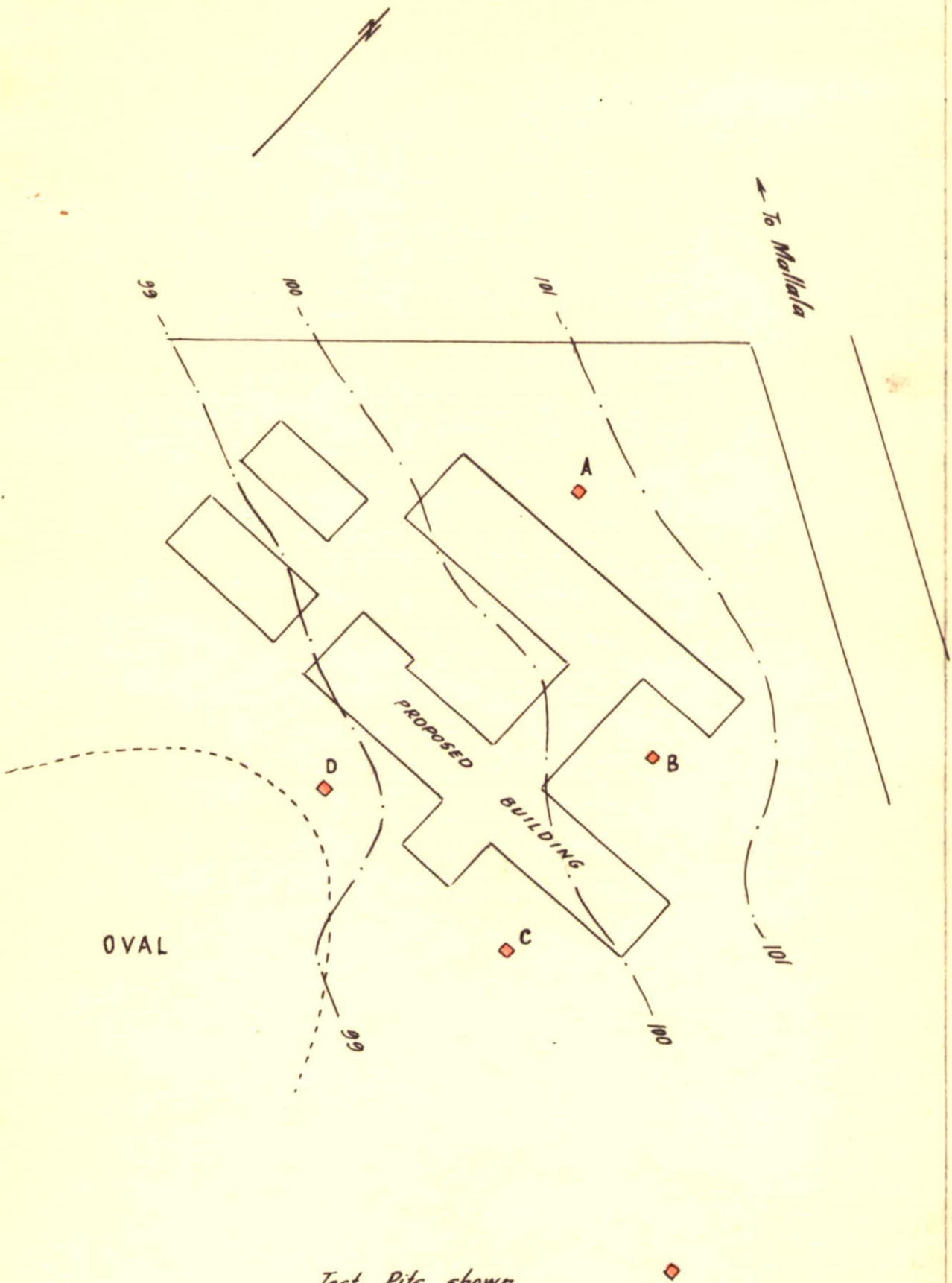

Test Pits shown .....

To accompany report by R. I. Chugg.

S.A. DEPARTMENT OF MINES

Approved	Passed	Drn.	MALLALA AREA SCHOOL LOCATION OF TEST PITS	D.M.	Scale 100 ft. to 1 in.
		Tcd.		Req.	S 2692
		Ckd.			GJ6
Director		Exd.			Date 9·2·61

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