DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY
SOILS SECTION

REPORT ON SOIL SURVEY
EAST MARDEN SUBDIVISION,
HUNDRED OF ADELAIDE, COUNTY ADELAIDE

by
J.B. Firman
GEOLOGIST

Rept. Bk. No.52/49
G.S. No. 1947
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East Murray Subdivision
Hundred of Adelaide, County Adelaide

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Hundred of Adelaide, County Adelaide

1. ABSTRACT

A soil survey was carried out of a proposed housing subdivision at East Marden, about 5 miles north-east of Adelaide.

Four soil units have been defined on the basis of soil profiles revealed in pits, and the probable areal extent of the units has been mapped on the basis of variations in the upper horizon of the soil.

Suitable footings for houses have been recommended.

2. INTRODUCTION

A soil survey was carried out at East Marden, on behalf of J.M. Foley Limited, to identify and map the soils determine foundation characteristics and recommend suitable footings for houses.

The subdivision is about five miles north-east of Adelaide near the junction of Fourth Creek with the River Torrens.

The soils have been classified into four soil units on the basis of colour, texture, structure, composition and consistence of the various horizons.

Soil profiles were recorded in four test pits and one trench (See Appendix)

3. SOIL UNITS, FOUNDATION CHARACTERISTICS AND FOOTING RECOMMENDATIONS

The soil units shown on the plate accompanying this report have been defined according to soil profiles revealed in the four pits. It has been assumed that the distribution of the soil units is in reasonably close agreement with the distribution of the uppermost soil horizon.

The section on the plate accompanying the report shows the

profiles in each pit and the probable continuation of various soil horizons.

Soil units 1,2 and 3 contain clay horizons that are subject to small seasonal shrink and swell movements. These movements are due to the reaction of the clay minerals when water is taken up or evaporated. The small order of this movement, together with an adequate bearing capacity and the cushioning effect of the overlying sandy clay and loam, enables the stresses to be accomodated with a relatively simple footing.

The recommended foundation practice for soil units 1, 2 & 3 is the construction of a deep beam type footing seated on, or near the soil surface. Suggested foundation dimensions are:-

FOR EXTERNAL WALLS: 18" deep, 14" wide, reinforced by six ½" diam. rods (3 top, 3 bottom)

FOR INTERNAL WALLS: 18" deep, 11" wide, reinforced by four ½" diam. rods (2 top, 2 bottom)

The standard 17" x 15" foundation is also acceptable.

A narrow foundation such as this present the minimum base area to the uplift forces resulting from the swelling clay and the depth should provide sufficient rigidity to withstand the stresses imposed.

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 should be kept well clear of the foundation area to prevent damage resulting from over-watering.

A wide concrete paving completely surrounding the house will assist in minimising soil moisture variations beneath the foundations.

Soil Unit 4 contains clay horizons that are subject to severe seasonal shrinkage and swelling movements.

The vertical component of such movement, translated at the soil surface, can be large and considerable force is exerted. As a result of these movements the incidence of foundation failure in brick or masonry houses with ordinary surface foundations is high, more than 50% of such houses

showing some cracking and many are seriously disfigured. However, the clay horizons of this soil are quite strong and their bearing capacity is moderately high.

The suggested foundation practice is the use of a very deep beam type foundation, set well down into the soil profile. This foundation has been used with success on soils of this type by some Adelaide builders and architects and has been adopted by the War Service Homes Division. On this site such a foundation beam should be seated at a depth of 2 ft. 6 ins. At this depth the soil movements would be appreciably smaller than at the surface and such a rigid foundation should be capable of withstanding the stresses imposed. Suggested dimensions for the beams are:-

FOR EXTERNAL WALLS: 36" deep, 14" wide, reinforced by seven ½" diam. rods (4 top, 3 bottom)

FOR INTERNAL WALLS: 36" deep, 11" wide, reinforced by five ½" diam. rods, (3 top, 2 bottom)

All surplus surface water and roof run-off should be carried wellaway from the foundations in properly constructed drains of adequate capacity. Lawns and gardens should be kept well clear of the foundation area to prevent damage resulting from over-watering.

A wide heavy asphalt paving completely surrounding the houses will minimise soil moisture variations beneath the foundations.

If a concrete paving is used it should be bonded to the foundation by means of a bituminstic compound.

If stepping is required for any of the footings on the area covered by Soil units 1,2 and 3, the footings should be stepped top and bottom to accomodate the slope. The horizontal distance "D" between a top step and its lower counterpart is given by the formula:-

D = 50 x rod diameter + 2 x step height. Steps in the foundation should not exceed 2 courses (7") in height and one course (3½") is preferable where practicable.

On the area where Soil Unit 4 occurs, the footings can be dug in upslope, or the top of the footing can be stepped.

In any case where a marked difference occurs between the soil profile described herein, and the soil profile revealed in a trench or other opening, the Soils Geology Section should be consulted.

5. BIBLIOGRAPHY

Aitchison, G.D., Spring, R.C., and Cochrane, G.F., 1954. The Soils and Geology of Adelaide and Suburbs, S.A. Dept. Min., Bull. No. 32. C.E.B.S., 1954. Design of Footings for Use in Adelaide. Commonwealth Experimental Building Station. Special Report No. 16

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APPENDIX

SOIL PROFILES

Pit I Total Depth: 3'9"

Logged by: J.B. Firman

Depth From	Depth To	Description
0'0"	0'9"	Light greyish brown silty and finely sandy clay-loam. Cultivated.
0'9"	2'0"	Light reddish brown fine sandy clay. Weak horizontal cracking at the base.
2'0"	3'1"	Red-brown and dark red-brown fine sandy clay. Fine prismatic structure with a dull sheen on structural units. Very light, wide spaced, dominantly vertical cracking.
3'1"	3'9"	Light yellow-brown and red-brown mottled fine sandy clay with some dark red ferruginous staining. Limey nodules are scattered throughout.

All the horizons are compact.

The site is nearly level.

Soil Unit I.

APPENDIX (cont.)

Pit 2 Total Depth: 3'11"

Logged by: J.B. Firman

DEPTH From	DEPTH To	Description
0'0"	0'7"	Light greyish brown fine sandy clay-loam. Cultivated.
0'7"	1'4"	Light reddish brown and greyish brown vaguely mottled clayey sand.
1'4"	2'0" to 3'1"	Red-brown and yellowish brown mottled sandy clay. Granular structure with a dull sheen on structural units. Weak irregular cracking, widely spaced. This horizon contains a small amount of quartz gravel and scattered small pockets of off-white earthy lime.
2'0" to 3'1"	3'11"	Light brown sandy and limey clay with scattered limey nodules and a small amount of quartz gravel.

All the horizons are compact.

The site is nearly level.

Soil Unit 2.

APPENDIX (cont.)

Pit 3 Total Depth 3'9"

Logged by J.B. Firman

Depths From	Depths To	Description
0'0"	1'9"	Light brownish grey fine sandy clay-loam. Cultivated.
1'9"	2'10"	Light brown and brown vaguely mottled clayey fine sand with very small patches of off-white earthy lime. Very firm and compact. Some thin bands of travertine are irregularly distributed in this horizon.
2'10"	3'9"	Light reddish brown and yellowish brown fine sandy clay. Moderately well-developed granular structure. Very poorly developed fine prismatic structure with a dull sheen on structural units. Very firm and compact
		Very weak, wide-spaced, vertical cracking occurs throughout the profile.

Soil Unit 3.

APPENDIX (cont.)

Pit 4. Total Depth 3'10"

Logged by J.B. Firman

Depth From	Depth To	Description
0'0"	0'7"	Dark brownish grey finely sandy clay-loam. Light dominantly vertical cracking. Cultivated.
0'7"	1'5"	Dark brownish grey clay with a granular structure. Light cracking.
1'5"	3'0"	Dark brownish grey clay with a well-developed prismatic structure having a dull sheen on structural unit surfaces. Aggregates of prisms occur to give a columnar structure up to 12 ins. maximum width and 2 ft. deep.
3'0"	3'10"	Grey-brown and yellow-brown mottled sandy clay containing small limey nodules. Polyhedral structure. Weak, dominantly vertical cracking.
		A small amount of stone occurs in the upper three horizons.
		The profile is compact throughout.
		The site is nearly level.

Soil Unit 4.