DEPARTMENT OF MINES
SOUTH AUSTRALIA

REPORT ON FOUNDATION CONDITIONS FOR PROPOSED BERRI & DISTRICT COMMUNITY HOSPITAL SECTION 877, BERRI IRRIGATION AREA, COUNTY HAMLEY.

by

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1. SUMMARY

Five test pits, each approximately 5' deep were examined on the site. Additional information to a depth of 8' was obtained by hand auger boring. The profile was generally uniform throughout, with sand overlying coarse limestone marl to variable depth. This marl horizon becomes unstable when wet, allowing differential settlement to occur. Below this, brown silty sand with odd limestone lumps was penetrated. The proposed foundation practice should be suitable provided all precautions against excess moisture penetration are adhered to. Maximum safe bearing capacity is of the order of 1-1½ tons per sq. ft.

2. INTRODUCTION

The enquiry for this investigation was initiated by Messrs. Brown and Davies architects, acting on behalf of the Berri & District Hospital Board.

It is proposed to erect a new hospital on the Northern side of the town of Berri on Section 877, Berri Irrigation Area, County Hamley. The site covers an area of 14½ acres on the North side of the Murray River, approximately ½ mile distant, and occupies a position near the crest of a hill that rises gently up from the River bank. The two main buildings are to be constructed on the higher ground to the North East and the North West. Between them a shallow drainage depression runs south towards the River. The site is flanked to the East by Worman Street, to the West by Hepworth Street and to the South by Cornwall Street.

3. SITE TESTING

Five test pits were prepared to a depth of 5' by district council employees. These were inspected and logged in detail and are included as an appendix to this report. Additional information to a depth of about 8', was obtained by sinking a hand auger hole from the bottom of each pit.

A brief survey of the neighbouring district was subsequently made to determine the nature and extent of cracking in stone and brick houses erected nearby. In all cases differential settlement was clearly the cause of the trouble. Those walls showing the most severe cracking were usually found to have lawns or gardens nearby, or roof run off draining directly into the soil. In some cases concrete paths had been constructed around the footings, but here again they were often defective and would permit ready access of water through them. Additional troubles maybe due to the fact that most of these homes are served by septic tanks, whose effluent runs directly into the subsoil.

Further enquiries have also revealed that the actual construction of many footings adversely affected, leaves much to be desired, some suggestions being that reinforcement was far from adequate.

An examination was also made to several outcrops and cliffs in the vicinity, in an attempt to determine the nature and depth of parent rock, but generally these outcrops were too remote to have any significance.

4. GENERAL GEOLOGY

The site is covered by a sand horizon ranging from a minimum depth of 1'7" in Pit No. 6, to a maximum of 2'10" in pit No. 3. This sand is generally brown, with some slight grey-brown and reddish-brown mottling. It is generally fine grained, well compacted and contains scattered grit fragments, and irregularly abundant plant root remains.

Below the surface sand layer, the profile grades into a sandy marl, consisting of brown to light reddish-brown fine silty sand, with lime irregularly very abundant, as small hard nodules, near top and coarse broken friable sandy rubble lower. This horizon has suitable bearing strength when dry, but when subjected to excess moisture, it becomes inherently unstable. This results in a marked decrease in bearing capacity and permits of differential settlement under conditions of uneven saturation of the subsoil.

Below this marl down to the maximum depth examined, i.e. 7'8", the profile becomes brown to reddish-brown fine silty to clayey and somewhat limey sand. This is cemented in part to form lumps of hard, light brown limestone rubble or travertine nodules.

In effect, the soil is a typical mallee soil, lithologically similar to type BS 2, the dominant soil type of the Enfield Association, as classified in Department of Mines Bulletin 32.

5. CONCLUSIONS

The site chosen for the main hospital building has probably a greater thickness of sand than elsewhere on the allotment, hence this factor alone should render it relatively stable. Due to the very sandy nature of the entire profile, seasonal shrinkage and swelling movements can be discounted, hence the only real problem becomes that of differential settlement.

The proposed foundation design if based on sound engineering principles, appears to be quite suitable, provided that the most conservative practices are employed to keep the subsoil free from excess moisture. It is therefore recommended that all roof run off, effluent from septic tanks etc., should be carried downhill well clear of the foundation area in properly constructed drains. Lawns and gardens should also be kept well away from the buildings, while the construction of a 5' wide impervious apron surrounding the footings would be an effective safeguard.

The maximum safe bearing capacity of this soil, would be in the vicinity of 1 to 1½ tons per square foot.

Provided the above conditions are fulfilled, no trouble is anticipated and no special foundations are warranted.

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SOILS GEOLOGY SECTION

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Pit No. 1

Surface - 5"	Fine brown sand with odd fill fragments and organic remnants.
5" - 1'0"	Fine brown to greyish-brown sand, with decomposed plant remains.
1'0" - 1'10"	Fine brown to reddish-brown sand, with few decomposed root remains and occasional travertine nodules.
1'10" - 2'7"	Brown to reddish-brown fine silty sand, with irregularly abundant travertine nodules and rubble fragments.
2'7" - 3'5"	Light brown to light reddish-brown silty to clayey and limey sand, with abundant coarse travertine rubble, mainly soft and friable, but with some hard nodules.
3'5" - 4'10"	Light brown silty to clayey sand, slightly limey, and cemented in part to soft, friable, sandy, lime rubble. Few decomposed root remains.
Auger 4'10"-7'6"	Light brown to light reddish-brown silty to slightly clayey sand. Somewhat limey in part, with odd small lime nodules.

Pit No. 2

Surface - 2'0"	Brown to greyish-brown sand. Generally fine and compacted, but with scattered grit fragments.
2'0" - 2'10"	Brown to light reddish-brown, fine compact sand, with numerous grit fragments. Scattered root remains.
2'10" - 3'5"	Light brown fine silty to clayey sand. Very limey in part, with very abundant travertine rubble.
3'5" - 4'7"	Light brown to light reddish-brown fine silty to clayey sand, with lumps of friable, partly cemented, sandy lime rubble.
Auger 4'7" -6'7"	Light brown silty to clayey sand, with odd limey pockets.

Pit No. 4

0 - 4"	Light brown, loose, fine grained sand, with numerous grit fragments and organic plant remains.
4" - 1'8"	Brown to greyish-brown, fine compact sand, with numerous gritty fragments.
1'8" - 2'6"	Brown to light brown fine silty to clayey sand, with irregularly abundant, generally small travertine nodules and friable lime rubble.
2'6" - 4'9"	Light brown to light reddish-brown silty to clayey sand, with odd small travertine nodules.
Auger 4'9"-7'3"	Light brown silty to clayey sand. Somewhat limey, with odd lumps of hard lime rubble.

Bore No. 6

Surface - 1'7"	Fine brown silty sand, with some greyish-brown to reddish-brown mottling, occasional small travertine nodules.
1'7" - 3'5"	Brown to light brown, fine, silty to clayey sand. Very limey, with abundant sandy lime rubble, mainly nodules near top, but coarse broken fragments lower.
3'5" - 4'10"	Brown to light brown silty sand, with lumps of light brown lime rubble.

Pit No. 8

Surface - 1'11"	Fine brown sand with slight grey-brown to reddish-brown mottling. Grit fragments and odd lime nodules near base.
1'11" - 3'4"	Brown, fine silty to clayey sand, with lime nodules and rubble irregularly abundant.
3'4" - 4'11"	Brown to light brown fine silty to clayey sand. Somewhat limey in part, with patches of soft friable lime rubble.
Auger 4'11" - 7'8"	Brown to reddish-brown fine silty sand, with lumps of light brown limestone marl increasing with depth.

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