Rept. Bk. 48/75
G.S. 1299
D.M. 491/59

Department of Mines
South Australia

REPORT ON FOUNDATION FAILURE

E.T.S.A. DEPOT, PORT ADELAIDE

ABSTRACT

The E.T.S.A. Depot, Port Adelaide, has suffered structural failure and this is considered to be due to settlement of inadequately and unevenly compacted fill, aggravated by a foundation of insufficient width and improper drainage. Much of the damage can be remedied and suggestions for doing so are outlined in the report.

INTRODUCTION

This investigation was initiated verbally by Mr. W. Southern of the Electricity Trust of South Australia. The request for the investigation was subsequently confirmed in writing by Mr. A. A. Bates, Property Officer, E.T.S.A. in a letter dated 10th March, 1959.

The building and site were examined by the writer in company with Mr. Southern.

The Depot occupies a block bounded by Webb Street on the north-west, Old Port Road on the south-west and Portland Road on the south-east. The office block is a long rectangular building, with its long axis running roughly east and west.

RESULTS OF EXAMINATION

The whole of the building appears to have suffered some settlement and this has resulted in the up-arching of the floors. However, the worst effects have resulted from differential settlement. The north-western corner of the building has settled badly and this has resulted in the structural failure of the western brick wall back along over half its length. Also, the northern wall beneath the western-most window has cracked badly and some displacement occurred as a result of this settlement.

CAUSES OF FAILURE

The initial general settlement of the building was probably due to two causes. The fill material used to build up

and level the site was not adequately and evenly compacted. In order to achieve proper compaction of fill materials for supporting structures the fill should be spread in even layers no more than 6" thick and each layer should be separately compacted before succeeding layers are put down. Further, trucks delivering loads of fill to the site should be encouraged to take different random paths across the fill instead of establishing well-worn tracks and thus giving rise to differential compaction. A well compacted patch occurs about half way along the western wall and this has acted as a fulcrum over which the foundation beam and the wall have been broken.

As well as having material of low compaction beneath the north-western corner of the building a rain-water down-pipe discharged onto the ground here, saturating the fill material and thus aggravating the settlement.

Finally, the foundation beam was too narrow to be properly supported by the material of low bearing capacity underlying the fill. For this site external footings should have a minimum width of 21" and internal footings 18", with a minimum of four $\frac{1}{2}$" diam. reinforcing rods throughout (2 top, 2 bottom).

RECOMMENDATIONS

Much of the worst damage can be remedied. The first step should be the construction of a 3 ft. x 3 ft pad footing at the shallowest convenient depth beneath the north-western corner of the building. This pad should be 12" thick and reinforced with mesh. This pad, when fully set and cured, can then be used for support for a jack (or jacks) with which the corner of the building can be supported and raised approximately to its original position. An additional similar support might be required part way along the western wall, but this is doubtful.

With the corner supported as described the soil can be excavated from beneath the damaged part of the western wall foundation and a wide auxilliary footing emplaced. This auxilliary footing should be 24" wide and 12" deep and be

reinforced with 6 x ½" rods (3 top, 3 bottom). This footing should also overlap the pad footing previously described, the gap between the auxilliary footing and the pad being filled with "Expandite" concrete.

When this work has set and cured the damaged part of the northern wall could be similarly treated after removal of the jack. The cracked mortar and plaster could then be repaired.

The arched floors could be remedied by removing part of them, excavating the surplus material from beneath and then replacing them. This might not be permanently effective.

The foregoing should be viewed in the light of suggestions only. These recommendations should be used mainly as a guide to the magnitude of the task involved and the sort of measures necessary to effect repairs.

Alan Gibson

A. A. GIBSON
SENIOR GEOLOGIST
SOILS GEOLOGY SECTION

AAG:CERF
26/3/59