ANALYSIS OF SHALLOW FOUNDATIONS ON EXPANSIVE CLAYS OF IRBID

BY

WAIL YACOUB ABU-EL-SHA'R

B.S. in Civil Eng., Yarmouk University, Jordan, 1983

THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN CIVIL ENGINEERING AT YARMOUK UNIVERSITY

APPROVED

Ramaswamy, S.V., Advisor

Resheidat, M., Member

Yeginobali, A., Member

March 1986

Irbid - Jordan
ABSTRACT

A rational procedure for the design of shallow foundations for single storey buildings on expansive soils of Irbid has been proposed. The procedure takes into account the intensity of loading, length and rigidity of the foundation members and the expansive properties and the compressibility of the foundation soil. The expansive soil is assumed to heave to a mound shape under the structure in the long term and the amount of heave is determined by the moisture content profiles and the expansive potential of the soil. The foundation member loses part of its support at the edges when the soil heaves and the lack of support is determined by using a graphical trial and error procedure. The foundation system is analyzed as a beam on Vlasov-Leontev foundation. In the analysis, the overhanging portion of the foundation members are replaced by a statically equivalent system of edge forces and moments.

Disturbed and undisturbed samples were taken in Irbid region from two sites at different depths. The soil parameters necessary for predicting the heave and load-deformation behaviour were obtained by laboratory tests on the samples. Reinforced strip footings and stiffened mat foundations were analyzed by the proposed procedure. The influence of the magnitude of heave and the intensity of
loading on the design values are discussed. The results are compared with BRAB procedure and it was found that the design negative moments obtained by the proposed method for Irbid region are less than those allowed by BRAB. The proposed sections for the foundation members were capable of resisting the calculated moments with minimum reinforcement for single storey buildings.