

## ABSTRACT

A foundation is the part of the structure, which is in direct contact with the ground that transmits the load of the structure to the ground.

In this study three dimensional nonlinear finite element analyses have been used to investigate the effect of the raft size and pile length on the load - settlement behavior of an axi-symmetric raft and a piled raft foundation. Analyses have been performed using a computer software package (**ANSYS 5.4**). The piles, raft and soil have been discretized into eight node brick finite elements denoted by (**SOLID 45**). The clay soil has been modeled as Drucker – Parger elastic-plastic medium.

Comparison between the results of three-computer software packages was performed on a data recorded from a documented field test (Armco Hel-Cor piles performed in 1969 at Houston site). The computer packages are; (**ANSYS 5.4**) by the researcher, (**AXINLFEM**) developed by (Maharaj, 2000) who studied axi-symmetric raft, piled raft in two dimension using finite element method, and (**AXPILE**) as was used by (Kraft et. al, 1981) for single pile analyses. The comparison shows a good agreement between the (**ANSYS 5.4**), field test and other two packages.

The load carrying capacity of raft foundation is found to increase with the increase in raft size. The effect of pile length (even for pile length equal to the diameter of the raft) is found to reduce the settlement of raft foundation significantly and hence increase the load carrying capacity. Such piles of small lengths can be used successfully as settlement reducing piles in a piled raft foundation.

The range of settlement reduction varies from 0 to 47.5 percent, approximately (50 percent). For the same size of raft and length of pile

(with the proportional increase of the two), it has been found that there is an increase in the initial overlap of the two load settlement curves. The increase in length of pile will increase the load carrying capacity of piled raft foundation. For the same length of pile under raft, the improvement is more for smaller raft than that of the larger raft.

Two mathematical models in form of simple Equations are proposed from the obtained results to simplify the analysis and obtain settlement of raft and piled raft foundations for different size raft and pile length.