Sustainability Design for Raft & Piled-Raft Foundations – *green initiative!*

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1. Introduction

1.1 Background

A raft foundation normally supports a number of columns or load bearing walls so as to transmit approximately uniform loading to the supporting soil.
Usually, foundation structures are designed for bearing capacity and piles are then introduced as a settlement reducer plus bearing capacity enhancer whenever is required.
The piled-raft is a foundation system consisting of three elements, piles, raft and soil. The full detailed analysis of a piled-raft is not a trivial exercise due to its three-dimensional nature and the complicated interactions between piles, soil and raft.
In the conventional design approach, piled-raft foundation designs usually ignore any contribution from the raft, and assume that piles carry all the superimposed loads. As a result, the conventional piled-raft designs are often conservative. The overall settlement of piled-raft in such conventional designs is often very small, owing to the installation of longer or more piles than are necessary. Obviously, more economical solutions can be obtained by accounting for the contribution of the raft.

Thus, objective of the research work is to study the effectiveness of raft element and it significance level of contribution on a piled-raft foundation in hope to bring saving and reduce depiction of materials and resources which would contribute to the building of cleaner and greener environment.

1.2 Problem Definition

The purport of this report was to investigate and develop design charts that could permit rapid preliminary load-settlement assessment for producing an optimum and leaner unpiled and piled-raft foundation design taking into consideration of the slab's efficiency under structure–soil interactions based on geotechnical aspect.
In order to develop an optimum squarely unpiled-raft and piled-raft design charts, ranges of raft sizes with various thicknesses, number of piles, different pile lengths and spacing among other parameters were identified, and executed in the numerical analysis desktop study work.
The piled-raft model was loaded with uniformly distributed load and grounded immediately on the soft clay overlaid a layer of firmer clay. Short term total vertical settlements of up to 25mm against permissible total loads (dead & imposed) design charts for undrained soil shear strengths of 10kPa, 20kPa, 30kPa & 40kPa were then established and results investigated and validated. These newly developed design charts would allow users to choose an optimum foundation size rapidly especially during preliminary design stage based on their need.
Both total settlements in short or long terms by it are rarely damaging. However, differential settlement is, but it may be reduced through prudent design. Most buildings can tolerate 20mm

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