

# Numerical investigation on the performance of Piled Raft Foundation in Soft Clayey Soils

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**Abstract** - In general high-rise buildings are predominantly supported by piled raft foundations. Deep foundations (piles) are very effective for heavy structures because piles penetrate through the weak or soft soil deposits to the stiff soil or bed rock to support the structure weight. This paper aims to present the performance of piled raft foundation with medium embedment depth in soft clayey soils. A numerical model was developed to simulate the case of a piled raft rigid foundation installed in soft clay. A parametric study is conducted to examine the effect of the geometry of the foundation system (such as piles diameter, length and spacing), and the rigidity ratio between piles material and clay, on the performance of this type of foundation system on soft soils. Moreover, the failure mechanism of such foundation system under loading is examined. Based on the observed failure mechanism, an efficiency factor for the ultimate carrying capacity ( $q_u$ ) of piled raft foundation is proposed. Furthermore, a semi-empirical model for the determination of improvement factor ( $IF$ ), for a given soil/pile/geometry conditions, is developed based on the parametric study.

**Keywords:** Piled raft foundation, performance, carrying capacity, failure mechanism, efficiency factor.