

Field Evaluation of Pile Behavior in Sandy Soil Underlain by Clay

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Abstract : When the building loads are relatively small, challenges are often facing the foundation design especially when inappropriate soil conditions exist. These may be represented in the existence of soft soil in the upper layers of soil while sandy soil or firm cohesive soil exist in the deeper layers. In such cases, the design becomes infeasible if the piles are extended to the deeper layers, especially when there are sandy layers existing at shallower depths underlain by stiff clayey soil. In this research, models of piles terminated in sand underlain by clay soils are numerically simulated by different modelling theories. Finite element software, Plaxis 3-D Foundation was used to evaluate the pile behavior under different loading scenarios. The standard static load test according to ASTM D-1143 was simulated and compared with the real-life loading scenario. The results showed that the pile behavior obtained from the current static load test do not realistically represent that obtained from real-life loading. Attempts were carried out to capture the proper numerical loading scenario that simulates the pile behavior in real-life loading including the long-term effect. A modified method based on this research findings is proposed for the static pile loading tests. Field loading tests were carried out to validate the new method. Results obtained from both numerical and field tests by using the modified method prove that this method is more accurate in predicting the pile behavior in sand soil underlain by clay more than the current standard static load.

Keywords : numerical simulation, static load test, pile behavior, sand underlain with clay, creep

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