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Behavior of Axially and Laterally Loaded Pile in Layered Soil

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Abstract

Pile foundations are still one of the most practiced deep foundation systems for bridges, high rise buildings and wharves when the soil supporting the foundation is weak. Piles in fine-grained soils have a relatively high shaft friction and a low end-bearing resistance, and in coarse soils the reverse is the case. Therefore, when piles are installed in layered soils the location of the pile toe is of great importance. The first essential is to obtain a reliable picture of the depth and lateral extent of the soil layers. If the pile toe is terminated in a layer of stiff clay or dense sand underlain by soft clay or loose sand, there is a risk of pile punching through the weak layer. To be able to design safe and economical pile foundations we must analyse the interaction between the pile and the soil, establish the modes of failure and estimate the settlement from soil deformation under the dead load, service loads etc. Piles also provide a convenient method of construction of works over water, such as bridge piers. In the case of bridge foundations, piles are to be properly designed against lateral load which is generated due to some dynamic forces like wave, seismic and wind forces etc. Hence piles subjected to lateral load and embedded in layered soil of clay and sand need assessment of lateral load capacity for proper structural design. The analysis of a single pile subjected to axial and lateral load embedded in layered soil is presented in this paper. In the present investigation, an attempt has been made to study some aspects of behavior of laterally loaded and axially loaded piles embedded in layered cohesive soil and cohesionless soil with the help of LPILE and ALLPILE software using field data. In addition, an effort is also made to correlate lateral and axial load carrying capacities of vertical piles based on IS code IS2911Part1 (sec2) and the results obtained by were compared with the LPILE and ALLPILE analysis.

Keywords: *axial load, bending moment, cohesionless soil, cohesive soil, , fixed head pile, lateral load, layered soil, pile, top displacement*