

Effect of Twin Cavities on the Axially Loaded Pile in Clay

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Abstract : Presence of cavities in soil predictably induces ground deformation and changes in soil stress, which might influence adjacent existing pile foundations, though the effect of twin cavities on a nearby pile needs to be understood. This research is an attempt to identify the behaviour of piles subjected to axial load and embedded in cavitied clayey soil. A series of finite element modelling were conducted to investigate the performance of piled foundation located in such soils. The validity of the numerical simulation was evaluated by comparing it with available field test and alternative analytical model. The study involved many parameters such as twin cavities size, depth, spacing between cavities, and eccentricity of cavities from the pile axis on the pile performance subjected to axial load. The study involved many cases; in each case, a critical value has been found in which cavities's presence has shown minimum impact on the behaviour of pile. Load-displacement relationships of the affecting parameters on the pile behaviour were presented to provide helpful information for designing piled foundation situated near twin underground cavities. It was concluded that the presence of the cavities within the soil mass reduces the ultimate capacity of pile. This reduction differs according to the size and location of the cavity.

Keywords : axial load, clay, finite element, pile, twin cavities, ultimate capacity

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