



Experimental Investigation on Efficiency Factor of Pile Groups Regarding Distance of Piles

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Abstract

There are a lot of the parameters which affect pile group behavior in soil. One of these factors is the distance of piles from each other. The impact of distance on pile groups in sand has been investigated through some researches, whereas most of them have not represented an exact estimation according to the continuous change of the distance in sand. Moreover, most of previous investigations have considered two piles as a perfect group. Since two-pile group has the least interaction effect among piles, it cannot suitably demonstrate the influence of spacing. In this lecture, several 4-pile groups modeled with different spacing were subjected to axial loading in laboratory. The pile groups were free-head with length to diameter ratio of 13.5. The piles are designed in a way which the shaft resistance of piles can be completely mobilized through the test. Then, the bearing capacities of pile groups are measured and compared with the single pile's resistance in order to calculate the efficiency coefficient of the groups. It is revealed that the distance is noticeably effective in efficiency factor and this effectiveness, non-linearly decreases by increase of spacing. The results show that the efficiency coefficient is changing between almost 1 and 1.4.

Keywords: Pile Group; Spacing; Distance; Efficiency; Axial Loading.

1. Introduction

Since the computational formulas are too conservative, designers take the advantages of practical experiment, satisfied with concepts such as the efficiency coefficient and the ratio of the pile group settlement. These two factors are properly able to represent the performance of the group. Nevertheless, due to the cost of the real size test, the laboratory models are more reasonable.

The influence of distance on group piles' behaviour has been investigated through some researches and it is clear that the increase of piles' spacing declines the effect of piles on each other in most aspects [1, 2], but most of them have not represented an exact estimation according to the continuous change of distance in sand. Moreover, most of previous investigations have considered two piles group as a perfect group. Because the interaction between piles enhances with increasing of the number of piles in group, in this lecture, 4-pile groups are investigated to better show the influence of spacing. In groups with more piles the loads are not distributed equally among piles. Therefore, four piles are suitable.

In one of the previous works, Vesić (1969) declared that the efficiency of the pile group in sandy soil is higher than 1 only if the density of sand or the distance between the piles is not high. Moreover, in the distance ratio of 2 to 3 times of the diameter, the efficiency reaches maximum state (1.3 to 2, respectively) [3]. Poulos and Davis (1980) have obtained

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