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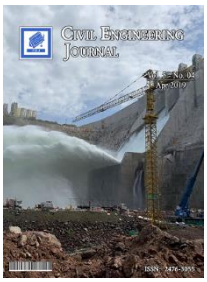

Design Charts for Axially Loaded Single Pile Action

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Abstract

The objective of this article is to generating the design charts deals with the axially ultimate capacity of single pile action by relating the soil and pile engineering properties with the pile capacity components. The soil and are connected together by the interface finite element along pile side an on its remote end. The analysis was carried out using ABAQUS software to find the nonlinear solution of the problem. Both pile and soil were modeled with three-dimensional brick elements. The software program is verified against field load-test measurements to verify its efficiency accuracy. The concrete bored piles are used with different lengths and pile diameter is taken equals to 0.6 m. The piles were installed into a single layer of sand soil with angles of internal friction (20° t0 40°) and into a single layer of clay soil with Cohesion (24 to 96) kPa. The getting results showed that for all cases study the total compression resistance is increased as pile length increased for the same property of soil, also illustrious that the total resistance of same pile length and diameter increased as the soil strength increasing. In addition, the same results were obtained for the end bearing resistance, skin resistance and tension capacity. Design charts were constructed between different types of soil resistance ratio and the pile length/diameter ratio (L/D) for all cases of study. One of improvement found from these curves that it is cheaply using piles of larger diameter than increasing their lengths for dense sand and to increasing piles lengths for loose sand. Moreover, it is inexpensively using piles of larger length in soft clay soil than increasing their diameter and piles of larger diameter in firm and stiff clay soils than increasing their length.

Keywords: Pile; Compression Load; ABAQUS Program; Design Charts; Pile Action.

1. Introduction

Piles defined as a slender long columns put in into the ground to utilized for transferring applied toad (vertical, horizontal, uplift) to stronger soil layers. Piles were usually used to reduce a large settlements of constructions structures that occurred by shallow foundations due to the soil void rate [1]. Also, piles were widely used in many buildings and structures such as basement mats, offshore platforms, transmission towers, piers an abutments of bridge, and etc. For vertical load resistance, piles can be categorized as a friction (flouting) piles or an end-bearing piles. But this classification has questionable remark for piles utilized in transmitting by a collection of the end-bearing and side friction portions. Tomlinson (1995) proposed a simple classification founded on the British Normal Program (BS 8004) of Repetition for Foundations [2].

Many methods had been developed during past decades by different researchers to find accurately the ultimate pile capacity such as Winker method, plasticity theories, numerical methods, an etc. But all of these methods have an

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