



Comparison of Single and Group Jet Grouting Columns Capacity Based on Field Load Test and Theoretical Methods

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Abstract

The evaluation of axial capacity of jet grouted soil cement columns in soft soil is a complicated issue because it depends according to the number of factors such as, soil type, influence mixture between soil and grouting materials, nozzle jet energy, jet grouting and water flow rate, rotation and lifting speed. These parameters related to the type of jet grouting methods (single, double and triple system). Most methods of design the bearing capacity of the jet-grouting column based on experience. Therefore, some designer calculates the bearing capacity of the jet grouting column based on jet grout section capacity. In this paper, different theoretical methods have been used to estimate of the jet grouting soil-cement capacity, such as Poulos and Davis, 1980 methods and then their comparison with the pile load test calculations based on the quick pile load test as presented in ASTM-D1143-07. Therefore, the study describes a prototype test single and group jet grout soil-cement models of arrangement (1×1, 1×2 and 2×2) for total length to diameter ratios (L/D) is 13.33 and clear spacing three times of diameter has been constructed in soft clayey soils in the right bank of the Euphrates River, at Al-Nasiriyah city. As a result, the theoretical method for estimation the bearing capacity gives unfaithful values for the single and group jet grout column compared to the load- settlement calculations obtained from field pile load test data. On the other hand, the Hansen's 90% and Butler and Hoy's given closer results to each other and may be considered faithful interpretation methods to compute the bearing capacity of single and group jet grouting columns.

Keywords: Jet Grouting Columns; Field Load Test; Axial Capacity; Soft Soil.

1. Introduction

Jet under high pressure is widely used in the industry, while in constructions of civil engineering are most significantly, to cut soil structures in-situ the high velocity of jetting material are used for ground improvement [1]. Jet grouting is a soil treatment technique adoption a high hydraulic energy to destroy the surrounding soil. Ground improvement by Jet grouting technology can be used in varied and difficult geological and geotechnical situations, showing its practical and economic advantages, in addition to the importance of the performance control on site, before and during the construction of the final foundations [2].

When soil particles were excavated then spoil outside the hole and recouped with cementing materials such as Portland cement to create a soil cement column aspect (soilcrete) [3] Construction of spoil, which could then again be recycled or integrated on the ground works [4]. When designing jet injection columns, change in the length of the jet grout columns and soil conditions must be carefully and correctly defined [5]. Jet grouting has increasing uses in the last

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