UNDER - REAMED BORED PILES IN BANGKOK CLAY

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by

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ABSTRACT

This thesis deals with (1) the development of an under-reamer and the construction of under-reamed bored piles in the weathered, soft and stiff clay layers of Bangkok subsoil, (2) load-testing the test piles to failure and (3) to check the increase in ultimate load of the under-reamed piles in the different layers.

The results show that successful under-reams can be constructed in all the clay layers with the under-reamer developed by the author. In the soft clay, the end-bearing load is increased by 3 times when the base diameter is enlarged to 1.7 times the shaft diameter. In the weathered and stiff clay layers, the increase is 3-6 times when the base is enlarged to 2-2.2 times the shaft diameter. The contribution of end-bearing to the ultimate carrying capacity is increased from 10% to 24% in the soft clay and from 18% to 42-60% in the stiff clay.

The total stress method and the Dutch Cone test can be used to predict the ultimate carrying capacity of straight and under-reamed bored piles in Bangkok Clay.

The results from the under-reamed bored piles are compared with the corresponding results from the granular piles. The under-reamed bored piles thus have great potentials especially in embankment road designs and light structures.

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I INTRODUCTION

1.1. General

The subsoil in the Bangkok area consists of a thick deposit of marine clays to an average depth of about 20 m. The upper 10 m consists of very highly compressible, soft to medium clay overlying another 10 m of medium to stiff clay (MUKTABHANT et al, 1967).

It is therefore common in Bangkok for foundations of high-rise structures and bridges to be supported on piles. The use of bored cast in-situ piles in Bangkok was introduced in the sixties due to problems of transportation and vibration caused during driving of precast piles. Since then, large diameter bored piles have been used in the first and second sand layers to support the foundations of high-rise buildings and bridges.

Bored piles are non-displacement piles which are installed by first removing the soil by a drilling process and then constructing the pile by placing concrete in the drilled hole. The preference of bored piles over other types of piles can be attributed to its potentiality to reach the bearing stratum chosen in the design, flexibility to adapt the diameter to load requirements, economy in the use of steel and minimum noise and vibration in installation.

The use of under-reams in bored pile construction has been successfully carried out in London Clay where boreholes can stand unsupported; and in Texas and India where expansive soils are met extensively. The principal advantages in under-reaming the base are substantial increases in the ultimate bearing capacity and uplift resistance.

1.2. Purpose Of Research

The purpose of this research are :

(1) to pioneer the construction of under-reamed bored piles in Bangkok Clay.

(2) to investigate the possibility of using only light equipment and accessories in the construction works.

(3) to design a suitable under-reamer capable of forming an enlargement at the base of a pile using the dry and wet methods.