INFLUENCE OF PILES ROUGHNESS ON NEGATIVE SKIN FRICTION

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ABSTRACT

This thesis reports an experiment investigation of negative skin friction on pile and presents the tests results of model piles in kaolin clay soil. In the model test, piles were install by penetrating a pile into clay. Particular attention is given to the influence of pile roughness on negative skin friction. It was to investigate also how the difference of pile diameter would effect the negative skin friction. The difference size of diameter of piles 20 mm and 30 mm and the same length 91 mm (3 ft) were used in this study. The soil was compressed by incremental of air pressure.

The problem of a single pile that penetrates through a soil layer will give a complex state of stresses in the soil around a pile. The zone of soil adjacent to the pile shaft would also be completely remoulded by the installation process. The properties of this remoulded soil would be altered significantly. The effects of these changes are very complex and as yet not well understood.

The model experiment was carried out in a circular tank with the diameter of 1000 mm and a depth of 1500 mm. At the base of the tank, the gravel and sand was installed to provide drainage for water. The soil was formed slurry with water content of 120 %. The slurry was consolidated one-dimensionally in the tank with a double incremental pressure of 50 to 400 Kpa. Then pile was push into clay with constant rate of penetration. The surcharge on the clay was increased to initiative the settlements of clay that turn gave a down-drag force on pile.

During penetration a down-drag stress give a maximum value at mid-depth of piles of 918.75 Kpa and 593.25 Kpa for diameter 30 mm and 20 mm respectively. And when the surcharge was increased, the value of down-drag stress was increased

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CHAPTER 1

INTRODUCTION

This chapter concerns a general background of study, objective of study, needed to study and scope of study.

1.1 Background of study

Piles often provided the only foundation system that can reliably transmit structural loads to the foundation soils in cases involving weak surficial deposits (e.g., soft clays) and hostile environments (e.g., offshore). Most existing methods of pile design start with estimating the axial capacity of a single pile. When designing pile foundations in such situation, the negative skin friction on pile needs to be carefully considered. Practical considerations require that this relevant characteristic must be measured or estimated with a satisfactory level of reliability by means of exploration, testing, and analysis methods available in current geotechnical practice.

Downdrag forces are induced in piles whenever the surrounding soil settles more than the piles. The soil settlement may have many causes. Frequently, it is a result of consolidation due to surcharge loading or settlement of soils due to dissipation of excess pore water pressure generated during pile driving.

This study is concerned with the influence of pile roughness on negative skin friction and small-scale model tests were used to study the phenomenon. In model tests, the installation methods of piles were been considered to know whether the pile installation method would effect the increasing rate of the negative skin friction or not occur.