SETTLEMENT ANALYSIS OF EMBANKMENT GROUND IMPROVED BY VERTICAL DRAINS AND SURCHARGE

By

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ABSTRACT

The preloading with vertical drains offers an economically viable solution to improve the ground for lightly loaded industrial and housing development over areas of soft compressible deposits, which require deep foundations. Preloading can be carried out by earth or sand fill, water, vacuum or by lowering the ground water. There are wide ranges of prefabricated vertical drains available locally and many projects have been successfully completed using them. In this study, a review of the properties of the drains, their selection criteria, methods of installation, design considerations of the preloading with vertical drains, and settlement analysis using Asaoka Method was made. Then, the manufacturing and installation of vertical drain of a project site in Bandar Baharu were investigated. Finally, analyses were then conducted using Asaoka's and Hyperbolic Curve Method on settlement of embankments in Bandar Baharu, Juru, Kuala Sg. Baru, and Kerteh. Based on these studies it was found that at the end of consolidation, the higher period of interval i.e. 21 days, for monitoring will give similar estimate of total consolidation and degree of consolidation would be almost similar for the two techniques. Asaoka's Method would give higher estimate of degree of consolidation as compared to Hyperbolic Curve Method. As to the accuracy, Asaoka's Method gave the most accurate prediction of degree of consolidation. When the settlement values lie on 45^0 line, it will give the final consolidation settlement. As to Hyperbolic Curve Method, it is hard to find the final consolidation because of the fluctuating and it required some calculations to predict the ultimate settlement.

CHAPTER 1

INTRODUCTION

1.1 Background

Structures built on soil are subject to settlement. Some settlement is often unavoidable, and, in some circumstances, some settlement is acceptable. For example, settlement of a garage or warehouse building might be acceptable, but for settlement (especially differential settlement) of a luxury hotel building would not be because of damage to walls, ceilings, and so on.

Although there are several possible causes of settlement (e.g. dynamic forces, changes in the groundwater table, adjacent excavation, etc.), probably the major cause is compressive deformation of soil beneath a structure (Figure 1.1).

Figure 1.1: Settlement at pedestrian pavement.

Compressive deformation generally results from reduction in void volume, accompanied by rearrangement of soil particles, and compression of the