UNIVERSITI TEKNOLOGI MARA

SUBGRADES STABILIZATION OF CLAY SOIL IN KLANG USING FLY ASH IN RELATION BETWEEN CBR VALUE AND RESILIENT MODULUS

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with regulations of Universiti Teknologi MARA (UiTM). It is original and is the result of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any other degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulation for Post Graduate, Universiti Teknologi MARA (UiTM), regulating the conduct of my study and research.

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ABSTRACT

Nowadays, the over dependent on the use of cement and lime have kept the cost of the construction of stabilized soil financially high. Using recycle material such as Fly Ash (FA) can minimize the cost of soil stabilization. The objective of this research was to quantify the enhancement of the subgrade strength using chemical stabilization of Fly Ash (FA) in order to acquire the correlation between California Bearing Ratio (CBR) and Resilient Modulus for stabilization of clay soil. Along with that, the deformation and stabilization of the soil was analyze using numerical modeling in order to determine the cost and benefit of the compacted stabilized soil. FA was obtained from Kapar Energy Venture (KEV) and soil samples were taken from Tanjung Harapan, Klang. Extensive laboratory work has been carried out in order to examine the importance of the research. The samples were tested to determine the optimum moisture content (OMC) and maximum dry density (MDD) using compaction test. The stabilized soil samples were prepared by mixing the FA from 4% to 20% by increasing the additives at 2% each sample. The strength of the samples was tested using Unconfined Compressive Test (UCT) after 7 days of curing in room temperature. Four (4) samples from different percentage of FA at OMC were tested for CBR value and M_R value curing in 7 days and 28 days. Those tests were also conducted with minimum -5% from OMC, at OMC and maximum +5% from OMC for every combination of fly ash. The result shows increases in the CBR and M_R value by the addition of FA. The presence of FA in different percentage was affected by different curing time period and increased the value of CBR and M_R differently. Apart from the percentage of fly ash, the strength of the soil was found significantly affected by the amount of moisture content in the soil. Numerical modeling result using PLAXIS software also shows that the data is not quite sensitive in comparison to the displacement of the pavement layer from day 1 to day 100. With a conventional JKR method, the result of pavement thickness design was 90cm for CBR 2% and 64cm for CBR 15%, using relevant figures and which to enhance the result from numerical modeling. In conclusion, it was found that the used of FA with an adequate amount of moisture is believed to improved soil properties thus offer an alternative for soil subgrades improvement in highway construction.

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