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Effects of Lime Cement Columns in Tropical Peat of East Coast of Peninsular Malaysia

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Abstract

This paper presents the effects of lime cement columns in terms of compressibility and shear strength in tropical peat. This paper also discussed the engineering properties of unstabilized and stabilized tropical peat of East Coast of Peninsular Malaysia. Samples from three locations were collected to distinguish the variants of organic content and fiber content in this study. Tropical peat collected from this location is classified as fibrous peat using Von Post scale. The moisture content and organic content of this peat is ranging from 400 % to 900 % and 80 % to 90 % respectively. Author also found a good correlation between the engineering properties and the compressibility parameters. A dosage rate of 150 kg/m^3 was used to mixed binders in the ratio of 80:20 (cement: lime).The compressibility and shear strength of unstabilized and stabilized peat was compared to determine the effectiveness of lime cement columns. The compressibility of peat was determined using conventional oedometer test and the undrained shear strength, S_u of peat was determined using unconfined compressive strength test. Compressibility indices, C_c and C_α were identified as two crucial parameters to estimate settlements in peat soil. Based on the results obtained, the mixing of lime cement column in peat extensively increases the shear strength and significantly reduces the compressibility of peat compared to the unstabilized peat.

Keywords: Peat, Lime Cement Column, Compressibility, Shear Strength.

1. INTRODUCTION

Peat is basically organic soil but the matters that differ from organic soil and peat soil is the percentage of organic content present in the soil. Peat soil contains more than 75% of organic matters but for ordinary organic soil the percentage of organic content is around 20 % [1]. Peat soil is a mass of dark brown or black plant material produced when the vegetation of a wet area is partly decomposed. Peat is used in many sectors such as agriculture, cosmetic, fuel alternative, and industry insulator but in construction sector the properties of peat soil which has high compressibility and low shear strength turns the peat soil into problematic soil.

Peat land can be found in many countries throughout the world. According to the survey by Harlten & Wolski (1996), Canada and Russia are the two countries with the largest areas of peat [2]. From the same survey it is denoted that Malaysia stands in 10th rank in the percentage of national area covered by peat which is 9.4% or 3.0 million hectares. However most of the peat land is not explored yet for construction and some of it is reserved for agricultural purpose. The peat land in Pekan is one of the best examples that picture the real situation where most of the area is covered by peat. It is not well explored because of the problematic soil which hosts certain difficulties in construction of line structures such as roads.

The lack of land for construction leaves the problematic peat as the last resort. Hence solution towards the betterment of the peat is of utmost importance. The best possible solution towards peat ground improvement is necessary.