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Stabilization of Tropical Peat Soil from Sarawak with Different Stabilizing Agents

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Abstract This paper describes a study on tropical peat soil stabilization to improve its physical properties by using different stabilizing agents. The samples were collected from six different locations of Sarawak, Malaysia, to evaluate their physical or index properties. Out of them, sample having the highest percentage of organic content has been selected for stabilization purposes. In this study, ordinary portland cement (OPC), quick lime (QL), and class F fly ash (FA) were used as stabilizer. The amount of OPC, QL, and FA added to the peat soil sample, as percentage of dry soil mass, were in the range of 5–20%; 5–20% and 2–8%, respectively for the curing periods of 7, 14, and 28 days. The Unconfined Compressive Strength (UCS) test was carried out on treated/stabilized samples with the above mentioned percentages of the stabilizer and the result shows that the UCS value increases significantly with the increase of all stabilizing agent used and also with curing periods. However, in case of FA and QL, the UCS value increases up to 15 and 6%, respectively with a curing period of 28 days but

decreases rather steady beyond this percentage. Some UCS tests have been conducted with a mixture of FA and QL to study the combined effect of the stabilizer. In addition, Scanning Electron Microscope (SEM) study was carried out on original peat soil and FA, as well as some treated samples in order to study their microstructures.

Keywords Tropical peat · Index properties · Stabilizers · Curing period · UCS test · SEM

1 Introduction

Peat soil has been identified as one of the major groups of soil found in Malaysia, which covers approximately 3.0 million hectares or 8% of the total land area. Out of that, Sarawak has the largest peat land area in Malaysia which is about 16,500 km² or 13% of the state, of which about 90% of the peat is more than 1 m in depth (Mutalib et al. 1991).

Peat or highly organic soil is a major problem in the infrastructure development of the coastal areas of Sarawak. Peat soil is generally considered as problematic soil in any construction project, because of its high compressibility and very low shear strength (Huat 2004). With the rapid industrialization and population growth, it has become necessary to construct infrastructures facilities on peat-land. The

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