

Investigation on Strength Development in RBI Grade 81 Stabilized Serian Soil with Microstructural Considerations

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Abstract. The aim of the research is to investigate the strength development of stabilised local Serian soil with RBI Grade 81 a chemical additive to enhance soil properties in term of strength. Serian is a town which is located about 60 km from Kuching city where the soil was chosen to be treated in this study. The soil sample was mixed with 2 %, 6 % and 8 % of RBI Grade 81 by weight of dry soil and added with water at optimum water content (OWC) to replicate field site conditions. The modified samples were cured in ambient air for 7, 14, and 28 days. Scanning Electron Microscope (SEM) was utilized to analyze surface morphology of the stabilized soil specifically on the formation of bonding between soils and RBI 81 particles. The experimental results show the highest average peak UCS strength achieved was 1071.6 kN/m² at 14 day curing period with 8 % of RBI Grade 81 which is higher than the untreated control sample which was 179.946 kN/m², showing increment by almost six folds. Hence the RBI 81 stabilization technique enhances the local soil structure by improving the inter-cluster bonding, reducing pore spaces in the soil and subsequently increasing the soil's strength.

Keywords: Soil stabilisation, microstructure, chemical additive.

1. Introduction

Soft Soils are characteristically known for their low strength, high compressibility and high groundwater table which cause large settlement. Typically due to sedimentary process in various environments, both physical and engineering properties such as void ratio, water content, grain size distribution, compressibility, permeability and strength exhibit substantial variation. In addition, soft soil also exhibit high compressibility (including the important secondary consolidation), reduced strength, low permeability which are unsuitable conditions for construction. Soft clay is also categorized as soft soil and is widely deposited in the state of Sarawak. Due to unavoidable reason such as population and economic growth, development and construction are forced to take place on poor ground such as soft clay. Soft clay has low load bearing capacity and undergo large settlement when loaded. Hence, construction of highways embankment on normally consolidated soft soil deposit has suffered from extravagant settlement and lateral displacement without proper ground improvement before construction implemented [1]. Therefore, ground improvement is needed to avoid these excessive settlements of structures constructed on soft ground.

