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Investigation Into Pros, Cons And Proposing A Potential Alternative Of Soil Stabilization Using Lime

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Abstract: This study is an overview of previous studies on lime (quick and hydrated) -treated soil. Lime is the oldest traditional stabilizer used for soil stabilization. The mechanism of soil-lime treatment involves cation exchange, which leads to the flocculation and agglomeration of soil particles. The high pH environment then causes a pozzolanic reaction between the free Ca^{+2} cations and the dissolved silica and alumina. Lime-treated soil effectively increases the strength, durability and workability of the soil. Such treatment also improves soil compressibility. A fluctuation behavior was observed on the influence of lime on soil permeability. However, the factors affecting the permeability of the soil-lime mixture should be extensively studied. Nonetheless, lime treatment has a number of inherent disadvantages, such as carbonation, sulfate attack and environment impact. Magnesium oxide/hydroxide are thus proposed as a suitable alternative stabilizer to overcome at least some of the disadvantages of using lime in soil stabilization.

Keywords – Lime, magnesium oxide, soil stabilization, treatment mechanism

[I] INTRODUCTION

Soil stabilization is the process of the alteration of the geotechnical properties to satisfy the engineering requirements (Attoh-Okine, 1995). Numerous kinds of stabilizers were used as soil additives to improve its engineering properties. A number of stabilizers, such as lime, cement and fly ash, depend on their chemical reactions with the soil elements in the presence of water (Azadegan *et al*., 2012; Mallela *et al* ., 2004; Ramadas *et al*., 2011). Other additives, such as geofiber and geogrid, depend on their physical effects to improve soil properties (Alawaji, 2001; Viswanadham *et al*., 2009). In addition, It can be combined both of chemical and physical stabilization, for example, by using lime and geofiber or geotextile together (Yang *et al*., 2012; Chong and Kassim, 2014).

Lime is the oldest traditional chemical stabilizer used for soil stabilization (Mallela *et al*., 2004). However, soil stabilization using lime involves advantages and disadvantages. This study provides details of advantages and disadvantages of using lime as soil stabilizer. In addition, to control the disadvantages inherent to lime treated soil, proposing an alternative material was discussed.