

Title: Static response on lime column and geotextile encapsulated lime column (GELC) stabilised marine clay under vertical load

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Abstract: Marine clay, which is widely encountered in coastal area in Malaysia, is a problematic base material. Previous researchers reported that deep lime stabilisation can significantly improve clay. However, insufficient confining pressure from surrounding soil normally lead to the inferior performance on the upper part of column such as column head crushing and larger deformation on the surrounding soil at top part of column. Therefore, geotextile encapsulation was proposed for lime column in this study. Static response and stress distribution are essential in the understanding on behaviour of columnar stabilised soil under vertical load. Multi stages loading tests were conducted on Pontian marine clay, with and without geotextile encapsulation. Stress concentration ratio ($\sigma_{mid}/\sigma_{soil}$) was examined in each loading stage, where it is defined as stress on column (σ_{mid}) divided by stress on surrounding soil (σ_{soil}). The samples were cured for 14, 28 and 56 days before tested. It was found that stress concentration ratio was dependent on column materials strength properties and applied loading. Geotextile encapsulation increased the stress concentration ratio on lime column. Stress concentration increment effect by geotextile encapsulation was further enhanced by the confining pressure of surrounding soil; however, the effect reduced with increase of applied loading. Higher stress concentration ratio indicated lesser load on surrounding soil and therefore the soil settlement could be reduced.