

Reduction of transferring stress to foundation soil by arbitrarily manipulated gap-graded granular particles

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ABSTRACT

It is generally known that high strength soil is indicative of well-graded particle size distribution. However, there are cases of firm ground despite of poor grade distribution, especially a specific gap-graded soil. Based on these discoveries, this study investigated the development of additive of gap-graded soils designed to increase soil strength. This theoretical concept was used to calculate the mixed ratio required for optimal soil strength of the ground sample. The gap-graded aggregate was added according to the calculated ratio and soil strength characteristics were then compared to characteristics of the original soil sample through various test results. In addition, the underground stress transfer rate was measured according to the test conditions. The test results showed that the ground settlement and stress limit thickness were reduced with the incorporation of gap-graded soil. Further field tests would confirm the reproducibility and reliability of the technology by using gap-graded soil to reinforce soft ground of a new construction site. Gap-graded soil has the potential to reduce the construction cost and time period compared to other reinforcing methods.

1. INTRODUCTION

Ground strength is the most basic and important factor in the design of civil engineering structures. The stronger the ground, the more economical the design and construction can be. Therefore, studies have been carried out to improve ground strength in various ways. Attempts have also been made to apply newly developed methods in the field. Cherif et al. (2014) tested the effects of particle size distribution on soil mechanics using silt and sand. Ueda et al. (2011) also showed that the ratio of silt particles in an aggregate of a binary granular mixture significantly affected the shear

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