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Experimental Investigation on Geosynthetic-Reinforced Soil Sections via California Bearing Ratio Test

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Abstract : Loose soils normally are of weak bearing capacity due to their structural nature. Being exposed to heavy traffic loads, they would fail in most cases. To tackle the aforementioned issue, geotechnical engineers have come up with different approaches; one of which is making use of geosynthetic-reinforced soil-aggregate systems. As these polymeric reinforcements have highlighted economic and environmentally-friendly features, they have become widespread in practice during the last decades. The present research investigates the efficiency of four different types of these reinforcements in increasing the bearing capacity of two-layered soil sections using a series California Bearing Ratio (CBR) test. The studied sections are comprised of a 10 cm-thick layer of no. 161 Firouzkooh sand (weak subgrade) and a 10 cm-thick layer of compacted aggregate materials (base course) classified as SP and GW according to the United Soil Classification System (USCS), respectively. The aggregate layer was compacted to the relative density (Dr) of 95% at the optimum water content (Wopt) of 6.5%. The applied reinforcements were including two kinds of geocomposites (type A and B), a geotextile, and a geogrid that were embedded at the interface of the lower and the upper layers of the soil-aggregate system. As the standard CBR mold was not appropriate in height for this study, the mold used for soaked CBR tests were utilized. To make a comparison between the results of stress-settlement behavior in the studied specimens, CBR values pertinent to the penetrations of 2.5 mm and 5 mm were considered. The obtained results demonstrated 21% and 24.5% increments in the amount of CBR value in the presence of geocomposite type A and geogrid, respectively. On the other hand, the effect of both geotextile and geocomposite type B on CBR values was generally insignificant in this research.

Keywords : geosynthetics, geogrid, geotextile, CBR test, increasing bearing capacity
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