Abstract

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Bearing capacity of rigid shallow footing on geogrid-reinforced fine sand—experimental modeling

The improvement of the bearing capacity and settlement characteristics of rigid shallow foundation on fine dune sands using geogrid reinforcement indicates a satisfactory behavior. In this research, an investigation evaluating the bearing capacity of (strip footing-geogrid-fine loose sand) system is carried out. The research main objective is to assess the influence of the reinforcement embedment ratio and the length ratio on the mobilized bearing capacity of the proposed system. The testing program includes 24 plate-loading tests on steel strip footing of varied width (B): 75, 100, and 120 mm rested on unreinforced sand as a reference to determine the obtained bearing capacity ratio (BCR). For reinforced dune sand, the studied parameters are the upper geogrid layer embedment ratio (u/B) and the geogrid length compared to the foundation element width (L/B). The increase of the mobilized bearing capacity of the footing could be monitored in comparison with the unreinforced dune sand bed. The increase of the geogrid reinforcing layers indicates a valuable increase in BCR, with an optimal value for the studied parameter. It is concluded that the gain in the mobilized bearing capacity (BCR) relative to that of the unreinforced case is found to be in range of 1.5 to 1.7 times, with optimal embedment ratio (u/B) and length ratio (L/B) of 0.25 and 7.5, respectively.