

Effect of Reinforcement Density on the Behaviour of Reinforced Sand Under a Square Footing

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Abstract : This study involves the behavior of reinforced sand under a square footing. A series of bearing capacity tests were performed on a small-scale laboratory model, which filled with a poorly-graded homogenous bed of sand, which was placed in a medium dense state using sand raining technique. The sand was reinforced with 40 mm wide household aluminum foil strips. The main studied parameters was to consider the effect of reinforcing strip length, with various linear density of reinforcement, number of reinforcement layers and depth of top layer of reinforcement below the footing, on load-settlement behavior, bearing capacity ratio and settlement reduction factor. The relation of load-settlement generally showed similar trend in all the tests. Failure was defined as settlement equal to 10% of the footing width. The recommended optimum reinforcing strip length, linear density of reinforcement, number of reinforcement layers and depth of top layer of reinforcing strips that give the maximum bearing capacity improvement and minimum settlement reduction factor were presented and discussed. Different bearing capacity ration versus length of the reinforcing strips and settlement reduction factor versus length of the reinforcing strips relations at failure were showed improvement of bearing capacity ratio by a factor of 3.82 and reduction of settlement reduction factor by a factor of 0.813. The optimum length of reinforcement was found to be 7.5 times the footing width.

Keywords : square footing, relative density, linear density of reinforcement, bearing capacity ratio, load-settlement behaviour

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