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Flexural Behavior of Geocell Reinforced Subgrade with Demolition Waste as Infill Material

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Abstract : The use of geocell in subgrade has been previously studied by various researchers in the past. It was observed that the infill material used could affect the performance of the geocell reinforced subgrade. So, the use of waste materials as infill in geocell reinforced subgrade may prove to be more effective, economical, and environment-friendly. The performance of demolition waste as an infill was studied using flexure testing, and we compared the results with that of the other infill materials; soil and sand. Flexural behaviour is very important to the geosynthetic application in pavements as it acts as a the geocell reinforcement acts as flexible layer embedded in pavements and leads to an improvement in stress distribution and reduction in stress on the soil subgrade. The flexural behaviour was determined using four-point bending tests and results were expressed in terms of modulus improvement factor (MIF) and load-deflection behaviour. The geocell reinforced subgrade with different infill materials was tested for flexural behaviour in a polywood-polywood three-layered beam model. The deflections of the three-layered model beam were measured for the corresponding load increments. Elastic modulus of the soil-geocell composite was calculated using closed-form solutions. Geocells were prepared from geonets with three different aspect ratios 0.45, 0.67, and 1. The demolition waste infilled geocell mattress with aspect ratio 0.67 showed improved flexural behavior with MIF of 2.67 followed by soil and sand. Owing to its improved flexural resistance as seen from the MIF and load-deflection behivour, crushed demolition waste can be effectively used as infill material for geocell reinforced subgrade, thereby reducing the difficulties in the management of demolition waste and improving the load distribution of weaker subgrade.

Keywords : demolition waste, flexural behavior, geocell, modulus improvement factor
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