

Comparative Assessment of Geocell and Geogrid Reinforcement for Flexible Pavement: Numerical Parametric Study

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Abstract : Development of highways and railways play crucial role in a nation's economic growth. While rigid concrete pavements are durable with high load bearing characteristics, growing economies mostly rely on flexible pavements which are easier in construction and more economical. The strength of flexible pavement is based on the strength of subgrade and load distribution characteristics of intermediate granular layers. In this scenario, to simultaneously meet economy and strength criteria, it is imperative to strengthen and stabilize the load transferring layers, namely subbase and base. Geosynthetic reinforcement in planar and cellular forms have been proven effective in improving soil stiffness and providing a stable load transfer platform. Studies have proven the relative superiority of cellular form-geocells over planar geosynthetic forms like geogrid, owing to the additional confinement of infill material and pocket effect arising from vertical deformation. Hence, the present study investigates the efficiency of geocells over single/multiple layer geogrid reinforcements by a series of three-dimensional model analyses of a flexible pavement section under a standard repetitive wheel load. The stress transfer mechanism and deformation profiles under various reinforcement configurations are also studied. Geocell reinforcement is observed to take up a higher proportion of stress caused by the traffic loads compared to single and double-layer geogrid reinforcements. The efficiency of single geogrid reinforcement reduces with an increase in embedment depth. The contribution of lower geogrid is insignificant in the case of the double-geogrid reinforced system.

Keywords : Geocell, Geogrid, Flexible Pavement, Repetitive Wheel Load, Numerical Analysis

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