Effect of Geogrid and Bamboo-grid Reinforcement in Soil Subgrade Using Dynamic Cone Penetration Test

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Abstract

Weak subgrade soils generally lead to excessive settlement, rutting, and unseasonable pavement failure. This study examines the effect of geogrid and bamboo-grid reinforcement on the performance of sandy soil subgrade using the dynamic cone penetration test (DCPT). The primary objective was to evaluate and compare the improvement in strength and penetration resistance of reinforced and unreinforced soil. Laboratory model tests were conducted on unreinforced soil as well as soil reinforced with geogrid and bamboo-grid layers at 50 mm and 100 mm depths within the soil, using DCP testing to measure depth penetration and subgrade performance. The dynamic cone penetration test was used to assess the dynamic cone penetration index and improvement in subgrade strength. The geogrid and bamboo-grid reinforced soft subgrade shows an increase approximately 300 percent cone resistance is achieved at 50 mm depth, and geogrid reinforced 200 percent cone resistance while 202.87 percent resistance achieved using bamboo-grid reinforced at 100 mm when compared to unreinforced soil section. The results show that both reinforcement materials significantly increased the load-bearing capacity and stiffness of the soil compared to unreinforced soil. The findings show up the reinforced subgrade systems in improving pavement foundation performance, reducing maintenance requirements, and sustainable ground improvement practices in transportation and geotechnical engineering applications.

Keywords

Bamboo-grid, DCPT, Geogrid, Reinforcement.