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EVALUATING THE PERFORMANCE OF GEOSYNTHETIC REINFORCED PAVEMENTS OVER WEAK SUBGRADE

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ABSTRACT

In the state of Louisiana, pavements often have to be built over a weak subgrade due to the soft nature of Louisiana soil, which generates many design and construction difficulties. As an alternative to the traditional method of treating the soft soil with lime or cement, geosynthetics, mainly geogrids and geotextiles were evaluated in reinforcing pavements constructed over soft natural subgrade. A total of six full-scale test sections were constructed, among which two sections were reinforced by one and two layers of triaxial geogrids, respectively; while high strength geotextiles were used to reinforce two of other sections with different base thicknesses. The rest of the two sections were left as control sections, of which one section was constructed over geotextile-wrapped sand embankment as the common practice in Southern Louisiana. The test sections were subjected to a full-scale moving wheel load applied by the Accelerated Loading Facility (ALF). A variety of instrumentations were used to measure the load-associated and environment-associated pavement responses and performances. Important design parameters such as the resilient deformations and stresses in the subgrade and the strains in the base were measured. The permanent deformations at the surface and in the subgrade of the test sections were measured at the select intervals of traffic load applications. Influential environmental factors such as moisture contents and temperatures were also monitored throughout the testing. Results of the full-scale tests demonstrate the effects of geosynthetics on the performance of pavements and quantify the benefits of different geosynthetics in stabilizing/reinforcing the subgrade/base in pavements. In addition to evaluating the pavement performance, the instrumentation measurements of pavement responses under dynamic moving wheel load provide the important information on geosynthetics' effects on the resilient behavior of pavements.