ABSTRACT

Behaviors of reinforced flexible pavements consisted of new pavement and overlayed conditions were investigated in this study by performing a series of scaled-down physical model test on flexible pavement structure. The physical model was prepared by pluviating through air the cleaned uniform sand (KMUTT sand) as base and sub-base layers. Then, a 6-cm thick asphaltic concrete (AC) layer, either unreinforced or reinforced with different types of geosynthetic reinforcement as well as their combination and arrangement, was placed on the top surface of the sand layer. The AC layer was compressed repeatedly for 200 cycles by means of a 6-cm wide rigid rough footing placed at the center. The average footing settlements as well as deflections along the lengthwise of AC layer were measured. In addition, strain fields of sand layer were computed lay a photogrammetric analysis. When considering the footing settlement, it was found that the permanent deformation of AC layer decreased when reinforced with geosynthetic for both new pavement and overlayed conditions. And, when the number of cycles of cyclic loading increased, the footing settlement increased but it was at decreasing rate. This is due to that the rigidity of AC layer increased when being reinforced. Therefore, the stress activated on the top surface of AC layer via footing can be effectively distributed to materials located below at a much wider area. Then, the maximum shear strain distribution of the based layer was uniformly distributed with the average value that was lower than the one when unreinforced. Also, when reinforced, any sign of strain localization to form shear band (δ) was not observed. When comparing the performance of using geosynthetic as global, it was found that reinforcing AC layer with geosynthetic is effective for new pavement condition and overlayed condition of which the old pavement was damage up to a moderate level.

Keywords: Flexible Pavement/ Geosynthetics/ Permanent Deformation/ Shear Band