

عنوان مقاله:

Enhancing the CBR Strength and Freeze–Thaw Performance of Silty Subgrade Using Three Reinforcement Categories

محل انتشار:

ژورنال مهندسی عمران، دوره 2، شماره 3 (سال: 1394)

تعداد صفحات اصل مقاله: 13

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خلاصه مقاله:

Silty subgrade soil cannot satisfy the requirements of highway construction because of its low strength and durability problems. A wide range of reinforcements have been used to improve soil performance. Improving the soil properties has caused more interest in identifying new accessible resources for reinforcement. This paper investigates the effect of including different reinforcement types on reducing the rapid accumulation of pavement damage caused by freeze–thaw cycles or low strength of a silty pavement foundation. The improvement of CBR strength and freeze-thaw behavior was tested with the inclusion of three reinforcement categories: i) randomly distributed fibers (natural palm fibers and chemical polypropylene fibers), ii) chemical additives (lime and cement), and iii) waste or by-product materials (fly ash and silica fume). To represent unsaturated and saturated soil conditions for various field applications, both unsubmerged and submerged samples were investigated. Mass losses were also calculated after freezing–thawing cycles as criteria for durability behavior. The test results for the reinforced specimens were compared with unreinforced samples to clarify the effectiveness of each reinforcement type and content. Unsubmerged samples especially that reinforced with waste materials provided a significant improvement in CBR strength. For submerged conditions, the best performance was observed from the specimens treated with chemical additives. 10% of cement reinforcement and 20% of waste materials provide the highest resistance against the freeze–thaw cycles.

کلمات کلیدی:

CBR Strength; Freeze-Thaw Behavior; Silty Subgrade; Reinforcement

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