



Investigation on the Effect of Geotextiles on Pavement Bearing Capacity (Part 1: Experimental Studies)

M. Makarchian^{1*} and J. Elyasi²

1 Department of Civil Engineering, Bu-Ali Sina University, Hamedan, Iran
2 MSc, Department of Civil Engineering, Bu-Ali Sina University, Hamedan, Iran

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ABSTRACT

Using geotextiles as a material with more tensile strength than soil has attracted attention of different researchers and organizations, particularly for road construction. In this research, first, the effect of geotextiles on pavement bearing has been investigated by laboratory model. Dimensions were determined in a way that boundaries have minimum effect on results. The free-end or fixed-end needle punched geotextiles were placed under a layer of sand (as sub-base) and over a layer of soft clay (as sub-grade). The results indicated that Fixed-End or Free-End conditions of geotextiles are similar to each other and geotextiles increase pavement bearing. This effect increases as displacement increases.

KEYWORDS

Geotextiles, Pavement, Bearing Capacity, CBR Test

* Corresponding Author, Email: makarchian@yahoo.com

1. INTRODUCTION

Reinforcement is geotextiles installation in tensile section of pavements to increase the bearing capacity of the pavement system [1]. Geotextile has been used for separation and drainage as well. Soil has good strength in compression but is weak in tensile, so that geotextiles can solve this problem in pavements. Several research have been reported in the literature that show effects of geotextiles on bearing capacity and behavior reinforced pavement [2], [3], [4], [5].

2. METHODOLOGY

In this research, the effect of geotextiles on pavement bearing has been investigated by laboratory model. A mold of 25 cm in diameter has been made similar to CBR mold, but larger to reduce boundary effects on results according to Taiebat and Carter (2000) [6]. Two layers soil were used as pavement layers. Sandy soil used at top as sub-base and clayey soil used to model a weak sub-grade layer. Four different geotextiles used for reinforcement element between sand and clay. CBR apparatus has been used for loading on soil. Different tests have been carried out to investigate the effect of reinforcement type of geotextiles, free or fixed edge of geotextiles, and its stiffness. The main aims of research were to show the effect of different properties of geotextiles on increasing the bearing capacity of pavement layers.

3. CONTRIBUTIONS

Fig.1 and 2 show some results of this experimental research. Main conclusions are:

1. Free and fixed end geotextiles has no effect on force-displacement curve.
2. Geotextile has little effect within little displacements. Its main effect is when $u/d > 0.10$.
3. Comparisons with other researchers have been presented and good agreements have been obtained.

4. REFERENCES

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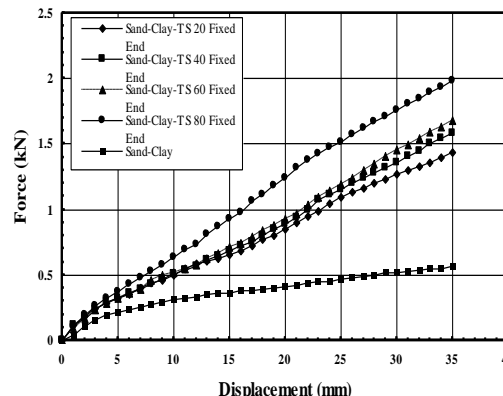


Figure 1: The effect of geotextiles with different stiffness on increasing the system strength in comparison with unreinforced state

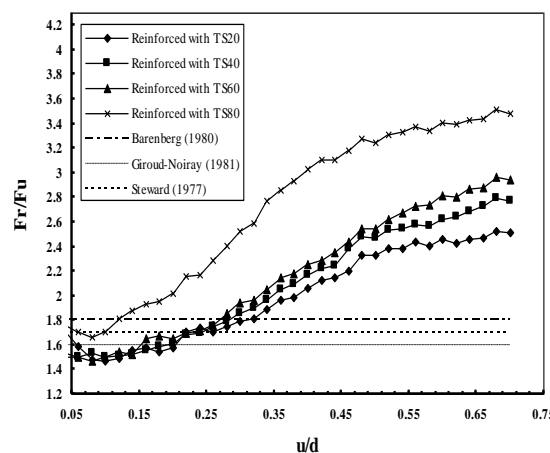


Figure 2: Relation between the bearing capacities of a soft sub-grade of pavement with different reinforcement stiffness in comparison with other researches

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