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Influence of a high modulus geogrid composite on the surface layer of roads on soft soil

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Abstract

In order to gain some insight about the mechanisms and the phenomena involved in the transfer of forces between a high modulus subbase reinforcement and the surrounding materials, a finite-elements system has been utilized. The influence of the reinforcement on the total paved road structure was assessed. Several issues were addressed like simulation of the bond characteristics of the reinforcement, simulations of the no-tension carrying characteristics of the aggregate materials, simulation of the propagation of discrete cracks in the pavement and their interaction with the surrounding materials. Practical design charts are presented for reinforced paved roads on soft subsoil.

1. Introduction

The use of geosynthetics as reinforcement in road construction has increased significantly over the past twenty years. Extensive use is now being made of a wide range of geosynthetics to improve road performance and or to economise in road construction. Geosynthetics can be placed in the asphalt and/or in the granular layers of a pavement in order to enhance the tension carrying characteristics of the material.

In order to gain some insight about the mechanisms and the phenomena involved in the transfer of forces between the reinforcement and the surrounding materials finite element analyses can be used [1]. The Delft University of Technology developed a finite elements (FEM) system, CAPA-2D [2], which has been utilized. A variety of options enable the quantification of the contribution of reinforcement in carrying tensile forces, the simulation of the no-tension carrying characteristics of the aggregate materials, the simulation of discrete cracks in the pavement and their interaction with the surrounding materials.

2. Multifunctional geogrid composite

In this FE-study a new geogrid composite has been used [3]. This geogrid composite has multifunctional properties by combining reinforcement, separation and filtration in one product. It is constructed from a coated high modulus aramid grid and a polyester nonwoven. The maximum strain is 3.5%. The geogrid composite has biaxial properties meaning that the strength is equal in both lengthwise and crosswise direction. This makes it suited for stabilization of soft, low bearing capacity soils and makes it possible to reduce