

STRENGTHENING OF FLEXIBLE ROAD PAVEMENTS BY GEONETS

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ABSTRACT :

The strength of subgrade soil used for flexible road pavement can be determined by using California Bearing Ratio test (C.B.R.). In the present study, CBR test has been conducted with / without Garfil Geonet layer at various depth on Black cotton soil (CH) and Murum soil (GW). The test results indicate substantial improvement in the CBR value of soil by using Geonets.

BACKGROUND :

The technique of soil reinforcement is being extensively used, since the last two decades, in a variety of applications ranging from earth retaining structures to subgrade stabilization. A brief literature review with reference to the use of earth reinforcement technology for road pavement is presented here under.

Bender and Barenberg¹ developed a design procedure based upon laboratory model studies for temporary roads on soft subsoil using light-weight non-woven geotextile as reinforcing material. Evert C. Lawton, Milind V. Khire & Nathaniel S. Fox² carried out study on reinforcement of soil by multioriented Geosynthetic inclusions. Venkatappa Rao G.³ carried out study on use of Geosynthetics in roads. The Central Road Research Institute, New Delhi, has undertaken several trials using geotextiles for road underlays in the rural and command area of Gujrat and Maharashtra, over black cotton soils.

EXPERIMENTAL WORK :

Material Properties :

In the present work soils used are : (1) Black cotton soil (CH) having liquid limit = 54 % , Plastic limit = 29 % , Shrinkage limit = 22 % , (2) Murum soil having Cu = 1.38 and Cc = 5.0. Garfil Geonet (4 mm , HDPE Braided twinenet mesh size 37.00 mm x 37.00 mm green in colour) manufactured by M/ S. Garware Wall Ropes Ltd. Pune has been used as reinforcing material.

California Bearing Ratio Test :

CBR Test has been carried out on unreinforced and reinforced soils at optimum moisture content condition. Soil samples have been compacted to achieve maximum dry density (MDD) and the experiment has been carried out for four types of samples with reference to geonet placement in the mould. The values of CBR obtained for subgrade soil at OMC for the different cases are shown in table - 2

TABLE NO. 1 Properties of Soil at CBR Test :

Sr. No.	Properties of soil	Black cotton soil (CH)	Murum Soil (GW)
1	Optimum Moisture Content	18.00 %	16.5 %
2	Max. Dry density	1765 Kg/ m ³	1905 Kg/m ³

TABLE NO. 2 CBR Test Results:

Sr. No.	Reinforcement Details during C.B.R. Test	Black Cotton Soil (CH) %	Murum Soil (GW) %
1	Unreinforced	6.0	10.9
2	Reinforced with one layer of Geonet at H/2 from the top	6.24	11.20
3	Reinforced with one layer of Geonet at H/3 from the top.	7.10	13.20
4	Reinforced with two layers of Geonet at H/3 and 2H/3 from the top.	7.97	14.09

DISCUSSION ON TEST RESULTS :

The CBR test results indicate that the presence of geonet, influences the CBR value. The improvement of soil strength due to presence of geonet is a function of interaction of geonet with soil at OMC condition. It has been observed that there is no significant improvement in the CBR value when the geonet layer is placed quite below. This is due to the reason that the depth through which the effective pressure bulb passes is a function of the diameter of the plunger and at the geonet inserted in the middle does not come under the way of effective pressure bulb, no significant improvement witnessed. To have an improvement in the CBR Value, it is necessary that the geonet inserted must intercept the effective pressure bulb generated due to the imposed load, otherwise it loses its meaning. So it is felt that it would be better to place geonet layer towards the top of the subgrade soil.

CONCLUSIONS :

From the study carried out for CBR test following conclusion have been drawn:

1. The presence of geonet, layer increases the CBR value of black cotton soil (CH) and murum (GW) type of subgrade soil.
2. There is no significant improvement in the CBR values when the geonet layer is placed in the lower half of the soil specimen.
3. In order to improve the CBR value of soil it is necessary to place geonet in such a manner that it intercepts the effective pressure bulb generated due to imposed load.

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