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Geoweb Technology-to the Succeeding Decades of Road Construction

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ABSTRACT: Neoloy Technology is a Novel Polymeric Alloy (NPA) developed to improve the strength and durability of geosynthetics' products. It is a strong, stiff and creep resistant alloy, the only one in the market today that can guarantee geotechnical-engineering properties for up to 75 years. The Neoloy Geocell (previously under the Neoweb trademark) is a Cellular Confinement System (geocell) developed and manufactured by PRS Geo-Technologies Ltd. Composed of ultrasonically welded strips, Geocells are opened up on-site to form a 3D honeycomb-like matrix, which is then filled with granular soil material to create a soil stabilization / road reinforcement system. In addition to reinforcement of the subgrade, subbase or base layer of roads and railways, cellular confinement is also used for soil stabilization and erosion control in slopes, channels, retention walls, reservoirs and landfills.

KEYWORDS: Road Construction, Geocell Reinforcement, Modulus Improvement Factor, Composite Structure.

I. INTRODUCTION

Neoloy Geocells are manufactured from a novel polymeric alloy (NPA). This material provides high dynamic stiffness (elastic modulus), resistance to permanent deformation (creep) and tensile strength. Research has shown a stiff geocell material better retains the cell geometry (dimensional stability) confinement and reinforcement. These geocell performance parameters are critical for the requirements of base-layer reinforcement of heavy-duty pavements and infrastructure. Neoloy Geocells are a sustainable solution for road construction as they reduce the use of virgin aggregate. This is achieved by the use of locally available but marginal-quality soils for structural infill and a reduction in the thickness of the pavement layers. Reinforcement with high modulus geocells also optimizes pavement design by enabling a longer design life and lower maintenance cycles/costs.

II. RELATED WORK

When Neoloy Geocells are deployed and compacted with soil/aggregate, a composite structure is created from the geotechnical interaction of the material, soil and geometry. Soil confinement retains infill materials in three dimensions providing high tensile strength on each axis. Under loading Neoloy Geocells generate lateral confinement while soil-to-cell wall friction reduces vertical movement. The high hoop strength of the cell walls, together with the passive earth and passive resistance of adjacent cells, also increases soil strength and stiffness. Geocells Neoloy technology strengthens soft soil by mechanically confining the soil in three-dimensional honeycomb geometry. The geocell ability to confine soil over the long-term depends on retaining its geometry. ... Upon loading geocells deform over time as a result of the stress on the cell walls.

III. METHODOLOGY

1. Firstly, we checked on the various materials which could be used in geoweb.
2. On researching the materials, we studied the tests on those materials. Following are the test results:
 - a. Impact Test. Impact Value= 23.68%
 - b. Crushing Test. Crushing Value= 28.14%
 - c. Los Angeles Abrasion Value= 12.4%
 - d. Water Absorption Test on Aggregate Water Absorption Value =0.81%

- e. Specific Gravity Specific Gravity Value = 2.64
- f. Flakiness & Elongation Test. Combined Flakiness & Elongation Index = 23%
3. We then compared the different types of geoweb materials and noted down their advantages over each other.
4. Finally we concluded on the drastic changes in the road construction in India.

IV. EXPERIMENTAL RESULTS

Neoloy maintains its stiffness and geometry for the geotechnical project lifespan under dynamic loading, thermal cycling and high temperatures. Pavement layers and subgrade reinforced by Neoloy Geocells improve the level of pavement stability and uniformity, thereby increasing the performance and life of the pavement.



Figure 1



Figure 2



Figure 3

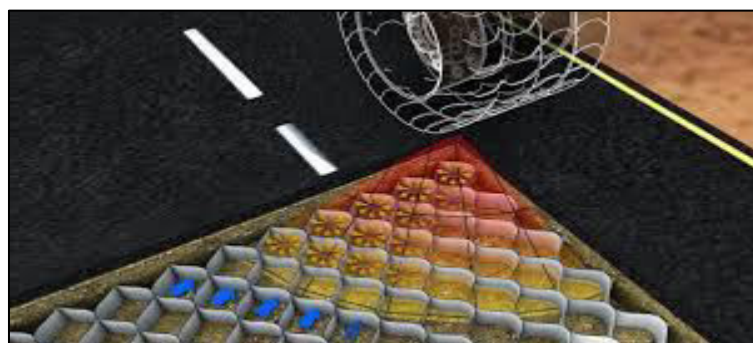


Figure 4

V. CONCLUSION

By analysis and comparison of properties and strength of both materials, HDPE and Neoloy, we found Neoloy is better than HDPE. We recommend Neoloy to be used in road pavement construction.

The literature involving, laboratory and numerical study results which shows that Geoweb materials can be used as reinforcement, pavement can be improved by providing Geoweb at the one-third to base of pavement. Geoweb helps in less permanent displacement in the subgrade layer by distributing the traffic load over a large area of subgrade. Approximately half of the base reduction from geoweb reinforcement by interlocking when it is placed, design results that about 20% to 40% thickness reduction is possible by geoweb in pavement design, greater thickness reduction stronger subgrade materials. efforts are needed to establish the guideline for placement of geoweb in the pavement

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