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A Study on Rutting Resistance and Microlevel Analysis on Bioenzyme Stabilized Subgrade Soils

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ABSTRACT

Soft soils are problematic because of their low strength and high compressibility, specifically permanent failures in the form of rutting, heaving and cracking. Subgrade soils with poor strength represent a challenge to pavement engineers, therefore continuous investigation of different additives and stabilizers is sought in order to improve such weak subgrade-soils and ultimately reduces the overall cost. In this study, an experimental program has been adopted to investigate the usage of bio-degradable waste materials in the form of enzymes for enhancement of engineering properties of soft subgrade-soils. Bio enzymes are organic degradable materials, currently introduced as soil improvement additives. A few studies were conducted to understand the effect of commercially available Bio-enzyme admixed with soft subgrade-soils with promising results but not established as a standard code of practice so far in Indian or other parts of world. Due to this reason, the present study has been undertaken to develop culture and Bio-enzyme indigenously and explore its possible usage for sub-grade soil-stabilization purpose. Several experiments were planned to conduct on the soft subgrade-soils by using the developed Bio-enzyme as the stabilizer, and also by introducing the enzyme with optimum dosage. Comparative studies were made between the sets of experiments using test parameter such as Liquid Limit, Plastic Limit, MDD, OMC, Free Swell Index, California Bearing Ratio (CBR), Unconfined Compression Strength, Wheel Tracking Test (WTT), SEM and EDAX tests. The influence of enzymes in improving the engineering property of the soils is confirmed by the changes induced at the micro level analysis as evidenced by scanning electron microscope (SEM) images. The Wheel-tracking test (WTT) results indicate that the stabilized subgrade soils stabilized with Bio-enzymes improves not only the strength in terms of CBR and UCS and also the rutting resistance against repeated applications. For a maximum value of 10mm rut depth of failure considered, the measured wheel load passes increased from 16% to 120% of CBR values range from 3.3 % to 6.1%, respectively. The study of WTT it easier to comprehend the rut depth under repeated wheel load passes by lab WT. The findings of this

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study will contribute to the existing knowledge on Culture prepared bio-enzyme-based soil stabilization and can provide valuable insights for future construction pavement construction projects.

Keywords: subgrade Soil stabilization, Bioenzyme, WTT

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