

Experimental Assessment of the Effect of Waste Milk Packets for the Improvement of Soil Subgrade in Flexible Pavement



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Abstract Low-density polyethylene (LDPE), known for its high molecular weight and stable chemical composition, does not possess the functional groups that are usually sought by microbial enzymes, making it resistant to biodegradation. As a result, the main disposal methods for LDPE plastics are landfilling and incineration. Milk packets, made from this non-recyclable LDPE plastics, are typically discarded post-use and accumulate in landfills. Reprocessing these materials for use in road construction subgrades offers an innovative and environmentally friendly alternative to traditional disposal methods. In view of this, waste milk packets have been used in the improvement of weak soil subgrade of flexible pavement. A series of standard proctor and California bearing ratio (CBR) tests were performed in order to determine the effect of plastic waste on the soil subgrade. The tests were performed on natural and plastic stabilized soil at different percentages of plastics ranging from 0.5 to 1.5%. The results from the experiments showed that the mechanical properties of soil were highly influenced by inclusion of plastic waste. The values of optimal moisture content (OMC) and maximum dry density (MDD) of soil were found to decrease from 11.11% to 8.37% and 1.95 to 1.93 g/cc, respectively. Moreover, the CBR of soil was found to increase from 3% to 18.3% when stabilized with plastic waste. The results of resilient modulus revealed that there is enhancement in the mechanical properties of soil. The resilient modulus of soil increased from 30 to 113 MPa when stabilized with plastic waste. This study highlights the twofold benefits of improving mechanical properties of soil as well as safe disposal of plastic waste in eco-friendly manner.

Keywords Soil subgrade · Plastic waste · Soil stabilization · LDPE · CBR

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