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Performance Evaluation of Environmentally Sustainable Waste Polythene Fiber Reinforced Bituminous Mix for Roads

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ABSTRACT

The design and characterization of asphalt mixtures for use as road paving material is the subject of the current study. Using cutting-edge laboratory test tools and technical literature from various information sources, a number of characteristics of asphalt mixtures were discussed. The locking point concept, the analytical aggregate gradation method, and basic mechanical parameters that characterize the behavior of asphalt mixtures based on sound engineering principles were suggested as part of a systematic, simplified design approach. For calculating the precise percentage of waste polythene, the Marshall method is used in these theses.

KEYWORDS: *design, characterization, asphalt, analytical, aggregate*

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INTRODUCTION

Excellent network of roads plays a vital role in linking different regions as also in integrating people of different places and cultures. Further it helps to uplift the standard of living, gives fillipto economy, industry, trade and tourism.

Vasudevan et al. (2006) were concluded that use of waste plastic for the construction of flexible pavements. The results of investigation showed that use of plastic waste in bituminous mix increases Marshall Stability value, less voids and less wetting property. The aggregates used in road construction have greater affinity for water due inherent wetting nature. When plastic is coated over aggregates, the coating reduces its affinity for water as a result of non-wetting nature of the plastic and this resists removal and therefore pot-hole formation is extremely a lot of reduced. They steered that 100% plastic waste by weight of bitumen will type a helpful bituminous combine for an honest versatile pavement of road. Praveen Kumar et al. (2008) studied the use of fly ash in bituminous mix. The results of the study showed optimized mixes with fly-ash content in excess of 5 percent shows a sharp reduction of stability values. The flow values of the mixes with fly ash are generally on higher side but within the limits. Flow values are in the range of 8-12 (0.25 mm). Roberts et al. (2000) gives a review of past present and futuretrends in asphaltic mixture design.

Road transport in Indian has been developing at a very fast rate in view of various advantages it enjoys. Motor vehicle population is currently witnessing a so appalling that serious economic losses like fuel wastages, delays, congestion, accidents and pollution hazards are posing daunting challenges. Therefore with the increased traffic planners got realize that there is a need to upgrade India's road system. The new road should be capable of handling the increase in the number of motor vehicles with comfort, speed, and safety. For this massive investments are required to achieve.

Bituminous binders are widely used by paving industry. A pavement has different layers. The main constituents of bituminous concrete (BC) are aggregate and bitumen.

LITERATURE SURVEY

Bhageerathy et al. (2014) investigated the employment of medicine Plastic Waste in hydrocarbon construction. They over that the Marshall stability worth of plastic changed combine was found to be fifty one p.c quite that for the conventional combine that indicates a rise in load carrying capability.

Behnood et al. (2015) was concluded that construction and maintenance of roads need an oversized volume of aggregates to be used in base, sub-base and surface layers. At an equivalent time, the growth of asphalt roadways ends up in the assembly of an oversized quantity of asphalt road waste, known as rescued asphalt pavement (RAP). This paper aims to research the feasibleness of the employment of copper dross and recycled concrete mixture (RCA) as substitutes for virgin aggregates in modifying the gradation of cold recycled mixes created with RAP material. Additionally, the consequences of 3 varieties of additives as well as cement, fly ash, and rice husk ash on the properties of recycled mixtures were investigated. Marshall, Indirect strength, resilient modulus, wetness condition, and dynamic creep tests were conducted to gauge the mechanical properties of the mixes. Toxicity characteristic activity procedure was wont to assess the environmental impacts of copper slag. the employment of copper dross had higher results than stone and RCA most likely thanks to higher interlocking and superior physical and mechanical properties. With relevance the consequences of additives, cement was found to be the foremost effective additive. The difference between ash and rice husk ash was found to be statistically insignificant.

Moghaddam et al. (2017) was concluded that stiffness of asphalt mixture may be a basic design parameter of flexible pavement. According to literature, stiffness value is extremely liable to environmental and loading conditions. During this paper, effects of applied stress and temperature on the stiffness modulus of unadapted and (PET) modified asphalt mixtures were evaluated using Response Surface Methodology (RSM). A quadratic model was with success fitted to the experimental knowledge. Supported the results achieved during this study, the temperature variation had the very best impact on the mixture's stiffness. Besides, PET content and quantity of stress showed to own almost the same result on the stiffness of mixtures. The optimum quantity of PET was found to be zero.41% by weight of mixture particles to achievethe very best stiffness price.

METHODOLOGY

MATERIAL & SPECIFICATIONS

Most of the road aggregates are prepared from natural rock. Gravel aggregates area unit tiny rounded stones of various sizes that area unit usually obtained per se from some stream beds. Sand is ok mixture from weathering of rock. The properties of the rock, from that the aggregates are shaped; depend upon the properties of constituent materials and therefore the nature of bond between them. Based on the origin, natural rocks are classified as igneous, sedimentary and metamorphic. Texture are the important factor, it is affecting the property of the rock and the fragments.

Figure 1 Polythene used

Figure 2 Shredded Polythene

Table 1 Marshall Mix Design Criteria for Bituminous concrete

Test Property	Specified Value
Marshall Stability, kg	340 (minimum)
Flow Value, 0.25 mm units	8 to 16
Air voids in total mix, Vv%	3 to 5
Voids filled with bitumen, VFB%	75 to 85

CONCLUSION

1. Maximum Marshall Stability value is 915 at 5% of polythene content and 5.5 % constantbitumen content.
2. It is watched that the Marshall Stability value is increased at the percentage of 5% and that decreased
3. Marshall Flow value increased with increasing the polythene content Marshall Stability=915 kg Bitumen content corresponding to maximum Stability = 5.5 %

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