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# Briefly Study of Waste Plastic in Flexible Pavement – An Approach to Sustainable Development

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**ABSTRACT:** The rapid rate of urbanization and development has led to increasing plastic waste generation. As plastic is non-biodegradable in nature, it remains in environment for several years and disposing plastic wastes at landfill are unsafe since toxic chemicals leach out into the soil, and under-ground water and pollute the water bodies. Due to littering habits, inadequate waste management system / infrastructure, plastic waste disposal continue to be a major problem for the civic authorities, especially in the urban areas.

**KEYWORDS:** Waste Plastic, Sustainable Development, Pavement, Bitumen, Aggregate, testing, optimization.

## I. INTRODUCTION

Polymer modified bitumen (PMB) is emerging as one of the important construction materials for flexible pavement choice of polymers varies from virgin polymer to waste polymer, from latex to waste rubber. Use of plastic waste in the construction of flexible pavement is gaining importance because of the following reasons. The polymer modified bitumen show better properties for road construction. Plastics waste otherwise considered to be a pollution menace can find its use in this process and this can help in solving the problem of pollution because most of plastics waste are polymers, namely polyethylene (PE), polypropylene (PP), polystyrene (PS), polypropylene (PP), polystyrene (PS), polyethylene terephthalate (PET) and polyvinyl chloride (PVC).

## II. LITERATURE REVIEW

**FransisHveem (1942)**, who was a project engineer of California Department of Highways, has developed the Hveemstabilometer in 1927. He did not have any previous experience on judging, the required mix from its colour, hence he decided to measure various mixture parameters to find the optimum quantity of bitumen [Vallerga and Lovering 1985]. He had used the surface area calculation concept, (which was already in use, at that time for the cement concrete mix design), to estimate the quantity of bitumen actually required.

**Roberts et al. (2002)** the technique, of using bitumen in pavements, was first used on rural roads in order to prevent rapid removal of the fine particles such as dust, from Water Bound Macadam, which was caused due to fast growth of automobiles. At initial stages, heavy oils were used as dust palliative. An eye estimation process which is called pat test was used to estimate the required quantities of the heavy oil, in the mix.

better binder compared to plain bitumen. Blend has increased Softening point and decreased Penetration value with a suitable ductility. When it used for road construction it can withstand higher temperature and load. The coating of plastics reduces the porosity, absorption of moisture and improves soundness. The polymer coated aggregate bitumen mix forms better material for flexible pavement construction as the mix shows higher Marshall Stability value and suitable Marshall Coefficient. Hence the use of waste plastics for flexible pavement is one of the best methods for easy disposal of waste plastics.

Today the availability of the waste plastics is enormous, as the plastic materials have become part and parcel of daily life. They either get mixed with Municipal Solid Waste and or thrown over land area. Their present disposal is either by land filling or by incineration. Both the processes are not Ecofriendly. Under this circumstance, an alternate



use for the waste plastics is also the need of the hour. Plastics are organic in nature and Bitumen is also a mixture of organic compounds. Hence the mixture of the two is possible.

### III. METHODOLOGY OF WORK

1. Data collection from literatures.
2. Preparation of Plastic bitumen film on the Aggregates.
3. Select proper Proportions for road application.
4. Casting of test samples and various tests on it.(Marshall Stability Test)
5. Comparison of the results and solution to the proper mix proportion to
6. achieve maximum strength with more amount of replacement of bitumen.

### IV. CONCLUSION

In this modification process plastics-waste is coated over aggregate. This increases the surface area of contact at the interface and ensures better bonding between aggregate and bitumen. The polymer coating also reduces the void spaces present in the mix. This prevents the moisture absorption and oxidation of bitumen by entrapped air. The road can withstand heavy traffic and show better service life. This study will have a positive impact on the environment as it will reduce the volume of plastic waste to be disposed off by incineration and land filling. It will not only add value to plastic waste but will develop a technology, which is eco-friendly

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