UTILIZATION OF WASTE MATERIAL IN FLEXIBLE ROAD PAVEMENT

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Abstract: This paper forms part of research to solve two main problems in country especially in Maharashtra. Firstly the management of municipal solid waste; Secondly formation of potholes in road due to excess traffic and axle weight.This happened due to grade of bitumen use for construction. This study examines the effect of blending waste thermoplastic polymers, Admixture (Zycosoil), Plastic waste, PVC pipe waste product, tyre rubberat various plastic compositions. The plastics were shredded and blended with the bitumen 'in-situ', with a shear mixer at a temperature range of 160^{O}C–170^{O}C. Improve strength of bitumen test results must be different form plain bitumen used for road construction. Basic Engineering parameters such as penetration, ring & ball softening point and viscosity tests were employed to determine the resulting changes from base bitumen. All admixture, Plastic Waste, PVC pipe waste and tyre rubber added in proportion of 1%, 3%, 5%, 7% and 9% weight of bitumen.

Keywords: Admixture, Waste plastic, PVC pipe waste

1. INTRODUCTION:

Most of the paved roads in our country have granular sub base and base; bituminous base and wearing courses. Plastic is a very versatile material. Due to the industrial revolution, and its large scale production plastic seemed to be a cheaper and effective raw material. Today, every vital sector of the economy starting from agriculture to packaging, automobile, electronics, electrical, building construction, communication sectors has been virtually revolutionized by the applications of plastics.

Plastic is a non-biodegradable material and researchers found that the material can remain on earth for 4500 years without degradation. Several studies have proven the health hazard caused by improper disposal of plastic waste. Plastics, a versatile material and a friend to common man become a problem to the environment after its use.

Disposal of a variety of plastic & rubber wastes in an eco-friendly way is the thrust area of today's research. Looking forward the scenario of present lifestyle a complete ban on the use of waste plastic cannot be put, although the waste plastic taking the face of a devil for the present and the future generation. But the use of waste plastics in road construction is gaining importance these days because plastic roads perform better than ordinary ones and the plastic waste considered to be a pollution menace, can find its use. The use of waste plastic for coating the aggregates of the bituminous mix found to improve its performance characteristics.

Recycled polyethene carry bags were shredded into small sizes and is coated on aggregates of the mix at a specified temperature. Bituminous mixes were prepared with 60/70 bitumen and plastic coated aggregates/ordinary aggregates with cement as a filler material.

The use of plastic waste help in substantially improving the abrasion and slip

resistance of flexible pavement and also allows to obtain values of splitting tensile strength satisfied the specified limits while plastic waste content is beyond 30% by weight of mix. If the consistent mixing time and mixing temperature are not provided for bitumen– modifier mix, modified bitumen cannot exhibit good performance in situ, thus premature failures will occur. Therefore, there are certain recommended mixing time, mixing temperature and modifier content for all the polymers with a trademark. This all should be taken in mind while mixing and lying of roads is to be done using plastic waste. The plastic road would be a boon for India. In hot and extremely humid climate durable and eco-friendly plastic roads are of greatest advantages. This will also help in relieving the earth from all type of plastic waste. Utilization of this plastic and after utilize it appeared to a waste and it is non-biodegradable material. Plastic can remain the length of numerous years on earth. Plastic waste is developing step by step and the issue is the thing that to do with Plastic waste. Thinks about states that the despicable transfer of plastic causes a few issues, for example, bosom disease, regenerative issues in people and creatures, genital anomalies and even a decrease in human sperm tally and quality. So if use this waste plastic in road construction is giving its importance. Here we should provide some major consideration regarding the quality aspects of role. Two main process, wet & dry process are adopted mainly for the construction of polymer roads.

2. OBJECTIVE:

1. To develop a bituminous pavements with the help of crumb rubber as a partial replacement of bitumen in different mix.

2. To enhances moisture and ruting resistance.

3. To study the ductility and penetration values for nominal and modified bitumen mix.

4. To know the stability and flow values for nominal and modified bitumen mix by conducting Marshall Stability test.

5. To reduce the disposal problem of plastics.

6. To study behavior of bitumen mix with added material and change in engineering properties of bitumen.

7. To conduct mix design as per IS: SP 23-1982.

8. To find out Optimum Plastic Content (OPC).

9. To analysis the properties of plain and plastic mixed bitumen.

3. METHODOLOGY:

Bituminous Mix Design
Test on Binder

1. Penetration test
2. Ductility test
3. Softening point test
4. Specific gravity test
5. Viscosity test
6. Flash and Fire point test
7. Float test

Test on Aggregates

1. Crushing test
2. Abrasion test
3. Impact test
4. Soundness test
5. Shape test
6. Specific gravity and water absorption test
7. Bitumen adhesion test

Collection of material:

This involves the collection waste plastic, tyre rubber from available sources like recycling plants, junk yards, etc..,

Fig. 1
Fig. 2

Collection of bitumen:

While in case of large scale purposes, the aggregates and bitumen are stored near some ready mix bituminous plant and then they can be mixed desired mix proportion at suitable temperatures

We went to a bitumen processing plant at Paldhi near Dharangaon for material collection for our study.

4. RESULTS:

Table.1: Tests results

Test	Result	Range
Ductility test	85	>75 cm
Penetration value	65	60-70 mm
Softening point	48°C	40°C - 60°C
Flash point test	180 °C	>175°C
Fire point test	240 °C	

5. CONCLUSION:

It is observed that from all the experiments performed we can conclude that the addition of plastic waste and other waste material enhances the various properties of an ordinary bituminous road. Due to use admixture (Zycosoil) bitumen stripping properties get reduces. Improvement in Flash and fire point of bitumen.Also provides us an improved pavement with better strength and longer life period.It will not only add value to plastic waste but will develop a technology, which is eco-friendly.

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