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WASTE TYRES USED IN ROAD

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ABSTRACT - The use of four wheeler, two wheeler vehicles etc. is increasing day by day. As a result amount of waste tyres also increasing. Waste tyres in India are categorized as solid or hazardous waste. It is estimated that about 60 percent of waste tyres are disposed via unknown routes in the urban as well as rural areas. This leads to various environmental problems which include air pollution associated with open burning of tyres (particulates, odor, visual impacts, and other harmful contaminants such as polycyclic aromatic hydrocarbon, dioxin, furans and oxides of nitrogen) and aesthetic pollution. The waste tyres can be used as well sized aggregate in the various bituminous mixes if it is cut in the form of aggregate and can be called as rubber aggregate. This not only minimizes the pollution occurred due to waste tyres but also minimizes the use of conventional aggregate which is available in exhaustible quantity.

KEYWORDS- WASTE TYRES, STONE AGGREGATE, BITUMEN.

INTRODUCTION

These materials pose environmental pollution in the nearby locality because many of them are non-biodegradable. Traditionally soil, stone aggregate, sand, bitumen, cement etc. are used for road construction. Natural material being exhaustible in nature, its quantity is declining gradually. Also, cost of extracting good quality of natural material is increasing. Concerned about this, the scientists are looking for alternative materials for highway construction, by which the pollution and disposal problems may be partly reduced. Keeping in mind the need for bulk use of these solid wastes in India, it was thought expedient to test these materials and to develop specifications to enhance the use of waste tyres in road making in which higher economic returns may be possible. The possible use of these materials should be developed for construction of low volume roads in different parts of our country. Centre for Transportation Engineering of Bangalore University compare the properties of the modified bitumen with ordinary bitumen. It was observed that the penetration and ductility values of the modified bitumen decreased with the increase in proportion of the plastic additive, up to 12 percent by weight. There-fore the life of the pavement surfacing using the modified bitumen is also expected to increase substantially in comparison to the use of ordinary bitumen.

LITERATURE REVIEW

Prof. Justo et al (2002), at the Centre for Transportation Engineering of Bangalore University compare the properties of the modified bitumen with ordinary bitumen. It was observed that the penetration and ductility values of the modified bitumen decreased with the increase in proportion of the plastic additive, up to 12 percent by weight. There-fore the life of the pavement surfacing using the modified bitumen is also expected to increase substantially in comparison to the use of ordinary bitumen. Shankar et al (2009), crumb rubber modified bitumen (CRMB 55) was blended at specified temperatures. Marshall's mix design was carried out by changing the modified bitumen content at constant optimum rubber content and subsequent tests have been performed to determine the different mix design characteristics and for conventional bitumen (60/70) also. This has resulted in much improved characteristics when compared with straight run bitumen and that too at reduced optimum modified binder content (5.67 %).

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METHODOLOGY

The use of waste tyres in construction of roads brings out a better performance. There is better binding of bitumen with waste tyres. The frequency of voids is also reduced due to increased bonding and area of contact between polyners and bitumen.

Property Of Stone Aggregate And Waste Rubber Tyre

- Rubber, in addition to being flexible, is highly durable, even more so after a tire goes through the vulcanization process.
- The particles contain an excess of moisture on the surface and will contribute moisture to mix.
- Aggregates need to be chemically stable so that they will neither react chemically with cement nor be affected chemically by outside influences.

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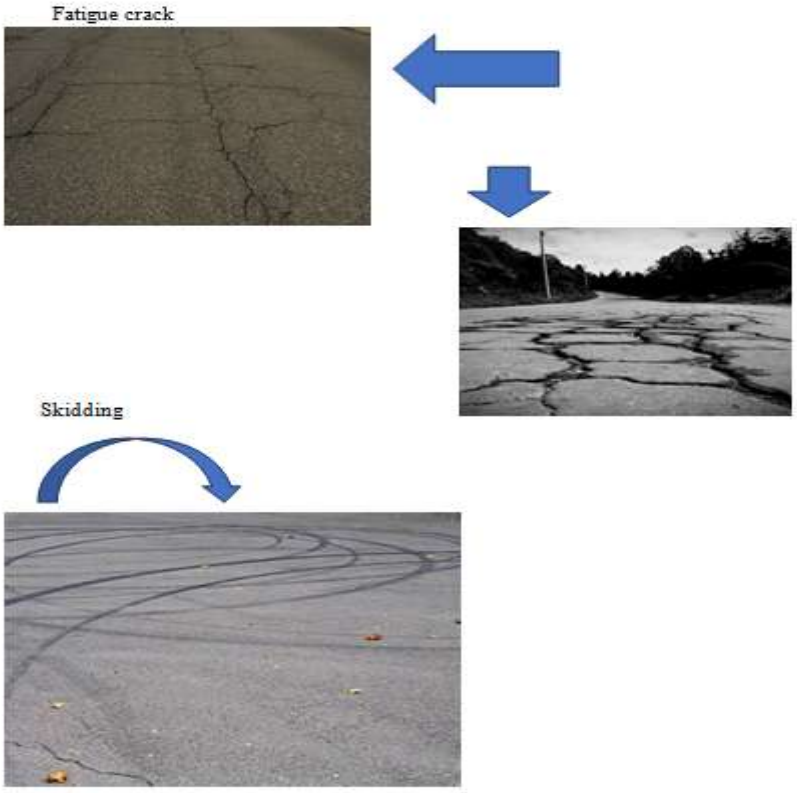
Problem On Normal Pavement



Fatigue Crack

Fatigue generally is the primary reason for formation of cracks as well as initiating cracks on the surface of a material. Fatigue leads to progressive and localized structural damage when any material experiences cyclic loading. Because of cycle landing the material cracks an ultimately forms fractures.

Estimating & Costing of surface dressing in 1Km double lane road (14% cost reduce)

Material	Volume in m^3	Quantity in Kg	Amount in Rupee
Aggregate	159	238500	143100
Bitumen	11.13	11130	2900000
Waste plastic and tyre	1.55	1503.5	428034
Total amount without PlastRubb	170	249630	3043100
Total amount after using PlastRubb	170	239056.5	2617066

Impact Test

- Impact value of given aggregate=8.15%.
- If it is less than 10% then it is strong.
- It should not be greater than 10%. (IS 2386 PART 4)
- It is perform by 'Impact Testing Machine'.

Crushing value test

- The crushing value of given aggregate=21.08%.
- If it is less than 45 then it is correct. (IS 2386 PART 4)
- It is perform by 'Compressive Testing Machine'.

Abrasion Test

- The abrasion test of given aggregate =14.17%.
- If it is less than 30% then it is correct. (IS 2386 PART 4)
- It is perform by 'Los Angeles Machine'.

Ductility Test

- The ductility value of given bitumen =79 cm.
- It should be minimum 25 cm. (IS 2386 PART 4)
- For good condition it should be greater than 65 cm.
- It is perform with the help of 'Briquette Mould Apparatus'.

Penetration Test

- The Penetration value of given the ability to flow.
- Penetration value is 69.67mm and grade is 255.
- It is perform to find out the grade of bitumen.

Softening point

- Softening point value is 55.25°C after adding waste plastic and rubber tyre.
- Softening point show the bearing of temperature effect.

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Market value

Stone aggregate Rs. 68/cubic feet

Waste tyres Rs. 20/tyres

Bitumen Rs. 26/kg

Advantage

- 14% low cost in comparison to normal bitumen.
- Good compressive strength.
- Leakage proof surface.
- Eco-Friendly.
- Re use of waste material.
- It reduced temperature effect in summer and winter on pavement.

Disadvantage

- It is not suitable for small project.

Conclusion

- After utilize the waste plastic and waste rubber tyre we reduce the cost of construction up to 4.28 lacs rupees in 1 Km.
- Its good compressive strength.
- Easily to make a road by waste things.

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