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RUBBER COTING IN ROAD SURFACE LAYER

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Abstract

Road surface in layer of rubber coating. In rubber coating is a road layer for friction speed it also break system. In accident time safe for in rubber coating road surface. Because rubber is elastic material & spongy material there for injure in very really. There for Indian road use for bitumen concert uses for road surface there road is very strong than a car speed increase on road surface very large taken time and road surface in rainy season in car very slip. In Indian road surface in stopping distance is very large because road very tough rubber coating in roads surface not uses. In U.S. compulsory in road Construction time rubber coating in about 4to5 inch apply on road surface coating therefore stopping distance very small. In that road speed is few second in car very small taken time. In rubber coating surface layer injure in very rear but India road is very stiffness and driver is not use helmet because is fashion than is accident in 48% Indian accident for 1year and rubber coating not use Indian because India is save money road construction time there for rubber coating is not use. There for India road is very strong stiffness than accident time injure is high but future Development is high and compulsory apply rubber coating in very important on road surface.

Index Terms:*chunk rubber, cold mix, low-volume roads, mix design, scrap tires, Rubber Modified Bitumen*

1. INTRODUCTION

Each year has approximately 288 million Tires Are added to stockpiles, landfills or illegal Dumps across the U.S.. The EPA estimates that the present size of the Scrap tire problem is two to three billion Tires. If the national rate of the tire generation is Used and It is estimated that on the average. One scrap tire per person per year is generated at Kansas. This translates to approximately 2.4 million Tires per year in Kansas. The current estimate of the number of accumulated scrap tires in the state is between 4.2 and 5.6 million. Cloud, Coffey, Leavenworth and Sedgwick Counties has the most scrap tires, total over 3.3 million. The case of Cloud County, a rural county with approximately 17,000 people, is particularly interesting. The estimated no. of accumulated tires is slightly over half a million. The large no. of tires accumulated over the year and currently being generated creates a disposal problem in the rural areas of Kansas. Introduction of scrap tire rubber into asphalt concrete pavement has the potential to solve this waste problem. It has been estimated that if 10% of all asphalt pavement laid each year in the United States contained 3% rubber, all the scrap tires produced for that year in India would be consumed. The potential benefits of A cost-effective product has kept interest in asphalt-rubber high throughout the world. The use of scrap tire rubber as an additive for asphalt concrete has been developing for 25 years. Recently, however, it has attracted attention all over the United States because of the enactment of the 1991 Intermodal Surface Transportation Efficiency Act (ISTEA) which mandates the use of crumb tire in hot mixes for asphalt Concrete pavements.

2. Best practices in construction

For optimum performance applyl types for chip seals in the warmest, driest weather possible, It optimum performance.

* mbient air temperature at the time of application should be a minimum of 51°F (11°C) when using emulsions, and 70°F (21°C) when using asphalt cements, with a maximum of 110°F (43°C) (chapter seven).

*When using emulsions, the temperature of the surface should be a minimum of 70°F (21°C) and no more than 140°F (54°C) (chapter seven).

*Complete patches at least 6 months before and crack seals at least 3 months before the application of chip seals (chapter seven).

*Variable nozzles permit to the application of a reduced rate of binder in the wheel paths and help combat flooding in the wheel paths, a defect that makes chip seals prone to bleeding. The Australian used of prespraying is another method for adjust the transverse surface texture of a pavement surface before applying a chip seal.

*A drag broom fitted on those rollers doing the starting roller pass corrects minor aggregate spread deficiencies such as corrugation, uneven spread,and missed areas (chapter seven).

*The aggregate as possible to emulsified and heat asphalt binder.

*The Montanasweeping test curtails the bias to spread excess aggregate created to a unit-price contract (chapter seven).

*Have the most experienced inspector initial drive par shot and paint binder rate adjustments on the pavement to facilitate field rate adjustments.

*In areas where extensive stopped and turn movement takes place, the application of a less amount of excess aggregate may decrese scuffing and rolling. The use of a rain seal may be a viable engineering solution for determining the precise amount of aggregate for these problematic areas.

*Furnish and enforce rolling guidelines for roller coverage, rolling patterns, and minimum rolling time to achieve full lane coverage and a similar number of passes for all areas of the lane.

*The need number of rollers is a function of desired distributor production and required rolling time for each shot width on the project.

*Have rolling follow as nearly as practical behind the chip spreader.

*Maintain traffic control for as long as possible to give the fresh seal the maximum amount of curing time.

3. Rubber Construction Of Roads

Proper blending of bitumen with NR in a constant proportion confers good elastic property to the blend. Incorporation of 2-4.4 per cent NR into bitumen thus improves the properties of the later substantially and rubber bitumen is found to be an excellent binder for rubbled and sandsoil. The rubberised bitumen formed minimum permanent deformation due to the large load on the road. This bitumen is unaffected by changes in atmospheric temperature and improve skid resistance due to increased aggregate retention and elimination of bleeding. Rubber increase the resistance to flow of bitumen at hot temperature and increases the resistance to normal fracture at less temperature. The properties will increase the service life of rubber roads in many cases to more than 100% when compared to that of bituminous roads. Thus, rubber of roads will combine economic with safety.

The advantages of the use of rubber-modified bitumen in road construction may as below.

- Increases in useful service life
- Improved resistance to folds at low temperature
- Better resistance to fatting up or bleeding of bitumen under hot condition
- Increases skid resistance
- Increase in fuel economy
- Better grip and cornering in rainy season
- Low repairs and maintenance cost (about 32% savings)

4. Technique of rubber construction

Basic rubber bitumen comprises of a bituminous compound into which rubber in a suitable form and property is incorporated using an a different technique. Rubbering bitumen is then used in paving using conventional road building techniques. Following the incorporation and constant distribution of rubber, bitumen undergoes curve changes in its properties depending to a high extent on the type and grade of rubber used, ratio of bitumen to rubber and the techniques of incorporation of rubber into bitumen.

It has been clearly established that for high effectiveness, the rubber must dissolve in the bitumen. When properly in rubber increases the viscosity, strength and heat resistance of the system. Though different polymers and rubbers have been tried for modification of bitumen for road works, very good results are reported in the case of NR modified bitumen. Different forms of NR like preserved field latex, prevulcanised latex, sheet rubber, powdered rubber and ground-vulcanised rubber were used for rubber and of these the best performance was seen with NR latex.

5. **Process Development for Natural**Rubber Modified Bitumen (NRMB)

The initial method for the createing of Natural Rubber Modified Bitumen (NRMB) was mostly in situ mixing of natural rubber latex with bitumen. For that the bitumen was heated to about 130°C and small amounts (2%) of kerosene was added as viscosity modifier. To the boiling bitumen, natural rubber latex as specially preserved field latex (about 2% by weight of bitumen) was added, stirred well and kept for about 2.5 hours for homogenisation. Constantly blended NRMB thus obtained was used for the rubber of roads.

Certain experiment difficulties were observed at time mixing of latex with bitumen on the spot. It was very may be time consuming and sometimes the mixing was not constant due to lack of experience of the workership. Because of the variations in properties of the rubber bitumen were also noticed. So, to that avoid these difficulties of mixing NR latex with bitumen at the site and for the effective quality control of the rubber bitumen, the Rubber Board in collaboration with M/s Kochi Refineries Limited developed a post-mix of

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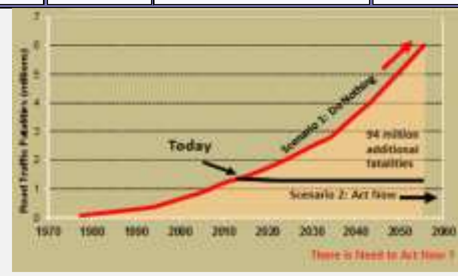
rubber with bitumen. This can be directly or sometimes used for road surfacing as in the conventional high way.

Details of Rubberised Roads Using Natural Rubber Modified Bitumen

Sr. No.	YEAR	Length of Road (KM)	Name of the Road	Implementing Agency
1	1974	1.0	Trivandrum-Kottayam Main-Central Road	The rubberisation was carried out by an agency consisting of Rubber Board, Kerala PWD, and Kerala Highway Research Institute.
2	1994	12.0	Mookenpetty Thulapally Road Enroute to Sabarimala	The project was implemented under Peoples Participatory Project by Malanadu Development Society, Kanjirapally, Kottayam.
3	1996	1.0	Madhavanpady-Rubber Board Road	A joint project of Rubber Board and Vijayapuram Panchayath
4	1997	2.0	Peruvanthanam-Kumily Road	The project was a collective effort of Rubber Board, State PWD, and Malanadu Development Society.
5	1997	2.0	Vandiperiyar-Kumily Road	This was done as a joint effort of Rubber Board, Kerala PWD and Malanadu Development Society.
6	1998	5.0	SIDCO Estate Roads	The project was conceived by SIDCO Madras as a pioneerr approach for the rubberisation of roads in the state/SIDCO Estates
7	1998	1.4	Ravipuram-Valamjambalam Road, Cochin	The work was a part of development schemes of rubberisation and jointly carried out by Rubber Board and Cochin Corporation
8	1999	2.0	KK Road in Kasaragod Municipality	Joint project of Kasaragod Municipality and Rubber Board



6. What is Rubber Bitumen?

Rubber bitumen is a combination of hot bitumen and crumb rubber derived from pre consumer waste and scrap tires. It is used largely in the highway paving industry in the USA, particularly an sometime in the states of Arizona, California and Texas. It is a component that can be used to close cracks and joints, be applied as a local seal coat and added to hot mineral aggregate to make a correct asphalt paving material. The American Society of Testing and Materials (ASTM D8) rubber bitumen as "a blend of asphalt cement concrete [bitumen], reclaimed tires rubber and certain additives, in which the rubber component is at minimum 15% by weight of the total blend and has reaction in the hot asphalt cement [bitumen] normally to cause swelling of the rubber material," This definition was developed in the late 1990's.

However the story of how rubber bitumen was original invented, patented, how it has been and how it is presently used in the world, how it is made, and its benefits and advantages that have increased with time, that story begins in the 1960's. The initial development of rubber bitumen started in the middle of 1960's when Charles McDonald, then City of Phoenix Materials Engineering, began finding for a method of maintaining pavements that were in a less ability pavement condition as a result of primarily cracking . McDonald's early efforts resulted in the development of small, prefabricated rubber bitumen patches that he called

"Band-Aids", These patches were generally 24" x 24" (0.61m x 0.61m) and consisted of rubber bitumen placed on paraffin coated paper with 3/8" (9.5mm) chips embed and some more dimension.

7. Recycled Rubber In Cold Mix

The MSO Construction and the T.J. Pounder, Ltd., in Ontario, Canada, are believed to be the first agencies to have studied of recycling of shredded tires in the Cold In-Place Recycling (CIR) process of deteriorated pavements. The method of creation used in the compendium of outhouse knowledge of material behavior and conclusion from engineering achievement and experimentation. From the conclusion of laboratory testing and based on the experiences of MSO and Pounder in the CIR process, it Proceedings of the 14th Annual Conference on Hazardous Waste Research in 1981 was determined that a feasible, stable, capable and durable binder course asphalt combination can be produced from cold mixes with crumb rubber in it. The rigid of this initial examination was to find a maximum significant amount of recycled rubber tires crumbs that could be mixed with Recycled Asphalt Pavement (RAP) as an aggregate and used in the CIR process. An emulsified asphalt was used as a recycling product in the combination along with ambient ground recycled tire crumb produced by the cry organic process. The together of rubber in RAP minimize the compressive strength by about 25%. However, it contributed to the flexibility. This lent itself to the atmospheric conditions in Ontario. The solution was to find an acceptable compromise point between the two characteristics strength and flexibility. The best results were found in a mix containing 7100 tires/km Rubber coating inroad surface that safe for time rainy season

RESULT:

The probably use of rubber material from scrap tires into concrete mix have already give best result in sub base course for highway pavements, highway aligment, sound barriers and other transportation design structures. The combination of rubber aggregate in bituminous mix reduce the quantity of stone aggregate by volume and area increases the flexibility and flexural strength of the carpet layer of the highways. Aggregate is the strong and tough material used in bitumen concrete mixtures, which makes up 90% to 95% of mixture weight and provide most of the load bearing characteristics of the mix. Due to which the quantity of aggregate is normally decreasing which will need the alternative material aggregate for the highway construction design. Based on the results of this study, the following conclusions can be drawn:

• The use of rubber chunks (up to a maximum size of 12.5 mm) in CRAC as a converted for traditional large aggregates results in a mix than without rubber. Since rubber is negligible as hard and tough as the crushed stone aggregates, it follows that the Marshall stability of an asphalt-aggregate-chunk rubber mix would be lower than a mix without chunk rubber. However, it was also Chunk Rubber Asphalt Concrete (CRAC) test results at 10% fly ash. Proceedings of the 14th Annual Conference on Hazardous Waste Research 1981 surmised that the larger rubber chunks tend to absorb some of the energy imparted to compact a CRAC sample, conclusion in a less strong aggregate structure than a mix without any chunk rubber.

• The combination of type fly ash results in higher Marshall stability of a chunk rubber asphalt concrete. A gap-graded CRAC cold-mix with 2% chunk rubber and 10% fly ash with an optimum expression content of 7% showed the highest average Marshall stability of 1800 N. However, this value is much lower than the KDOT accepted 2825 N Marshall stability for a suitable cold mix.

• If 11 kg of chunk rubber equivalent is produced per tire, then a 1 km long and 7.3 m wide low-volume road with a 150 mm thick base built with this mix can incorporate approximately 3350 tires.

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