COMPARISON THE PERFORMANCE OF MODIFIED BITUMEN AND MODIFIED BITUMEN WITH VARYING PERCENTAGE OF RAIN TREE NUTS & SEEDS

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ABSTRACT:-The surface layer is made of hot-mix asphalt (HMA) (also called bituminous concrete). The material for the base course is typically unsterilized aggregates. The aggregate base could also be stabilized with Bitumen, Portland cement, or another stabilizing agent. The sub-base is mostly a local aggregate material. Also, the top of the subgrade is sometimes stabilized with either cement or lime. Unlike rigid pavement, when the traffic load is applied on top of the surface layer a localized deformation occurs under the load, while the load is distributed. It can be seen that the load is distributed on a small area at the surface. As the depth increases, the same load is distributed over a larger area. Therefore, the highest stress occurs at the surface and the stress decreases as the depth increases.

I. INTRODUCTION

The surface layer of pavement is made of bituminous combination with aggregate and filler material. The material forthe base course is typically base course of water bound macadam, wet mix macadam, or crusher run macadam aggregates or unbound granular layers. The aggregate base could also be bound layer mixed with Bitumen, Portland cement, or another binding material. The sub-base is mostly a local aggregate material. Also, the top of the sub grade is sometimes stabilized with either cement or lime.

The highest quality material needs to be at the surface and as the depth increases lower quality materials can be used. When the load is removed the pavement layers rebound. A very small amount of deformation, however, could stay permanently which could accumulate over many load repetitions causing rutting in the wheel path. The name, flexible pavement, is used because of the localized deformation and the rebounce that happens every time the traffic load is applied and removed. The required thickness of each layer of the flexible pavement varies widely depending on the materials used, magnitude and number of repetitions traffic load, environmental conditions, and the desired service life of the pavement

II. OBJECTIVE

- To assess the physical properties of aggregate as per MoRT&H requirements.
- To determine the load at which the prepared specimen fails which is designated as stability.
- To determine the optimum bitumen content for CRMB 55 bituminous concrete mix by Marshall Method of mix design as per IRC SP: 53-2002 specifications.
- To determine Marshall Properties of CRMB 55 bituminous concrete mix by compaction of 75 blows.
- To prepare standard specimen of bituminous concrete mix for the measurement of stability and flow in Marshall Apparatus and to determine the density, percentage air voids and percentage of aggregates voids filled with binder.
- To compare the performance of binder type with varying percentage of bitumen content (CRMB55) with skin of rain tree and rain tree seeds.

III. LITRATURE REVIEW

Basically, highway pavements can be categorized into two groups, flexible and rigid. Flexible pavements are those which are surfaced with bituminous (or asphalt) materials.

- These types of pavements are called "flexible" since the total pavement structure "bends" or "deflects" due to traffic loads. A flexible pavement structure is generally composed of several layers of materials which can accommodate this "flexing". On the other hand, rigid pavements are composed of a PCC surface course. Such pavements are substantially "stiffer" than flexible pavements due to the high modulus of elasticity of the PCC material. Flexible pavements being economical are extensively used as far as possible. A precise engineering design of a flexible pavement may save considerable investment; as well as reliable

performance of the in-service highway pavement can be achieved.

- In recent years, many countries have experienced an increase in truck tire pressures, axle loads, and traffic volumes. Tire pressure and axle load increases mean that the bituminous layer near the pavement surface is exposed to higher stresses. High density of traffic in terms of commercial vehicles, overloading of trucks and significant variations in daily and seasonal temperature of pavements have been responsible for development of distress symptoms like ravelling, undulations, rutting, cracking, bleeding, shoving and potholing of bituminous surfaces. Suitable material combinations and modified bituminous binders have been found to result longer life for wearing courses depending upon the percentage of filler and type of fillers used.

IV. METHODOLOGY

Considering all mentioned points like, high density of traffic in terms of commercial vehicles, overloading of trucks and significant variations in daily and seasonal temperature of pavements have been responsible for development of distress symptoms like raveling, undulations, rutting, cracking, bleeding, shoving and potholing of bituminous surfaces. Suitable material combinations and modified bituminous binders have been found to result longer life for wearing courses depending upon the percentage of filler and type of fillers used.

V. MATERIAL USED

A. COARSE AGGREGATE

Locally available crushed stones conforming to graded aggregate of size 0.075 mm to 20mm as per MoRT&H requirements. Crushed aggregate with specific gravity of 2.56.Several investigations concluded that maximum size of coarse aggregate should be restricted in strength of the composite.

B. MODIFIED BITUMEN CRMB-55

Crumb Rubber Modified Bitumen (CRMB) is hydrocarbon binder obtained through physical and chemical interaction of crumb rubber (produced by recycling of used tiers) with bitumen and some specific additives. CRMB is suitable for pavements submitted to all sorts of weather conditions, highways, traffic denser roads, junctions, heavy duty and high traffic sea ports roads etc. It is durable and economical solution for new construction and maintenance of wearing coarse.

C. RAIN TREE NUTS & SEEDS

Locally available rain tree seeds used as filler material of size 0.075 mm and its specific gravity of 1.75.Rain tree nuts are good binding material. Several investigations concluded that eco-friendly material and it resist the penetration of water inside the pavement.

VI. APPLICATION

- Preparation of roads for less failure due to rain water drops from trees beside roads.
- To avoid pothole, cracks and rutting formation in pavement, preventing water penetration and promoting water migration away from the road way.
- To provide safe roadway surface and to maintain a riding quality satisfactory to travelling public.
- Overall improved performance in extreme climatic conditions and under heavy traffic conditions.
- Minimize the damage of pavement due to increase in service traffic density, axle loading.

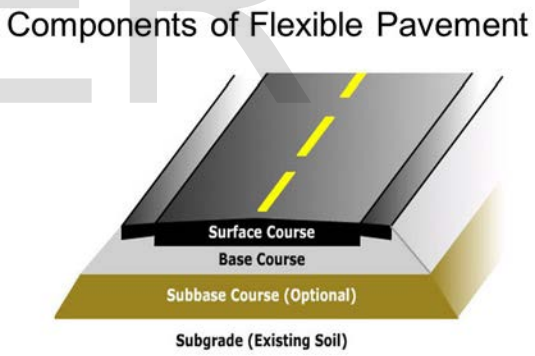

Fig 1: Modeling of Flexible pavement.

Fig 2: Rain Tree Seeds

Fig 3: Rain Tree Nuts

VII. CONCLUSION

To provide durable and economical solution for new construction and maintenance of wearing courses and less failure due pothole, cracks and rutting formation in pavement due to rain water and minimize the damage of pavement.

VIII. REFERENCE

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