

Mix Design of Bituminous Concrete using Waste Polythene

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Abstract— Now a day, the steady increment in high traffic intensity in terms of commercial vehicles, and the significant variation in daily and seasonal temperature put us in a demanding situation to think of some alternatives for the improvisation of the pavement characteristics and quality by applying some necessary modifications which shall satisfy both the strength as well as economical aspects. Also considering the environmental approach, due to excessive use of polythene in day to day business, the pollution to the environment is enormous. Since the polythene is not biodegradable, the need of the current hour is to use the waste polythene in some beneficial purposes. This paper presents a research conducted to study the behavior of BC mix modified with waste polythene. And we use the grade of bitumen is 80/100.

Key words: Bituminous Concrete, Waste Polythene

I. PAVEMENT

Excellent network of roads plays a vital role in linking different regions as also in integrating people of different places and cultures. Further it helps to uplift the standard of living, gives fillip to economy, industry, trade and tourism. Vasudevan et. al. suggested use of waste plastic for the construction of flexible pavements. The results of investigation showed that use of plastic waste in bituminous mix increases Marshall Stability value, less voids and less wetting property. The aggregates used in road construction have greater affinity for water due inherent wetting nature. When plastic is coated over aggregates, the coating reduces its affinity for water as a result of non-wetting nature of the plastic and this resists removal and therefore pot-hole formation is extremely a lot of reduced. Motor vehicle population is currently witnessing a so appalling that serious economic losses like fuel wastages, delays, congestion, accidents and pollution hazards are posing daunting challenges. Therefore with the increased traffic planners got realize that there is a need to upgrade India's road system. The new road should be capable of handling the increase in the number of motor vehicles with comfort, speed, and safety. For this massive investments are required to achieve. Bituminous binders are widely used by paving industry. A pavement has different layers.

II. LITERATURE REVIEW

Gawande, A et. al. (2012) were over that This review supposed to search out the effective ways in which to reutilize the arduous plastic waste particles as hydrocarbon modifier for versatile pavements. the employment of recycled waste plastic in pavement asphalt represents a valuable outlet for such materials. the employment of changed hydrocarbon with the addition of processed waste plastic of concerning 5-10% by weight of hydrocarbon helps in considerably up the Marshall stability, strength, fatigue

life and different fascinating properties of hydrocarbon concrete combine, ensuing that improves the longevity and pavement performance with marginal saving in hydrocarbon usage. the method is setting friendly. The employment of waste plastics within the manufacture of roads and laminated roofing additionally facilitate to consume great quantity of waste plastics. Thus, these processes are socially extremely relevant, giving higher infrastructure.

Naskar, et. Al. (2012) were over that totally different changed hydrocarbon binders ar employed in pavement construction for improved sturdiness and for increased performance in resisting cracking and permanent deformation of hydrocarbon layers. Waste plastics, whose disposal could be a matter of concern; are used with success for modifying hydrocarbon. Changed hydrocarbon binders ready victimization totally different plastic contents (0–7 skyscraper by weight of bitumen) were investigated.

Swami et al. (2012) investigated the employment of waste plastic within the construction of hydrocarbon Road. They over that plastic waste consisting of carry luggage, cups and different utilised plastic may well be used as a coating over aggregates and this coated stone may well be used for construction.

Sultana S. K. and Prasad K. S. B., (2012) investigated the employment of waste plastic as a strength modifier in surface course of versatile and rigid pavements. They over that the potential use of waste plastic as a modifier for asphalt concrete and cement concrete pavement.

Swami Vidula, and Karan P.,(2012) investigated the “An summary on waste plastic utilization in asphaltting of roads”. They reviewed techniques to use plastic waste for construction purpose of roads and versatile pavements.

Chavan, A.J., 2013 was over that Plastic coating on aggregates is employed for the higher performance of roads. This helps to own an improved binding of hydrocarbon with plastic wasted coated mixture attributable to inflated bonding and inflated space of contact between polymers and hydrocarbon. The chemical compound coating additionally reduces the voids. This prevents the wet absorption and oxidization of hydrocarbon by entrapped air. This has resulted in reducing rutting, raveling and there's no hollow formation. The roads will face up to significant traffic and show higher sturdiness. Aggregate Impact worth of management specimen was five.43%. It reduced to four.91% for PP8 and four.26% for PP10. Reduction in worth was 100% for PP8 and twenty second for PP10. This shows that the toughness of the combination was inflated to face the impacts. Crushing worth was reduced from nineteen.2% to 13.33% and 9.82% for PP8 and PP10 severally. Worth reduced by half-hour for PP8 and forty eighth for PP10. Low mixture crushing worth indicates robust aggregates, because the crushed fraction is low. relative density of the combination will increase from a pair

of.45 for management specimen to a pair of.7 for PP8 and a couple of.85 for PP10 attributable to plastic coating.

Rohilla, V. and Malik, P.,2013 were terminated that the findings of the current work, the subsequent conclusions area unit drawn. It's terminated that the specimens ready with the 165 °C commixture temperature and 30°C commixture time for 4 wheel drive HDPE have the best stability and therefore the smallest flow, then the best Marshall Quotient. A stability increase indicates that the HDPE-modified combines area unit a lot of stronger than the management mix. This combine is extremely proof against permanent deformation (rutting) in asphalt concrete. though the flow price of HDPE-modified asphalt concrete is that the same because the management combine, higher values of MQ area unit obtained because of higher stability values. MQ hyperbolic five hundredth compared to manage combines. Thus, the pavements being additional proof against permanent deformation area unit obtained and a solid waste disposal downside is comparatively resolved.

Shu, X. and Huang, B., 2014 were terminated that Waste tires because important health and environmental considerations if not recycled and/or discarded properly. Over the years, usage waste tires into applied science applications, particularly into asphalt paving mixtures and cement concrete, has been gaining additional and additional interests. The rubberized asphalt mixtures even have shown smart compatibility with 2 wide used property technologies in asphalt paving business – saved asphalt pavement (RAP) and warm-mix asphalt (WMA).

III. RESULT

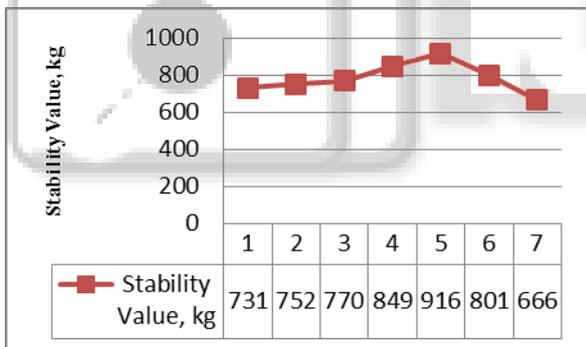


Fig. 1: Plotting Curves Marshall Stability Value Vs. Bitumen + Polythene Content

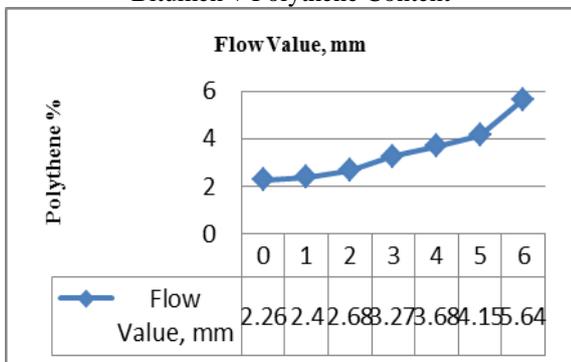


Fig. 2: Plotting Curves Marshall Flow Value Vs. Bitumen + Polythene Content

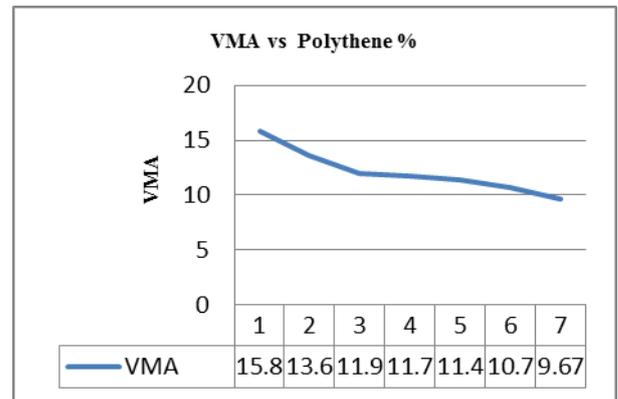


Fig. 3: plotting curves Average value VMA

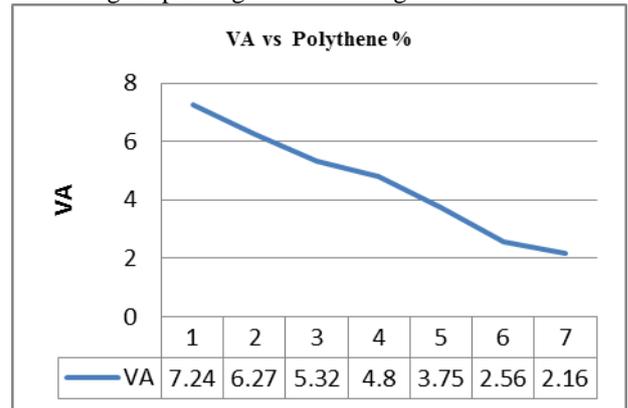


Fig. 4: plotting curves Average value VA

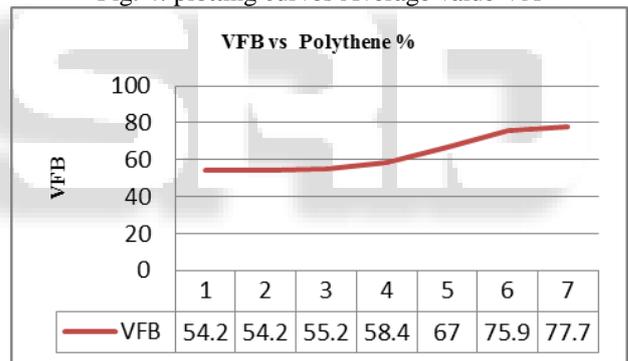


Fig. 5: plotting curves Average value VFB

IV. CONCLUSION

From this paper conclude below point:-

- 1) Maximum Marshall Stability value is 915 at 5% of polythene content and 5.5 % constant bitumen content.
- 2) It is watched that the Marshall Stability value is increased at the percentage of 5% and that decreased
- 3) Marshall Flow value increased with increasing the polythene content

Marshall Stability= 915 kg

Bitumen content corresponding to maximum Stability = 5.5 %

Bitumen content (5.5%) and polythene content (5%) corresponding to

- 1) Air voids = 3.75%
- 2) VFB at 5.1 % = 66.95%

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