Published by :
http://www.ijert.org

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 8 Issue 06, June-2019

Pothole Reclamation using Different Pavement Mixes

Amina N S, Ansar A, Ashna I, Thasni Thaha
UG Scholars: Dept. of Civil Engineering
MES Institute of Technology and Management
Chathannoor, Kollam, Kerala, India

Neetta S Kumar
Assistant Professsor: Dep. of Civil Engineering
MES Institute of Technology and Management
Chathannoor, Kollam, Kerala, India

***Abstract*— Potholes are the most common form of defects seen in asphalt pavements all over the world. They might arise due to a number of factors – seepage of water, poor mixes, heavy traffic, freezing and thawing which occurs due to climatic variations, inadequate pavement thickness etc. If not taken proper care of, these might lead to discomfort in travel and can even cause severe accidents. This project investigates the suitability of three pavement mixes. Namely, Hincol Road bond ready-mix, A cutback based cold mix with chemical additive (Pavebond) and Plastic with bitumen are to be used for pothole reclamation in Pathanapuram–Mancode road . For this, three potholes were identified along the road, which are heavily trafficked and prone to increase in severity. An experimental investigation and a field study is carried out to evaluate the overall effectiveness of these mixes. Strength and durability of the mixes were tested in the laboratory. Field study is carried out by reclaiming the identified potholes and visually observing the same for a period of time. A comparative study of the three mixes is made considering their appearance, settling, raveling and stripping resistance.**

Keywords- Pavement Mixes;Hincol; Cold mix with Pavebond; Plastic with Bitumen; Wet Coating; Static Immersion; Water Resistance

1. INTRODUCTION

Potholes are bowl shaped cavities normally formed on the pavement surface but at times extends upto the base course, and is formed as a result of localized disintegration of pavement materials. It is one of the most common form of defect seen in flexible pavements all over the world. Potholes often appear after rain or during thaw periods when the pavements are weaker. Potholes may be accompanied by severe cracking and deformation or distortion of the surfacing around the pothole, indicating a deeper seated cause for pothole formation. Where little deformation is observed in the vicinity of the pothole, the cause is more likely to be the entry of water through surface cracks in the road pavement and deterioration of only the surfacing and upper structural layers of the pavement.

2. METHODOLOGY FOR EXPERIMENTATION

A. Materials and its testing

The various materials used are Hincol Roadbond Mix (readymade), Plastic with bitumen (plastic, bitumen, coarse aggregate), Cold mix with pavebond (Coarse Aggregate, Pavebond Additive, Bitumen, Kerosene). The various experimental results are shown below:

Table 1 Aggregate test

Sl.no	Test	Result
1	Impact Test	36% (121g)
2	Sieve Analysis	6.3mm size
3	Los-Angeles Abrasion	50.4%
4	Water Absorption	2% (0.55)

B. Site Selection

Potholes are identified along Pathanapuram-Mancode road. Only three potholes were identified, so as to ensure effective pavement evaluation for each of the three mixes.

C. Pothole Dimension

Table 2 Pothole dimensions

Selected Potholes	Dimensions (cm)	Location
Pothole no. 1	35 x 33 x 4	Mancode
Pothole no. 2	43 x 33x 5	Mancode
Pothole no. 3	43 x 33 x 5	Mancode

Fig 1.Pothole no. 1

Fig 2.Pothole no. 2

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 8 Issue 06, June-2019

Fig 3.Pothole no. 3

D. Preparation of mix

a. Hincol Roadbond Mix

Hincol Road bond is an instant repair pre-mix manufactured by Hindustan Colas Pvt. Ltd., Chennai Revolutionary product based on cold mix technology specially designed to solve the problems of potholes with fast technique. It is a blend of carefully selected high quality aggregates and specially designed Bitumen Emulsion.

Fig.4.Hincol road bond

b. Cold mix with pavebond

Take 3 kg of aggregate satisfying the gradation. These samples were then just heated to remove the moisture content. Preparation of cutback bitumen. Cutback was prepared using Bitumen (70%), Kerosene (27%) and Pavebond additive (3%). The required quantity of bitumen is heated and 27% of Kerosene and 3% of Pavebond were added and thoroughly mixed.

Fig 5. Pavebond

Fig 6. Prepared design mix

c. Plastic with bitumen

The aggregate was heated to around 170°C.The shredded plastic was added over hot aggregate with constant mixing to give a uniform distribution.The plastic got softened and coated over the aggregate.The hot plastic waste coated aggregate was mixed with hot bitumen. Mix is ready.

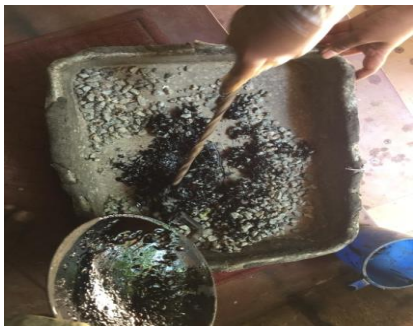

Fig.7.Plastic with bitumen mix

E. Placing of mix

Firstly, the edges of the selected pothole were marked. Pothole was properly shaped and thoroughly cleaned. Mix was then spread on to the pothole using a trowel. Compaction was done using a hand compactor .The road was opened for traffic after 30 minutes. The reclaimed pothole was visually evaluated in terms of its appearance, settlement, raveling and strippi

F. Experimental study

Pavement evaluation was done for a period of one month.

3. RESULT

Table 3. Durability test results

Experiments	Hincol mix	Plastic with bitumen	Cold mix with pavebond	Specification
Wet coating (%)	97.5%	96%	96%	At least 98%
Static immersion (%)	98%	95%	95%	At least 95%
Water resistance test (%)	97%	96%	95%	At least 90%

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 8 Issue 06, June-2019

Table 4 .Field study

Pavement evaluation	**Hincol mix**	**Pavebond with additive**	**Plastic with bitumen**
Appearance	Clean and neat	Clean and neat	Satisfactory
Settlement	Satisfactory	Very negligible in visual examination	Very negligible in visual examination
Ravelling	No significant raveling	No significant raveling in the repaired pothole.	Slight raveling in the repaired pothole
Stripping	Good anti-stripping resistance	Good anti-stripping resistance	Poor anti-stripping resistance

4.CONCLUSION

Based on the laboratory investigations and the field study for a limited period, it was observed that all three mixes investigated in this study were suitable for pothole reclamation under the climatic and traffic conditions prevailing in Kerala city roads. Based on field study, Hincol Road bond mix gave better results in appearance, reveling, stripping compared to other two mixes.In the case of cold mix, it will give a good results. It is observed for 1 month. Raveling and stripping are long term phenomenon, which will cannot seen at the end of one month cannot be taken for a precise conclusion. In the case of plastic with bitumen, appearance was not good. Thus, overall Hincol Road bond mix showed better performance than other two mixes.

ACKNOWLEDGMENT

First of all, we would like to thank The Almighty for all the blessings and guidance in making us to take this project. We wish to place on records our ardent and earnest gratitude to our project guide Prof. Neetta S Kumar, Dept. of Civil Engineering, MES Institute of Technology and Management. Her tutelage and guidance was leading factor in translating our effort to fruition. We would like to thank our principle Dr. J. Nazar for providing all facilities in our campus for our project. We are extremely happy to mention a great word of gratitude to Prof. Abi Basheer, Head of the Dept. of Civil Engineering for providing us with all facilities foe the completion of the project. We also extend our gratefulness to all staff members in the department. We also thank all our friends and well-wishers who greatly helped me in our Endeavour.

REFERENCE

[1] Evans, T.(1984), “Method of Repairing Potholes in Road Surfaces by Filling Them with Fly Ash in Water”, US patent 4431335.
[2] <http://www.pavementinteractive.org/bituminous-surface-treatments> (Downloaded on April 20, 2018).
[3] Buckelew, J. (2001), “Pavement Hole Seal Covered Repair Fill”, United StatesPatent 5183353.
[4] Choudhary, R., Mondal, A. and Kaulgud, H.(2012), “ Use of Cold Mixes for Rural Road Construction”, International Conference on Emerging Frontiers in Technology for Rural Area, India.
[5] Ouma, Y. and Hahn, M. (2017), “Pothole Detection on Asphalt Pavements from 2D-Colour Pothole Images Using Fuzzy Automated Pothole Distress Assessment Using Asphalt Pavement Video Data C-Means Clustering and Morphological Reconstruction”, *Automation in Construction, I*ssue 1, pp 122-159.
[6] Koch, C., Jog, G. and Brilakis, I. (2013), “Automated Pothole Distress Assessment Using Asphalt Pavement Video Data”, *Journal of American Society of Civil Engineers, V*olume 2, pp. 121-133.
[7] Radopoulou, S. and Brilakis, I. (2016), “Automated Detection of Multiple Pavement Defects”, *Journal of American Society of Civil Engineers, V*olume 1, pp. 1943-5487.
[8] IS 217 : 1993 (1993), Specifications for Cutback Bitumen, pp 1 - 5, Bureau of Indian Standards.
[9] IS 14982 Part II : 2001(2001), Anti- Stripping Agents Specifications, pp 1-14 , Bureau of Indian Standards.