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Flexible Pavement in highway Engineering

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ABSTRACT

This study is a survey to evaluate the flexible pavement conditions to determine and specify the types of the failures in the pavement for the selected highway. Evaluation of existing flexible pavement condition is a requirement to choose improvement technique that has to be implemented to improve its quality. Non-destructive testing methods are desirable to evaluate existing flexible pavement. The study had two major and critical goals which covered by considering the following three tasks, the first was the visual evaluation and inspection of existing flexible pavement conditions including the failures, the second to determine and find out the actual causes of these failures in the pavement, and the third is to select the most and effective treatments and maintenance types. e. Functional properties of pavement are roughness, rutting, crack, patch, potholes and ravelling. This paper presents a review on structural and functional evaluation of flexible pavement and relationship between the roughness and other surface distress.

Keywords *– Benkelman Beam, Deflection, Functional Evaluation, Flexible pavement, Structural evaluation*.

I.INTRODUCTION

Transportation infrastructure plays a lead role in economic growth and development of country. It is necessary to provide a good road network for the development of any country. India has the second largest road network system in the world. Road network in India has expanded from 0.4 million km in 1951 to about 5.47 million kilometres presently, a sevenfold increase, but traffic has increased 120 times. t. Most highways in India are narrow and congested with poor surface quality. Though highways are well designed as well as properly constructed but still it may require maintenance, the extent which will depend on several factors including the pavement type. The performance evaluation of any flexible pavement is analyzed through structural evaluation and functional evaluation.

Ordinarily the term pavement only means the surface layer. But in the designing of the highways, it means the pavement total thickness including wearing course, base course and sub-base course. Pavement deflection evaluation is an important study, because shape and magnitude of deflection is a function of structural condition, temperature, moisture condition and traffic type and volume affecting pavement structure. This method has been most widely used in India. Flexible pavement design is the process and method of selecting

the most effective and economical composition of flexible pavement courses or layers to fit the subgrade foundation.

II.TYPES OF FAILURES OF FLEXIBLE PAVEMENT

Different types of failure encountered in flexible pavements are as follow:

- Alligator cracking or Map cracking
- Consolidation of pavement layers
- Shear failure cracking
- Longitudinal cracking
- Frost heaving
- Lack of binding to the lower course
- Formation of waves and corrugation
- Bleeding
- Pumping

III.REVIEW OF LITERATURE

Dhaval V. L et al. (2015)conducted visual observation like rutting, potholes, cracks and patch work. They carried out Benkelman Beam test, traffic survey and collected soil sample at Waghodiya crossing to Limda in Vadodara, Gujarat. They calculated the overlay thickness of pavement. They got to knew that the Benkelman Beam deflection and visual observation correlates with each other as per IRC: 81-1997.In another study by**Etikala Nagaraju (2015),**the major focus was on rehabilitation of pavement and its maintenance. As the road networks are subjected to severe deterioration leading to premature failure of the pavements. From this study it is concluded that significant savings could be obtained by choosing various rehabilitation strategies that include recycled materials in new layers.**G. Bhatt Mayank et al. (2013),** have conducted visual observation for potholes, raveling, stripping and cracks. They were conducted by Benkelman Beam test and structural inadequacy were found at selected section of SH – 188 Sarsa in Haryana to Vasad junction in Gujarat. They found overlay thickness in terms of bituminous macadam for selected stretches and it ranges from 110 to 210 mm. They identified Benkelman Beam deflection and visual observation correlating each other. **Ahmed (2008),** studied the formation of cracks in the pavement surface causes numerous problems such as discomfort to the users, reduction of safety, etc. In addition to the above, intrusion of water causing reduction of the strength in lower layers as well as lowering of bearing capacity of subgrade soil by pumping of soil particles through the cracks is also a major problem associated with the pavements.**Woods and Adcox (2004),** stated that pavement failure may be considered as structural, functional, or materials failure, or a combination of these factors. Structural failure is the loss of load carrying capability, where the pavement is no longer able to absorb and transmit the wheel loading through the structure of the road without causing further deterioration. Functional failure is a broader term, which may indicate the loss of any function of the pavement such as skid resistance,

structural capacity, and serviceability or passenger comfort. Materials failure occurs due to the disintegration or loss of material characteristics of any of the component materials.

IV.CONCLUSION

This paper presented literature review on performance evaluation of flexible pavement. Thus it is concluded that a research needs to be done so as to see the various alternatives which can be adopted. The research should mainly have the objectives as:-

(a) To identify type and classification of common defects in flexible pavements.

(b) To identify the causes of these defects and suggest remedial measures.

(c) To identify the deficiencies in existing pavement maintenance practices.

(d) To rectify the identified defects for smooth movement of traffic flow

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