

## Evaluation of Flexible Pavement: Reviews

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**Abstract:** - Now Day's Highway Pavement, Bridges, Parking, And Other Commercial Structures Becoming Functionally Deteriorating Due To Repeated Of Vehicular Load And Effect Of Climatic Condition. Non-Destructive Testing Methods Are Desirable To Evaluate Existing Flexible Pavement. In The Study Consisted Of Two Tasks: During Visual Inspection of the Existing Pavement Failures. Second, Investigated The Actual Causes Of These Failures. In The Found That Most Of The Damaged Pavement Sections Suffered From Severe Cracking And Rutting Failures. In The Structure Evaluation Of Flexible Pavement In The Deflection Is Measure By Benkelman Beam. Functional Evaluation Of Pavement Is Like Roughness, Rutting, Crack, Patch, Potholes, And Ravelling. The Present Study Is To Carry Out The Flexible Pavement Condition Index Survey Studies By IRC 81-1997.

**Key Words:** - Pavement Evaluation, Benkelman Beam, Deflection, Flexible Pavement, Functional Evaluation

### 1. INTRODUCTION

Transportation infrastructure play a lead role in economic growth and development of country. India has the second largest highway and road network system on the world. They carry almost 90 percent of the country's passenger traffic 65 percent of its freight. Most highway 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 functional deterioration is indicated by the changes in surface condition of the pavement in the form of deterioration in the riding quality, which can be measured by simple methods; it is also possible to restore the surface to original condition of the pavement by providing a profile correction course and a resurfacing layer. Capacity analysis is fundamental to the planning, design and operation of roads, and provides, among other things, the basis for determining the carriageway width to be provided at any point on a road network with respect to the volume and composition of traffic. Scope of transportation system has developed very largely.

#### 1.1 NEED OF STUDY

A good road management is necessary, and maintenance and rehabilitation action must be taken

with good timing. Pavement rehabilitation activities, though not as spectacular as the construction ones, are of major importance for development of transportaion infrastructure. Major economic losses will continue unless improved capabilities for rehabilitation design are provided to meet today's highway traffic needs, as most projects today include rehabilitation design. Improved pavement quality condition.



Fig 1:- Exsiting Pavement Condition

## 1.2 SCOPE OF STUDY

- Perform visual inspection by visit of selected road stretch. Check various distress in pavement.

## 2. LITERATURAE REVIEW

1. Performance Evaluation of Pavement: "A case study on kankot-mavdi road"<sup>1</sup>

In this paper have measured evaluation of flexible pavement deflection by Benkelman beam. In paper emphasis on performance evaluation of kankot-mavdi road in Rajkot by supplementing research with the use of performance indicator instruments like MERLIN, BBD.

Finally conclusion have based observation for rutting, patch work, potholes and cracks can explain weak spots of pavement. The visual observation and Benkelman beam deflection correlates each other. The overlay thickness in terms of bituminous concrete were found for all stretches. The Benkelman beam study was conducted on all the selection of SH and NH of the road and structural inadequacies were found on all the sections.

2. "Functional And Structural Evaluation Of Urban Road Sections In Rajkot City"<sup>2</sup>

Urban asphalt areas are for the most part organized without taking asphalt support as a need which prompts incapability in the cost of upkeep works. To accomplish best outcomes for the support work parameters like Pavement Serviceability Rating (PSR), Road Class, Road Quality, Traffic Volume and Structural Adequacy are considered. Add up to five blood vessel segments for the 6 km length of extend in both ways were considered. Parameters were practically and fundamentally assessed. The survey has been set up for the match astute correlation of recognized parameters and the weight age will be figured utilizing Expert Choice utilizing AHP method. A last need record will be computed and all areas will be positioned in light of this list for support prioritization. The outcome from Benkelman Pillar demonstrates the diverse trademark avoidance of the given segments. The esteem extends between 0.1 to 0.2 mm which is viewed as great. The outcomes from PSR rating by specialists had demonstrated that rating for Nana Mava Main Road were 3.67 for upside heading and it is viewed as great and 4 for drawback course which demonstrates it's great.

3. "Pavement Evaluation by Benkelman Beam of State Highway Section (Bhavnagar Road - Ajidam Circle to R.K. University)"<sup>3</sup>

In this paper pavement cracks, holes and undulations. Recognizing defects and understanding their causes helps we rate pavement condition and select cost effective repairs. Periodic inspection is necessary to provide current and useful evaluation data. It is the present study is evaluate the PCI for state highway 121 Bhavnagar road ajidam circle to R.K. univeristy.

Finally conclusion based on Visual Observation for Distresses Can Explain Weak Spots of Pavement. The Benkelman Beam Study Should Be Carried Out Of Ajidam Circle To R.K.univeristy. Calculate The Characteristics Deflection Value. The Visual Observation and Benkelman Beam Deflection Correlates Each Other As Per the Irc-81 1997 Guideline.

4. "Pavement Evaluation by Benkelman Beam of State highway Section (Waghodiya Crossing to Limda)"<sup>4</sup>

In this paper 'structural evaluation of flexible pavement deflection by the Benkelman Beam' is measured. Rebound deflection is used for overlay design. A detailed pavement condition survey is done on State Highway 158 (Waghodiya crossing to Limda) and the road condition is evaluated structurally. Their present study is evaluates the overlay thickness for State Highway 158 Waghodiya crossing to Limda. This studied method in they have carried out visual survey and structural survey. In visual survey find Rutting, Patching and Pothole. And in structural survey find deflection by Benkelman beam deflection test.

Finally, the conclusion based on visual observation for rutting, patchwork, potholes, and cracks are weak spots of pavement was given. Calculate the overlay thickness on existing flexible pavement in terms of bituminous macadam by BBD technique. In the visual observation and Benkelman beam deflection correlates each other as per the IRC-81- 1997 guideline.

5. "Structural evaluation using Benkelman Beam Deflection technique and Rehabilitation of Flexible pavement for State Highway 188 (Sarsa Junction to Vasad Junction)"<sup>5</sup>

In this research they have studied on structural evaluation. In the structural evaluation of flexible pavement the pavement deflection is measured by the Benkelman beam. It is possible to measure the rebound and residual deflections of the pavement structure. While the rebound deflection is one related to pavement performance, the residual deflection may be due to non-recoverable deflection of the pavement or because of the influence of the deflection bowl on the front legs of the beam. Rebound deflection is used for overlay design.

The conclusion of research, the visual observation for cracks, potholes, ravelling and stripping can explain weak spots of pavement. The Benkelman beam study was conducted on all the selected section of SH: 188 from sarsa to vasad junction of the road and structural inadequacy were found in all the sections. There is needed to go for measures such as an overlay on all the sections of SH: 188 form sarsa to vasad junction. The overlay thicknesses in terms of bituminous macadam were found for all the stretches, it ranges from 110mm to 210mm. The visual observation and Benkelman beam deflection correlates each other.

### 3. LOCATION

Pavement condition should be rough or at the stage of failure so that there are some maintenance or rehabilitation. My site is K-7 to Vavol State Highway-133. Map of the site shown below. Which indicates blue line. There are many college buses, loaded trucks travelling 24 hours on the stretch on the road so that pavement condition becomes rough, unsafe for road users due to heavy traffic.

The road stretch k-7 circle to Vavol road stretch connected with the SH- 133, Vavol village is located at 23.24° N and 72.62° E. Here satellite images of the villages are given below.

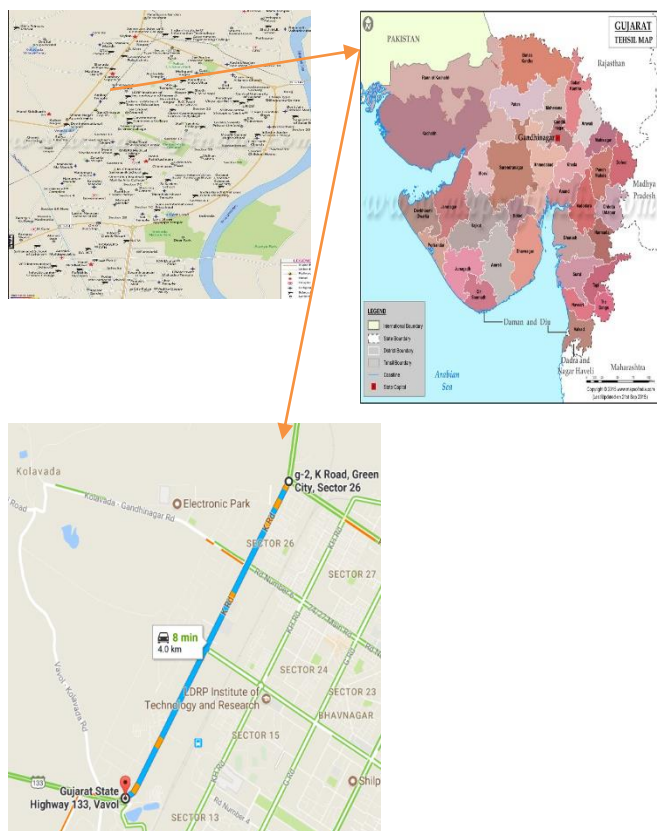


Fig 2:- Location And Layout Study Area

### 4. Data collection

The salient features of the road section are: (k-7 to vavol)

- Length Of The Stretch: 4.0 km.
- Type Of Pavement: Bituminous
- No Of Lanes: 2 Lane
- Divided/Undivided :- divided
- Type Of Shoulder :- Rough Shoulder
- Width Of Carriageway:- 14.0m
- Surrounding Area:- Rural
- Type Of Traffic:- Mixed Traffic.

Traffic volume survey carried out at K-7 circle to Vavol state highway 133 in PCU/day for justification of capacity of the road. The traffic volume was collected for both directions by manual method which is given below chart:

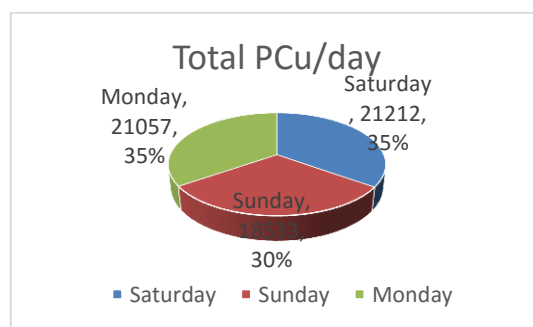


Fig 3:- PCU/Day

### 5. PAVEMENT CONDITION SURVEY

The functional evaluation survey is conducted on SH-133, from 00/00 to 4/00 km LHS and 00/00 to 4/00 RHS. 4 km length of flexible pavement. In this phase of operation visual observations supplemented by simple measurements for Rut-depth, block crack, patching, hairline crack, alligator crack, longitudinal crack, transverse cracks, pot holes etc. Based on data collected during surface condition survey, the road length shall be classified into sections of equal performance in accordance with the criteria given in Table.

Table 1 Pavement classification

Chainage	Length of pavement classification(Km)		
	Good	Fair	Poor
00/00 to 1/00		1	
1/00 to 2/00			
2/00 to 3/00	1		1
3/00 to 4/00			1
Total	1	1	2

It is observed that 1 km stretch is good, 1 km stretch is fair and 2 km stretch is poor so that only 30% pavement

surface condition is good. So, overall condition of surface of pavement stretch is considered as poor.

## 6. FUTURE OUTCOME

In this review paper, Functional evaluation of the road section have been done respectively. Structural evaluation non-destructive testing method, Benkelman beam test will be carried out to determine the pavement deflection. In finally overlay design.

## 7. CONCLUSION

1. The visual observation for cracking, rutting, potholes and patch can explains weak spot of pavement.
2. The heavy traffic volume data and pavement condition is bed to need the calculate the overlay thickness on existing flexible pavement.

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