

Investigation and Improvement of Road Pavement Section for Rankuva Crossing to Chikhali-Vansda Road

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Abstract - Highway pavements are deteriorating fast due to lack of timely maintenance, leading to higher vehicle operating costs, increasing number of accidents etc. Thus, timely maintenance of the highway pavement is essential. Because, once pavements start to deteriorate; they deteriorate rapidly beyond the point where maintenance is effective. Thus, there is an urgent need to develop a strategy for maintenance of pavement in a huge highway network. Priority of various maintenance activities to be carried out on pavement sections. Maintenance priority of the pavement is based on importance of the road sections, present road conditions, and future road conditions. In this study, a strategy for maintenance of highway pavement is proposed. In this study consists of detailed analysis of all aspects of pavement condition resulting in the identification of specific problems and their causes. The data type required for analysis range from simple data such as pavement design features and pavement geometrics, to detailed data obtained from destructive testing and non-destructive testing. Firstly, failure patterns will classify between Rankuva Crossing To Chikhali-Vansda Highway in existing pavement by visual inspection. Secondly, I will study Visual maintenance and structural maintenance. For structural maintenance, stress and deflection of Rankuva Crossing To Chikhali-Vansda Highway will determine by using the various methods.

Keywords: Highway, Pavements, Maintenance, Stress.

1. INTRODUCTION

In India, post-independence road traffic development has been quite exceptional. The number of vehicles has increased from 3 lakh in 1951 to around 450 lakh today, while the amount of commodities transported by road has increased dramatically, from 600 million tonnes to 40,000 lakh tonnes today. The increase in vehicle numbers over the past 60 years is shown in Table 1.3. The volume and axle weights of traffic on Indian roadways are growing at an alarming rate; the annual growth rate is thought to be in the neighbourhood of 10%. The current road network is under a great deal of stress as a result of this unprecedented increase in car population and road usage. The axle loads carried by freight vehicles have increased significantly, but regulations governing axle weight limits have not changed significantly for a long time. As a result, pavements are suffering from fatigue and accelerated deterioration.

2. OBJECTIVE

- To get the overview of existing traffic flow, surface condition, geometry etc.
- To analyse existing road condition to find out possible causes of road stretch deterioration
- To prepare a maintenance strategy of the selected pavement section.
- To Prepare the Overlay design for the improvement of the pavement section.

3. PROBLEM STATEMENT

- One of the stretches of road with the highest volume of traffic, particularly for commercial vehicles and laden trucks, is the Rankuva Chikhali-Vansda segment road. The presence of a quarry industry in the area of Chikhali is to blame for the heavy traffic of trucks carrying quarry material that are overburdened.
- The road is a non-toll road, but NH 48, a toll road, runs next to it. As a result, some traffic is diverted onto the chosen road section, adding to the volume of traffic along the road stretch.
- The road's construction and design were done to withstand standard loads. The main factor contributing to the deterioration of road condition is heavy and crowded traffic. For the purpose of designing a road's pavement, the Benkelman beam deflection method (BBD) or another method must be used.
- To address this issue, a thorough investigation and road inspection survey are needed to identify the root causes of road deterioration

4. METHODOLOGY CHART & STUDY AREA

The coordinates of Chikhli are 20.75°N 73.07°E. Its typical elevation is 19 metres (62 ft). The smallest city in the South Gujarat region is Chikhli. About 10 km east of the city and rail junction of Bilimora, which is located about 27 km south-east of the city of Navsari, 28 km north of the city of Valsad,

and The state highways leading to the hill resort of Saputara and Ahwa via Waghai and Vansda split off at Chikhli, which is on Indian National Highway 8.

5.	Horse Driven vehicle	4.00
6.	Bullock cart (Big)	8.00
7.	Bullock cart (small)	6.00

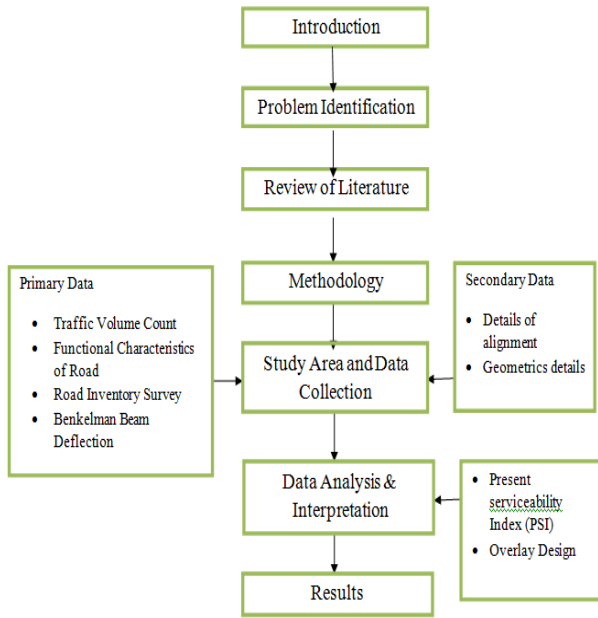


Fig-1: Methodology Chart

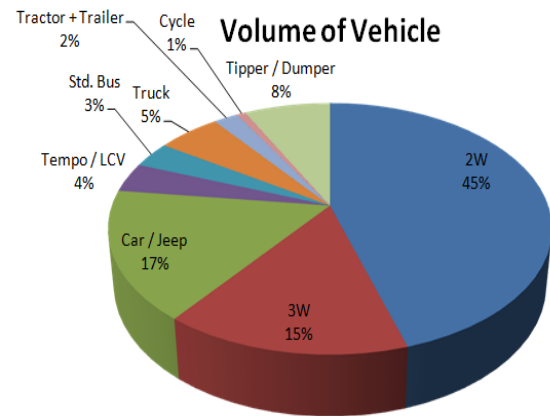


Fig-3: Volume Of Vehicle

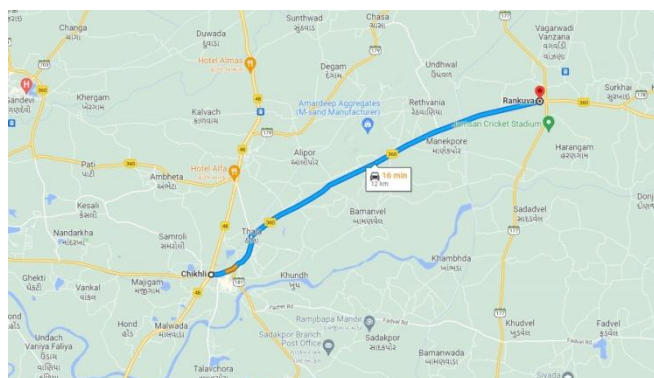


Fig-2: Study area Map

5. DATA COLLECTION

Table-1: Process Parameter Level

Sr. No	Category of Vehicles	PCU value
1	Passenger car, tempo, auto-rikshaw and tractor (without trailer)	1.00
2.	Cycle, motor/scooter	0.50
3.	Lorry, Bus and Tractor-trailer unit	3.00
4.	Cycle-Rikshaw	1.50

PCU Analysis

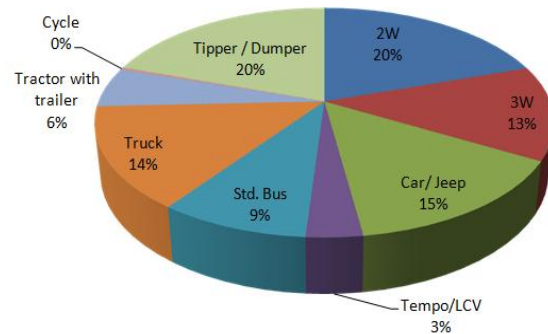


Fig-4: PCU Analysis

PCU analysis of commercial and non commercial vehicle

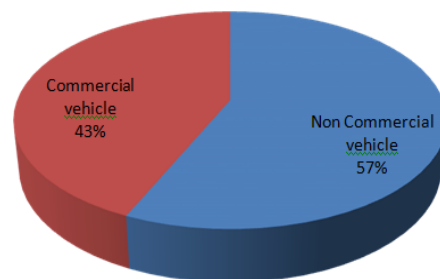


Fig-5: PCU analysis of commercial and Non commercial Vehicle

CVPD Analysis

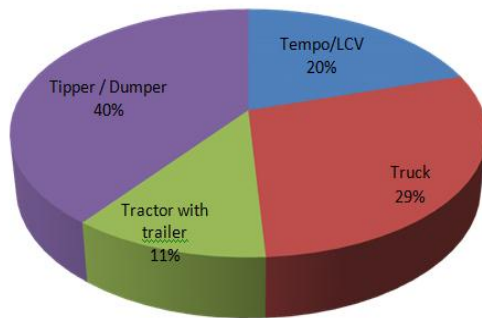


Fig-6: CVPD Analysis

Table-4: Final Rating Value of road link between 3.5 km to 4.5 km

DISTRESS TYPE	(%)	RATING AS PER TABLE 5.1	WEIGHTAGE	WEIGHTAGE RATING VALUE
Fatigue Crack	3.49	1.1	1	1.10
Rutting	12.00	1	1	1.00
Potholes	0.68	1.5	0.5	0.75
FINAL RATING VALUE				0.95
CONDITION				POOR

6. RESULT

Table-2: Pavement Distress Based Rating for Highways

Pavement Distress Based Rating For Highways CODE: IRC:82-2015			
DEFECTS	RANGE OF DISTRESS		
Cracking (%)	>10	5-10	<5
Raveling (%)	>10	1-10	<1
Pothole (%)	>1	0.1-10	<0.1
Patching (%)	>10	1-10	<1
Rut Depth	>10	5-10	<5
Rating	1	1.1 – 2	2.1 – 3
Condition	Poor	Fair	Good

Table-3: Weightage Factor as per IRC 82-2015

Sr. No.	Parameter	Weightage (Fixed) (Multiplier Factor)
1	Cracking	1.00
2	Raveling	0.75
3	Pothole	0.50
4	Patching	0.75
5	Settlement	0.75
6	Shoving	1.00
7	Rut Depth	1.00

Table-5: Final Rating Value of road link between 5.0 km to 6.0 km

DISTRESS TYPE	(%)	RATING AS PER TABLE 5.1	WEIGHTAGE	WEIGHTAGE RATING VALUE
Fatigue Crack	7.48	1.1	1	1.10
Rutting	12.00	1	1	1.00
Potholes	1.01	1.3	0.5	0.65
FINAL RATING VALUE				0.92
CONDITION				POOR

7. CONCLUSION

The Rankuva Crossing to Chikhali-Vandsa Pavement Section is not intended for the overloaded commercial truck load.

The Rankuva crossing to Chikhali-Vandsa is one of the main interconnected roads with a significantly higher PCU/Day and CVPD than what is advised by the IRC.

The selected link's stretches with the lowest pavement serviceability index are seen to be used by heavy commercial vehicles and are therefore in poor condition.

There is a lot of traffic on state route 12, particularly loaded trucks and business vehicles. The presence of a quarry industry in the area around Chikhali-Vandsa is to blame for the heavy traffic of trucks carrying excess quantities of quarry material.

The road is a non-toll road, but NH 48, which runs next to it and is a toll road, is. As a result, some traffic is diverted onto

the chosen road section, adding to the amount of traffic on the stretch and causing further pavement deterioration.

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