A Study on Rural Road Widening Project Based on Prediction of Traffic Volume – A Case Study in Rajkot Morbi State Highway 24

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Abstract— In India, traffic flow is a mixed traffic characteristics and also the traffic congestion is the common problem in most major cities in India. Two-lane roads represent the majority of the highway system in India. The analysis of traffic performance on two-lane roads is critical for their planning, design, maintenance, rehabilitation, and operation. Performance evaluation is typically carried out with the capacity analysis for various highway facilities. In Rajkot Morbi state highway 24 the stretch 5 km to 15 km total 10 km is selected in this stretch same problem occurring like mixed traffic, traffic congestion, speed reduction and chances of accident due to insufficient width of road. In this paper road inventory data and traffic volume survey has been carried out, maximum PCU/Day of three days traffic volume survey is 25843. And IRC: 64-1990 "guideline for the capacity of rural road" is recommended for 2 lane rural road is 15000 PCU/day. So the data was compared with IRC: 64-1990, and the road widening has been justified the Rajkot Morbi state highway 24 is needed to widen.

Key words: Highway capacity manual (HCM), traffic studies, traffic volume, volume count

I. INTRODUCTION

Scope of transportation system has developed very largely. This led to the increase in vehicular traffic especially in private transport network. Thus road space available was becoming insufficient to meet the growing demand of traffic and congestion started. 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. Due to this circumstance will occur problem such as accident, traffic speed reduction etc. The population of Rajkot is growing day by day. The intensity of the traffic and pedestrians crossing has increased significantly and there is no increasing the road width. For a variety of reasons such as increase population, industrial, commercial and auto ownership growth, increasing traffic demand can exceed the carrying capacity of the road.[6]

II. LITERATURE REVIEW

B. S. Konthoujam analyzed the traffic flow in most cities of India is a mixed traffic characteristics and also the traffic congestion is the common problem in most major cities in India. In Bangalore city, most of the roads are congested and operate in level of service E or F. the objective of the present study is to improve the performance operation of the urban read network by proposing the proper alternatives to enhance the traffic capacity. To achieve this objective, a complete methodology for analyzing the mixed traffic flow in 2 km long stretch from Koli Farm Fate to Jalli Machine Bus stop in Bangalore city, along the Bannerghatta road, is selected and analyzed. Traffic studies of volume and speed and speed flow relationship was established to understand LOS and traffic volume for future year projects to know the drop in LOS. Methodology of existing studied is (i) a detailed site investigation which includes reconnaissance and topographical studies (ii) traffic survey and analysis (iii) preparation of conceptual design.[1]

Indrajit Ghosh has assessment of methods only on past studied as Performance evaluation is typically carried out with the capacity analysis for various highway facilities. Many countries in the world have a standard methodology for capacity analysis procedure. In general, performance of a highway is expressed in terms of level of service (LOS), which is a scheme intended to depict traffic conditions for an existing or proposed transportation facility operating under current or projected traffic demand. Evaluating the performance of the two-lane roads is not an easy task because of several distinct characteristics associated with these roads. IRC: 64-1990 provides some guidelines for capacity of two-lane roads; however, these guidelines provide very little information on LOS and its evaluation on these roads. As a result of that planners in India use the methodologies given in the Highway Capacity Manuals (HCM) of other developed countries. This studied summaries the evolution of research on determining the LOS of two-lane roads and provides a discussion for future directions pertinent to Indian mixed traffic situation.[3]

Kazunori Munehiro analyzed undertaken using a traffic flow micro-simulation program "SIM-R" to evaluate the effectiveness of "2+1 lane highway" sections, which were built by adding an auxiliary lane to rural two-lane highways, in a cold, snowy region. In the field study evaluation indicators, average travel speed, the number of vehicles and the density of vehicles were used. The results traffic volume targeted was hourly traffic volume in one direction from 100 to 500 vehicles per hour. For "2+1 lane" highway sections, the intervals between auxiliary lanes were 3 km, 5 km, 7 km, 8.5 km and 10 km. It was confirmed that by adding an auxiliary lane to two-lane highways at certain intervals, namely by introducing "2+1 lane" highways, the level of service was improved for each evaluation indicator – average travel speed and traffic volume.[4]

III. OBJECTIVE

- To study the existing traffic situation for the selected road stretch
- To carry out traffic volume survey of stretch
- To study on need of road widening and justify

IV. METHODOLOGY

The methodology involved for the study is as follows.

1) A detailed site investigation: in which include road inventory data, traffic flow condition and identify the traffic circulation pattern in and around the study area.
2) Traffic survey and analysis: The collected data was analyzed to identify the Roadway Segments capacity, based on the Indian road congress guideline for capacity of rural road in plain area IRC: 64-1990.
3) Preparation of conceptual design: The next step was to propose section specific interventions to the identified issue and prepare their of implementation plan. Based on the need of urgency.

V. DATA COLLECTION AND ANALYSIS

The various data collected for the studies are:
– Road inventory data has collected which is given below:
  – Length of the stretch: 10.5 km.
  – Type of Pavement: Bituminous.
  – Width of carriageway: 7 m.
  – No. of lanes: 2 lanes.
  – Divided/Undivided: undivided.
  – Type of Shoulder: paved Shoulder.
  – Surrounding Environment: Rural.
  – Type of traffic: Mixed traffic.
– Volume count for mixed traffic, three days 24 hours (Saturday, Sunday and Monday) data was collected, the traffic volume was collected for both directions by manual method which is given below chart:
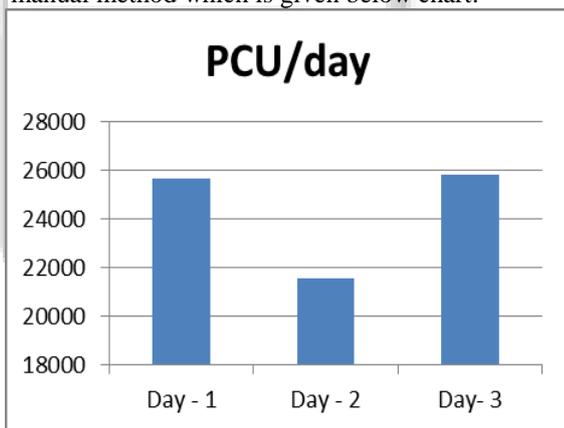

Fig. 1:

VI. CAPACITY OF RURAL ROAD

IRC recommended design service volumes for Two Lane Roads.[5]

Sr. No.	Terrain	Curvature	Design service volume in PCU/day
1	Plain	Low (0-50)	15000
		High(>51)	12500
2-	Rolling	Low (0-100)	11000
		High(>101)	10000
3	Hilly	Low (0-200)	7000
		High(>201)	5000

Table 1.

VII. RESULT AND CONCLUSION

– From the road inventory data Rajkot Morbi state highway 24 is 2 lane-7 m carriageway.

– Rajkot Morbi state highway 24: the traffic volume survey data of three days Saturday, Sunday and Monday are 25664, 21565 and 25843 PCU/Day respectively.
– The IRC: 64-1990 recommended for the capacity of plain terrain- low curvature- two lane- 7 m carriageway road is 15000 PCU/day.
– From the above traffic data and IRC recommendation of road capacity, the maximum PCU/Day in Rajkot Morbi state highway 24 is 25843 and IRC recommended has 15000 for same stretch. So there is need to road widening of selected stretch.

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