Development of Capacity for the Heterogeneous Traffic in Urban Area

Niraj D Trivedi
VPMP Polytechnic, India

Abstract— The traffic of an urban roads increases rapidly due to the growth in prosperity and vehicle ownership of urban population. The problems occurred due to this increased traffic have also become more and more complex. The urban roads of India generally carry the heterogeneous traffic which is the combination of various vehicles like Cars, Buses, Trucks, Motor cycles, Light goods vehicles, Auto Rickshaws, Pedal Cycles, Hand drawn carts, Animal drawn carts etc.

Key words: Heterogeneous Traffic, Urban Area

I. INTRODUCTION

The increasing urbanization Improved transportation technology and an expanding economy, additional roads and highway are built, in an effort to balance roadway capacity and demand at the same time traffic volumes and travel distances continue to increase, and the new roadway facilities get filled up shortly after completion. Traffic congestion and safety are serious problems, impacting on the economy, environment and quality of life in our cities.

The traffic of an urban roads increases rapidly due to the growth of prosperity and vehicle ownership of urban area. The non-uniform carriageway width along the length of road which reduce the speed of vehicle. In urban area mostly heterogeneous traffic flow. Different size and speed of vehicle moving on same lane which reduce vehicle speed and effect on capacity establish the relationship among flow parameters of an urban traffic flow for various road widths. Study the effect of traffic composition, various road widths, gradient of road on road capacity

II. TRAFFIC FIELD STUDY AND SURVEYS

Traffic surveys are conducted to gather data on classified vehicular volume and speed on the selected road section. Inventory surveys are conducted for gathering primary information regarding road geometry including number of lanes, lane marking median service lane etc .on the basis of inventory surveys detailed traffic surveys are planned the surveys are conducted on normal working days during morning and evening peak as well as off peak hours covering wide range of traffic conditions and flow behavior,

III. STUDY OF CVC COUNT

Total eight stretches were considered for the case study. The data collection on these roads has been done by Videography. The collected was then analyzed in the transportation laboratory and the speed and volume per five-minute time interval was found out. The speed-flow, Cumulative frequency curve and Traffic composition has been developed for all the eight roads for 5 min. time interval data. The stretches of roads are listed as

A. Following Morning Data Collection 9:45 To 10:45 Am

1) 132"Ring road (from Jaymangal to AEC)
2) 132"Ring road (from AEC to Jaymangal-oppside)
3) From polytechnic to Urmila circle
4) From Urmila circle to Polytechnic (opposite side)

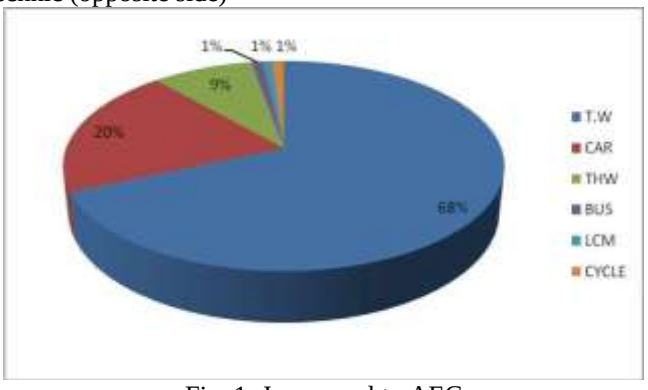

Fig. 1: Jaymangal to AEC

The Figure shows the percentage of two wheeler is 68% which is more than other mode of traffic and percentage car 20% which is increased in Urban area

CVC:-In classified volume count, one hour videography is done to find vehicle flow on the selected stretch and then it was converted to PCU/hr. Maximum value of PCU/hr in this stretch is 3652 PCU/hr and width of road is 9.5m.

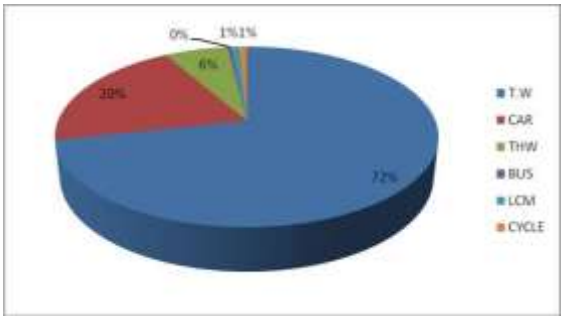

Fig. 2: AEC to Jaymangal-oppside

The Figure shows the percentage of two wheeler is 72% which is more than other mode of traffic and percentage car 20% which is increased in Urban area

CVC:-In classified volume count, one hour videography is done to find vehicle flow on the selected stretch and then it was converted to PCU/hr. Maximum value of PCU/hr in this stretch is 4897 PCU/hr and width of road is 9.5m.

The Figure shows percentage of two wheeler is 56% which is more than other mode of traffic and percentage car 31% which is increased in Urban area

CVC:- In classified volume count, one hour videography is done to find vehicle flow on the selected stretch and then it was converted to PCU/hr .maximum value of PCU/hr in this stretch is 3294 PCU/hr and width of road is 10.9m

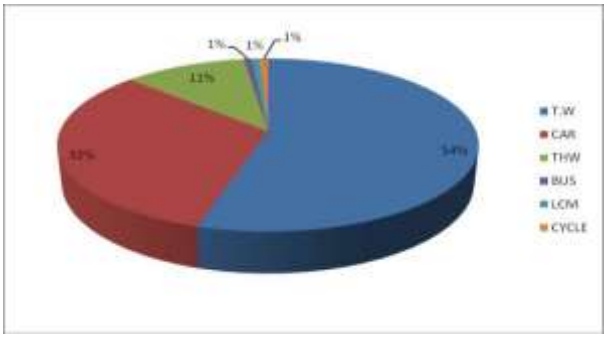

Fig. 3: Urmila circle to Polytechnic

The figure shows the percentage of two wheeler is 54% which is more than other mode of traffic and percentage car 32% which is increased in Urban area

CVC:- In classified volume count, one hour videography is done to find vehicle flow on the selected stretch and then it was converted to PCU/hr. Maximum value of PCU/hr in this stretch is 3148 PCU/hr and width of road is 10.9m.

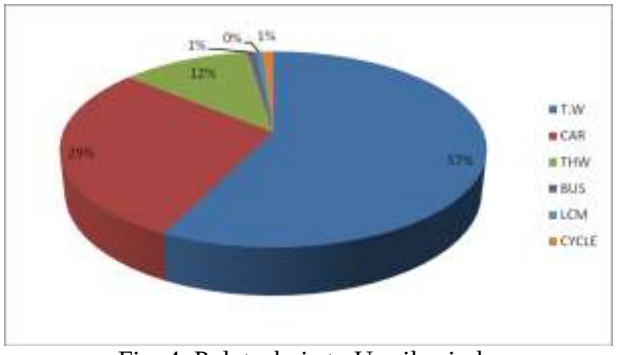

Fig. 4: Polytechnic to Urmila circle

The figure shows the percentage of two wheeler is 57% which is more than other mode of traffic and percentage car 29% which is increased in Urban area

CVC:- In classified volume count, one hour videography is done to find vehicle flow on the selected stretch and then it was converted to PCU/hr .maximum value of PCU/hr in this stretch is 3378 PCU/hr and width of road is 10.9m

IV. METHOD OF DATA COLLECTION

The roads were selected in such a way that using different sets of traffic data. Traffic flow can be modeled for a wide range of roadway traffic and control conditions. More than eight road stretches were considered under this study. Number of traffic lanes, carriage way width, surface type and various data collection techniques are considered in this study. Depending on the prevailing roadway conditions and abutting land use, two different methods were adopted for collection of traffic data for this study. Where the abutting land use patterns were favorable for placing the video camera at the suitable location to cover the traffic movement on selected stretch of road, the video graphic method was used for collection traffic data All the road stretches considered under this study were operating under mixed traffic condition. However, the average composition of traffic varied

from one location to the others. Different vehicle types as observed in the field are mentioned below with their codes used in subsequent tables.

1) Two wheeler (2W)
2) Three wheeler (3W)
3) Four wheeler e.g., car, van, jeep, etc. (car)
4) Bus, Truck, etc. (Bus)
5) Cycle
6) Slow Moving Vehicle (Non-Motorized) (SMV)

Depending on the availability of the data and the composition of different vehicle types in the stream, the vehicle type observed in the field have been logically categorized into groups. For example, in some cases, all bigger vehicles like bus, truck etc. were put into one group. Similarly, car, jeep, van etc. were put in one group. The classified traffic counts were available for every five-minute interval. Traffic counts were aggregated for 5- minute interval and then appropriately converted into hourly traffic volume in PCU per hour (PCU/H).

A. Following Evening Data Collection: 5:30 To 06:30 Pm

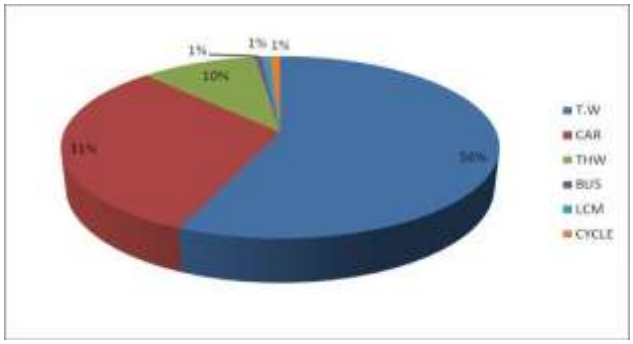

Fig. 5: Polytechnic to Urmilacircle

The figure shows the percentage of two wheeler is 57% which is more than other mode of traffic and percentage car 29% which is increased in Urban area

CVC:- In classified volume count, one hour videography is done to find vehicle flow on the selected stretch and then it was converted to PCU/hr .maximum value of PCU/hr in this stretch is 3378 PCU/hr and width of road is 10.9m

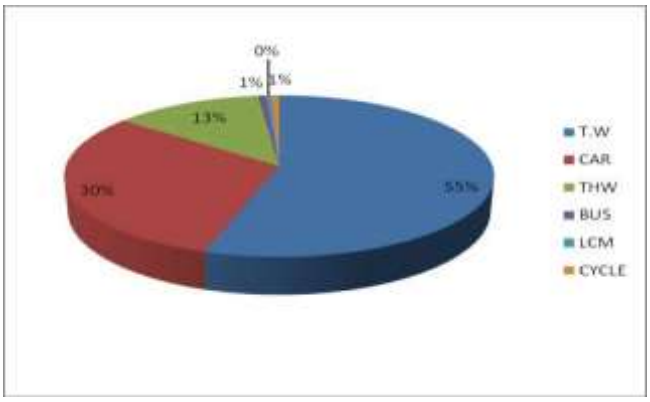

Fig. 6: Urmilacircle to polytechnic

The Figure shows the percentage of two wheeler is 55% which is more than other mode of traffic and percentage car 30% which is increased in Urban area

CVC:- In classified volume count, one hour videography is done to find vehicle flow on the selected stretch and then it was converted to PCU/hr. Maximum value of PCU/hr in this stretch is 3346 PCU/hr and width of road is 9.5m.

V. VEHICULAR GROWTH AND COMPOSITION

There are different category vehicle registered in Ahmedabad city. It clearly indicates that the predominant mode of transport within the city is two wheelers. It consists 71.64% of total registered vehicles. However four wheelers (cars) and three-wheelers are of 15.22% and 4.94% respectively. On the other hand primary survey of this study also indicates percentage of bicycles in vehicle composition is also significant. The overall growth rate of two wheelers is more than cars and 3 – wheelers. Total vehicles registered in Ahmedabad are covered more than 20% share of total vehicles registered in Gujarat. Overall growth rate is 8.46%, which indicates high use of personalized vehicles. Average growth rate of vehicles also shows increase.

VI. CONCLUSION

1) The numbers of two wheelers are more in the study area. It ranges from 35 to 40 Kmph. The speed of the two wheelers at S.G.Highway is 55 to 60 Kmph. The speed of the car ranges from 75 to 80 Kmph because of higher road width
2) It is observed that actual capacity calculated is higher than the theoretical capacity. The vales are carrying due to change in behavior of the vehicles and non updation of PCUs.
3) There is substantial variation in the capacity values estimated by various researchers by virtue of the variation in the roadway and traffic conditions considered
4) Traffic Composition of Two wheeler is more compare to other mode of vehicle. 60% of two wheelers are observed. It reduces the delay due to less space occupied and hence, the capacity increases.
5) Maximum use of mass transportation only one solution of reduce value of PCU

REFERENCES

[1] Ketankumar c varmora(2013), a dissertation work on ―Effect of Traffic Composition and Road Width on Traffic Stream Behavior‖
[2] Chetan R Patel , Dr. G. J. Joshi (2012), a dissertation work on ―Capacity and LOS for urban arterial road in Indian mixed traffic condition‖
[3] ABDEL-WAHED, Talaat Ali et.al (2012) presented the research paper in ScienceDirect journal on ―Effect of Highway Geometric Characteristics on Capacity Loss‖
[4] Errampalli Madhu and S.Velmurugan(2011) Presented research paper on ―Estimation of Roadway Capacity of Eight-lane Divided Urban Expressways under Heterogeneous traffic Through Microscopic simulation models‖

Books

[1] Highway Capacity Manual-2000
[2] IRC 106-1990 ―Guide lines for capacity of Urban roads in Plain Areas‖