

“Literature Review and Methodology for Developing Capacity Model of Heterogeneous Traffic in Urban Area”

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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, Motorcycles, Light goods vehicles, Auto Rickshaws, Pedal Cycles, Hand drawn carts, Animal-drawn carts etc. These all vehicles have different speeds, size, Load carrying capacities or passenger capacities etc. which affect the urban heterogeneous traffic flow. The non-uniform carriage way width along the road is commone specially in developing countries. Due to change in carriage way width, the traffic stream speed also encounters more congestion level along the length of link. Traffic composition is most important factor which directly affects the traffic stream behavior (i.e., speed, flow and density).In case of homogeneous traffic the characteristics of traffic does not change abruptly, as the traffic composition mainly consisting of same types of vehicle. When the traffic composition has maximum number of two wheelers it gives higher speed value and higher flow values. This is due to the reason that two wheelers occupy less pace as compare to car and bus and trucks. Also stands till distance required is very less, as two wheelers can be easily stopped with compare to bus and heavy trucks. Speed is also more when two wheelers are driven on urban streets.

Key Words:- Heterogeneous traffic, C.V.C, Capacity curve, Space mean speed, capacity modal.

I. INTRODUCTION

The problem is more in case of mixed traffic flow when speed differential among different categories of vehicles is quite substantial. It increases the desired number of overtaking considerably with limited opportunities to overtake. Prediction and knowledge of capacity is fundamental in design, planning, operation and layout of road network sections. Roadway factors that influence capacity of a various-lane road include lane width, gradient and type of shoulder.

For heterogeneous traffic which is the combination of various vehicles like Cars, Buses, Trucks, Motorcycles, Light goods vehicles, Auto Rickshaws, Pedal Cycles, Hand drawn carts, Animal drawn carts etc. These all vehicles have different speeds, size, Load carrying capacities or passenger capacities etc. which affect the urbanheterogeneous traffic flow.Thefollowingaresomebasicd efinitions of traffic flow parameters.

II. OBJECTIVE OF STUDY

- To identify problem of heterogeneous traffic in urban area.

- To study a literature related traffic compositional of urban road.
- To prepare methodology for development of mathematical model for urban road capacity.

III. PROBLEM STATEMENT

- 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 affect on moving vehicles.
- In urban area mostly heterogeneous traffic flow. Different size and speed of vehicle moving in same lane which reduce speed.
- Side friction is effect on the urban area which loss of capacity.

IV. BACKGROUND OF STUDY

A. **Capacity**:-The maximum number of vehicles that can pass as given point on a lane or roadway during one hour without the traffic density being so great as the cause unreasonable dela ,hazards or restriction to the drivers' freedom to man oeuvre under prevailing roadway and traffic conditions. This term is frequently referred to as the design capacity.

B. **Important of Capacity**:-The design of a highway facility is possible only when capacity is related to the projected requirements of traffic.

C. **Speed Flow(VsQ)Relationship**:- At very low speeds the traffic volume would also below. With increasing speed, traffic volume also increases up to a certain limit, as head way initially decreases. But as the speed further increases the spacing between the vehicles increases and becomes so large that volume decreases. There is an optimum speed (U_m)at which the flow is maximum(q_m).

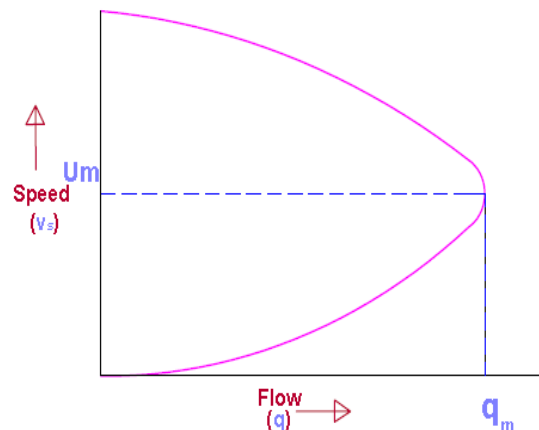


Fig. 1: Speed-flow(Vs-q)relationship

V. LITERATURE REVIEW

The traffic of an urban streets increases rapidly. Similar increase in traffic the problems related to this also become more and more complex .mostly heterogeneous traffic seen the urban road of India this traffic is combination of various vehicle like Cars, Buses, Trucks, Motor cycles, Light goods vehicles, Auto Rickshaws, Pedal Cycles, Hand drawn carts, Animal drawn carts, etc. all the vehicle have different speeds, size load carrying capacities or passenger capacities etc. Traffic flow model can be divided into two major categories like microscopic and macroscopic. Microscopic model describe the motion of individual vehicles and their interaction with one another. Car following model is also microscopic models which attempt to describe the motion in term of position, velocity, acceleration) of vehicles following one another in congested traffic and gap accepted models, which apply to situation in which vehicles have to pass through gaps in conflicting traffic flows for instance at non signalized intersections .Macroscopic models describe the relationship among speed flow and density.

Computer simulation models can play an important role in the analysis and assessment of the road transport system and its components .Also these models are very useful to develop traffic stream models car following theory, shock wave analysis and queuing analysis.

- K.C.VARMORA(2013):In this study developed the relation between flow parameter in heterogeneous traffic Collected the data of a mid-block section of urban road having various road width like 9.5m,6.2m,7.1m and 11.10m.The capacity obtain from speed-volume relation and VISSIM model were compared. The little difference was found.He has not considered gradient of an urban road. Considered different width of lane and traffic composition for his study area.
- Dr.G.j.Joshi(2012):This research work the speed- flow relationship was developed. Developed for ANN model for generating missing stream speed data for unobserved values of flow.Speed -flow relation compare with observed data and ANN model out-put data little difference was found. Collected the data at amid block section of six lane urban road each direction is 10.5m. Only width of lane consider in calculation of capacity. Mid- block section is Horizontal plane terrain.
- Abdel-wahedTalatAli(2012):In this research automatic traffic counters are used to conduct the traffic survey 7hour and 12 difference site. Traffic data collected at mid-block section which horizontal plane terrain of the tangent (point A) preceding the curve and at the midpoint of the curve (point B). Developed relation between flow rate and density of one of the study site.Traffic capacity can be calculated by the way of quadratic function use.Calculate loss of capacity when vehicle move in curve shape road.
- Stockholm, sweden(2011):Site friction reduce the speed of vehicle.In this research Analyzed and developed multi regression formula.Developed relation between side friction and speed.It is found that parking/stopping vehicles is the most influence factor in reducing the speed.The effect traffic composition are not mention.
- ErrampalliMadhuela (2011) :In this research data collected for 130m length of mid-block in Eight lane divide urban expressed road.Calibration and validation of simulation model.The capacity obtain from speed-flow relationship and simulation were compare the little difference was found.Gradient of the road are not consider.
- Arasan V.T et al(2010):In this study the location is on bridge the width of the road 12m wide road with curb.No interference of pedestrian traffic. Geometry uniform and no interference to vehicular movement due to pedestrian traffic.Video capturing the traffic flow selected point for continuous 1hr during peak-hr. Establish Relationship between density and area-occupancy. Only find the concentration on traffic stream other traffic flow variable not consider.
- Dr. SatishChandra:Studied the effect of gradient, lane width, model split, shoulders condition, pavement roughness and percent of slow moving vehicle.Developed the relationship between the speed-volume at 3 section of road.When shoulder condition count two wheeler and bicycles do not require much use of shoulder these vehicle not including in data collection.Grade of different section are given which indicate that each per cent at up grad decrease the capacity 2.61 per cent and each per cent downward incrise the capacity 3.09per cent.Developed the between roughness and free speed of vehicles.Model is not reflecting the effect of traffic composition and side friction .
- B.R. MARWAH(2004):Studied in three ways: Number of vehicles in the road section. Road occupancy expressed as total vehicle area in relation to the road area. Vehicle influence area expressed as proportion of road area.thesimulation results of benchmark road and traffic composition the levels of service are classified into the four groups. Result not compare with other model. Classified the level of service in heterogeneous traffic.
- Dr.v.thamizhet allstudided a model to simulate heterogeneous traffic flow on mid-block section of urban road. Capacity values of 7.5 m and 11.0 m wide road spaces, with traffic in one direction, were then obtained as about 3,200 and 4,500 cars per hour respectively .The model has been demonstrated only for two road widths though similar results can be obtained for any normal widths of road space using the model. . Model is not reflecting the effect of traffic composition and side friction.

VI. PROPOSED METHODOLOGY

The detailed step by step procedure of capacity estimation and modeling is described in the flow chart.

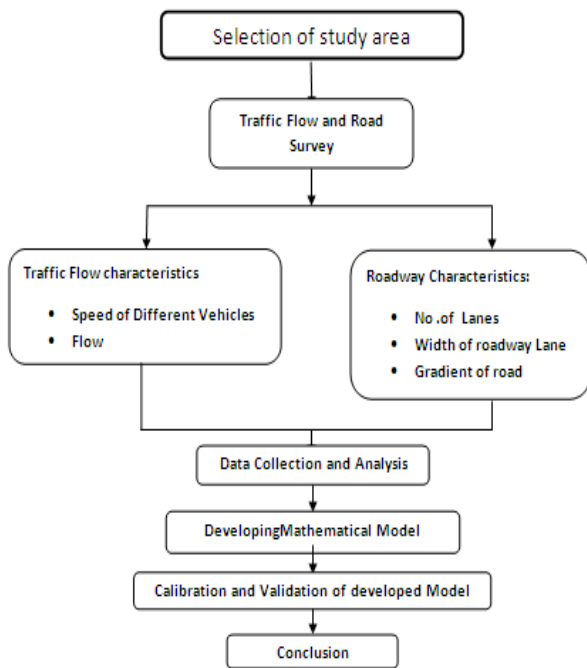


Fig. 2: Flow chart showing general methodology

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