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Link Volume And Capacity Utilisation Of Roads in Kondotty Town

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Abstract - *Transportation planning is obligatory for any region in order to design and prepare for future needs so as to ensure better mobility of people and goods. The road networks within the Kondotty town, Kerala,India already suffers from congestion and with the imminent developments planned over the next fifteen years, it is forecasted to get considerably worse. To keep Kondotty as a vibrant and flourishing town it is vital to address the problems and not wait until the situation becomes critical. The underlying reasons for the deprived state of the transportation systems in the town are identified based on studies and surveys .Capacity analysis is fundamental to planning, design and operation of roads. For an existing road network, the capacity analysis helps in assessing the traffic carrying ability of the number of traffic lane provided for a given road link under the present traffic and roadway conditions. Highway capacity values and speed flow relationships used for planning , design and operation of highways , in most of the developing countries ,pertain to fairly homogenous traffic conditions comprising vehicles of more or less uniform static and dynamic characteristics. This study deals with determination of the traffic volume on selected roads and assessing the extent of shortfall of the road system within the urban limits of the town. The results of the study provides an insight into the complexity of the vehicular interaction in heterogenous traffic. It helps in rational evaluation of the investments needed for further road construction and improvements required.*

Key Words: ***V/C ratio, PCU, Highway Capacity, Link volume, Traffic Count***

1. INTRODUCTION

The worsening traffic conditions in Indian cities is a matter of great concern in the present scenario. The efficiency and usage of different traffic factors should be checked regularly for controlling the rising problems with the traffic. The estimation of the traffic volume and utilization of the available road links are some of the most useful methods of traffic analysis. The traffic conditions of Kondotty town is becoming critical. Traffic Volume Count is counting of number of vehicles passing through a road link over a period of time. It is measured in vehicles per minute, vehicle per hour and vehicle per day. It is performed to calculate the level of service of the road and related attributes like congestion, carrying capacity, V/C ratio, identification of peak hour or extended peak hour etc. The traffic volume on a link is not stable, but varies during 24 hours of the day. For expressing the traffic flow on a road per unit time, the flow of the different vehicle classes should be converted into a standard vehicle class known as passenger car unit (PCU). Large number of roadway and traffic factors influences the interaction between moving vehicles in a traffic stream. For better operation and management of the roadway facilities, accurate estimation of the magnitude of vehicular interaction for different roadway and traffic conditions is a prerequisite. The methods adopted for traffic volume count depends on various factors like manpower available, magnitude of traffic data required or to be collected which will then determine quality and type of vehicle classification to be adopted. The type of count being taken and the intended use of the data recorded decides the length of the sampling period. Traffic volume counts are used to form the basis of check for efficiency/ saturation of the road link by comparing present traffic volume with the prescribed capacity for the road network. They can be also used for establishing the use of the road network by vehicles of different categories, traffic distribution and PCU / vehicle value. The volume values of each links are checked with the threshold values corresponding to the type of roads. This study was done associated with the 'Transportation Planning for Kondotty town' conducted by NATPAC.

2. METHODOLOGY

A detailed methodology for undertaking the study is proposed which consists of a set of tasks as given below:

- Identification of survey locations and homogenous sections.
- Design and conduct of primary survey.
- Compilation, analysis and interpretation of data.
- Estimation of variation of traffic flow during study period.
- Identification of deficiencies in road network.
- Suggestion of improvement measures.

2.1 BRIEF PROFILE OF STUDY AREA

Kondotty is a revenue village and municipality, a developing town in the Malappuram district, state of

Kerala, India with an extent of 30 sq.km. It is located near Calicut International Airport, 24 km from Malappuram. The National Highway 966 which connects Kozhikode with Malappuram and Palakkad passes through Kondotty. The town is very well connected by roads to the nearby cities and towns. The public transport system in the region consist of both State owned Kerala State Road Transport Corporation (KSRTC) and private buses. The road network in Kondotty town area consists of National Highway No. 966*(Kozhikode – Mysore)*, State Highway No. 65, the Kondotty - Areacode Road which is jointing to the Areacode – Thamarassery Road.Other major roads are the roads are leading from Kondotty to places like Ekkaparamba, Musaliyarangadi and Harijan Colony. The major junctions in the Kondotty town are (i) KuruppathJn (ii)Thangals Road Jn, (iii) Kondotty 17 Jn (iv)ChungamJn.

2.2 HOMOGENOUS SECTIONS

The road networks within the study area were divided into 10 homogenous sections between the intersections. Survey was conducted at mid-block of these sections. The road links in the study area falls under 3 classes-National Highway, State Highway and Other District roads. The homogenous sections are listed in Table 1.

2.3 METHOD USED FOR DATA COLLECTION

The commonly adopted method for collecting traffic volume data is the manual method. It involves a group of people recording the number of vehicles moving, on a predetermined location using tally marks in inventories. Raw data collected from those inventories is then organized for compilation and analysis. This method can be expensive in terms of manpower, but it is considered necessary in most cases where vehicles are to be classified with a number of movements recorded separately, such as at intersections. It is also used where automatic methods cannot be used due to lack of infrastructure, necessary authorization etc.

3. LINK VOLUME ANALYSIS

Link volume count survey was carried out at mid points of all the major homogeneous sections within the study area between 8.00 AM and 8.00 PM. The survey was conducted by manual traffic volume count classified by the type of vehicle for a period ranging between eight hours and 12 hours depending on the importance of the road and intensity of traffic. Data collected from the field has been scrutinized and was converted to Passenger Car Units (PCU) by adopting equivalent PCUs as suggested by Indian Roads Congress 106: 1990, shown in Table 1. The peak hour of traffic flow for each section was determined from the data collected.

The composition of different class of vehicles during the peak hours on midblock sections of NH and SH is shown in Fig 1 & Fig 2 respectively.

On the National Highway 966, both two wheelers and cars contributed to the major share of traffic flow during peak hours, while on SH 65, 47 % of traffic flow during peak hours was due to two-wheeler movement. So improvement measures should be adopted to make easy and hassle free movement of two-wheeler traffic on both SH and NH .The share of passenger autos on peak hour traffic flow are also relevant.

Table 1: Values of Passenger Car Unit adopted for the study

Sl. No.	Type of vehicle	PCU Value
1	KSRTC bus	3
2	Private bus	3
3	Institution bus	3
4	Other buses	3
5	Mini bus/ tempo - education	1.5
6	Mini bus/ tempo -Others	1.5
7	Car	1
8	Passenger Auto	1
9	Two wheeler	0.5
10	Multi Axle Truck	4.5
11	Truck	3
12	Mini-truck/ tempo	1.5
13	Goods auto	1
14	Bi-cycle	0.5
15	Hand cart	4.5
16	Others	4

4. CAPACITY UTILISATION

Capacity utilization of the road stretches was measured by volume-to-capacity ratio (V/C Ratio). It is the ratio of volume of peak hour traffic plying on the road stretch to the capacity of the road stretch. Capacity analysis gives a quantitative measure of a facility. The threshold value for V/C is 1. For working out the capacity of different road sections, the information compiled during the road inventory survey was compared with the specifications of IRC-106-1990 (Guidelines for capacity on urban roads). While working out the capacities due consideration was given to carriage- way width, junctions, parking, lateral clearance, shoulder, surface condition etc. The broad classification adopted for calculating the capacities is given in Table 3. The traffic volume observed at different road stretches were compared with the capacity of road sections, to calculate the volume - capacity ratio (V/C ratio) of different road sections within the study area.

The State Highway 65 through Kondotty town is two lane with two way traffic. The average carriage way of SH 65 is 6.6m and average right of way is 11m. The urban stretch of National Highway 966 running across Kondotty town is four lane with two way traffic movement. It is channelized within the town limits and diminishes to two lane- two way -undivided highways outside the town. It have an average carriageway width of 11m with an average shoulder width of 2 m on either side. The estimation of V/C ratio of different homogenous sections is shown in Table 4. The variation of V/C ratio of different sections is shown graphically in Figure 3.The red bars indicate sections which are over utilized.

It is shown that the v/c value is maximum for the road stretch between Kondotty-17 junction and Pandikkadu, followed by Kuruppath Junction – Kodangad Junction. It was observed from analysis that the road stretch between Pandikkadu and Kondotty 17 were over utilised to about 2 times its handling capacity. The volume-capacity ratio for all stretches between the end nodes of NH 966 within the study area is more than the threshold value of 1. In short, even in the current scenario, the road stretches on NH is having the highest volume-capacity ratio and hence needs capacity augmentation. The other road stretch having V/C ratio equal to or greater than one is which connects Thangals road and Chungam Junction on SH 65.The lowest V/C ratio is found on Thangals Road.

5. IMPROVEMENT MEASURES

The study reveals that the traffic on many road sections exceeds the design service volume at the desired level of service which will deteriorate the operating conditions. So the available practical capacities can be improved through application of traffic engineering techniques besides better enforcement. For enhancing the capacity of road links , following measures could be adopted:

- Segregating the two way traffic flow through central channelisers or median.
- Prohibiting on street parking of vehicles and clearing of encroachments
- Providing adequate facilities for pedestrians and cycles.
- Regulating the cross traffic and side street traffic by checking the gaps in medians
- Improving traffic discipline
- Banning conflicting movements at major intersections, particularly during peak hours

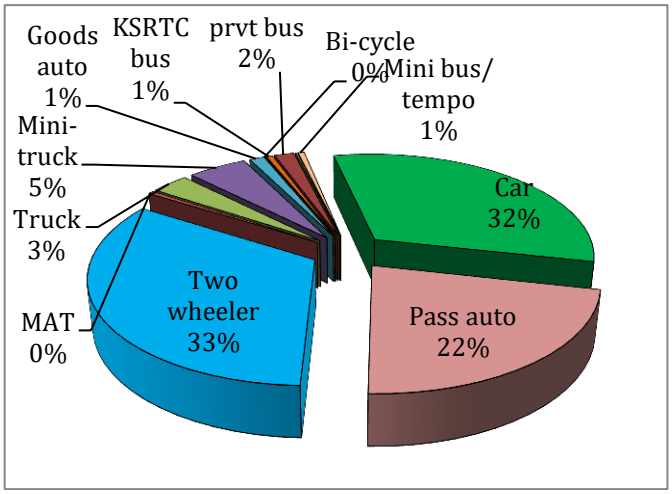

Chart 1: Composition of different vehicles during peak hours on NH 966

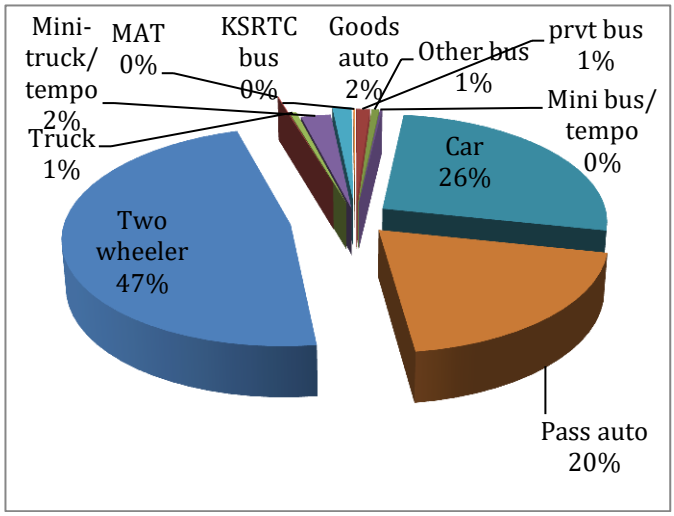

Chart 2: Composition of different vehicles during peak hours on SH 65.

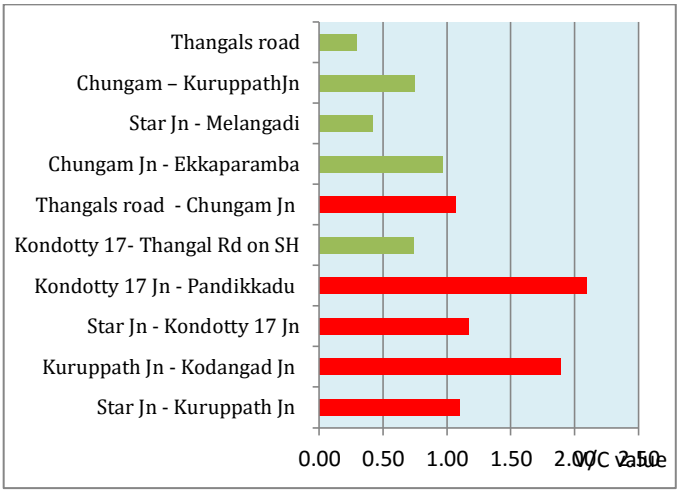

Chart 3: Variation of V/C values of different road links

Table 2: Homogenous road sections in Kondotty town.

Sl. No	Name Of Road	Homogenous Section
I	NH 966 (old NH 213)	Pandikkadu to Kondotty 17 Jn
		Kondotty 17 Jn to Star Jn
		Star Jn to Kuruppathu Jn
		Kuruppathu Jn to Kodangadu
II	SH 65	Chungam Jn to Ekkapparambu
		Chungam Jn to Thangals meet point
		Thangals meetpoint on SH 65 to Kondotty 17 Jn
		Star Jn to Melangadi
III	Other Roads	Thangals Road
		Chungam Jn to Kuruppath (extension link of SH)

Table 3: Recommended design service volume (PCUs per hour)

S.No	Type of carriage way	Total Design Service Volumes for Different Categories of Urban Roads		
		Arterial	Sub-arterial	Collector
1	2-Lane (One-Way)	2400	1900	1400
2	2-Lane (Two-Way)	1500	1200	900
3	3-Lane (One-Way)	3600	2900	2200
4	4-Lane Undivided (Two-Way)	3000	2400	1800
5	4-Lane Divided (Two-Way)	3600	2900	
6	6-Lane Undivided (Two-Way)	4800	3800	
7	6-Lane Divided (Two-Way)	5400	4300	
8	8-Lane Divided (Two-Way)	7200		

Table 4 : Volume Capacity ratio of road links in Kondotty town

HS. No	Road Link	Volume (PCU)/Hr)	CAPACITY(PCU/Hr)	Volume/Capacity
I	**NH 966 (old NH 213) -Palakkad Side**			
1	Star Jn - Kuruppath Jn	3961	3600	**1.10**
2	Kuruppath Jn - Kodangad Jn	2841.5	1500	**1.89**
II	**NH 966 (old NH 213) -Kozhikode Side**			
3	Star Jn - Kondotty 17 Jn	4214.5	3600	**1.17**
4	Kondotty 17 Jn - Pandikkadu Jn	3147.5	1500	**2.10**
III	**SH 65 - Ekkaparamba Side**			
5	Kondotty 17 Jn- Meeting Point of Thangals road on SH	889	1200	**0.74**
6	Meeting Point of Thangals road on SH - Chungam Jn	1285	1200	**1.07**
7	Chungam Jn - Ekkaparamba	1158.5	1200	**0.97**
IV	**SH 65 - Melangadi Side**			
8	Star Jn - Melangadi	502.5	1200	**0.42**
V	**Other roads**			
9	Chungam – KuruppathJn(Extension link of SH 65)	899.5	1200	**0.75**
10	Thangals road	563	1900	**0.30**

6. FUTURE SCOPES OF THE STUDY

The traffic volume studies at mid block sections leads to wide scopes as listed below:

1. Designing of new lanes or road networks
2. Planning of flow pattern for future
3. Improvement for the existing road links.
4. Dynamic traffic management
5. Estimation of highway usage.
6. Computing accident rates
7. Estimation of flow fluctuation characteristics

7. CONCLUSION

The present efficiency and usage of the road networks within the Kondotty town was analysed using the data collected by conducting primary surveys. The characteristics of the mixed flow traffic within the town was obtained. The peak hour of traffic flow on most of the road sections of Kondotty town was found to be between 5 PM and 7 PM. Two wheelers and cars carries a major share of traffic during the peak hours on all road stretches .The undivided road links on National Highway are highly over utilised and requires immediate attention. The condition of the State Highway should be improved to control the problems arising in future. From the study conducted ,it is concluded that conditions of most of the road links in the town are perilous.

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