Impact Factor (SJIF): 5.301

International Journal of Advance Research in Engineering, Science & Technology

e-ISSN: 2393-9877, p-ISSN: 2394-2444

Volume 7, Issue 6, June-2020

EVALUATION OF PASSENGER CAR UNIT

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Abstract— *PCU are used to this quote describes almost everything about the importance of transportation, Is carrying civilization to a brighter future. The road traffic system, travel patterns and other traffic characteristic are different for each various type of roads in India due to difference in geometric patterns, Amount of funds available for the development of road and so on. Simultaneously many relocations and factors used in one stretch may not be suited for another stretch therefore an issue comes up to determine the different traffic engineering parameters which are appropriate to local transportation system characteristics . One such idea is to determine the PCU. find out the elects of varying mixed vehicle type on traffic stream , the traffic volume study data is prime for analysis of network planning, designing of road system. Highway in India is different from other road of the country. Traffic on India road consists of a mix characteristic type of vehicles. There vehicles in the highway have different static and dynamic characteristic.*

Keywords: *PCU*

1. INTRODUCTION

India has the second biggest street network in the world at 5.4 million km. This biggest road network transports about 60% of all goods in the country and about 85% of India's total vehicular traffic. Street transportation will changes and expanded continuously throughout the years with the accessibility between urban communities, rural areas, towns in the nation. The Indian roads network carry almost 90 per cent of the country's passenger traffic and it will carry around 65 per cent of its freight. In India the vehicular traffic increasing at a quick rate. There is a need to create an adequate network of road to cater to the increased vehicular traffic and for movement of goods, Government of India invested 20 per cent of the investment of US$ 1 trillion reserved for infrastructure work during the 12th Five-Year Plan (2012–17) to develop the road network of the country's. The vehicular count on highways and on urban streets has increased at a quick rate due to rapid growth in industrial, economic activities and this scenario demands an efficient highway facilities and road infrastructure in developing and developed country in order to maintain the traffic flow operations. India has a large road network of about 4.32 million kilometers, and acquired a density of 1.31 km of roads per square kilometer of land, which is high when compared with the countries like US, UK, Australia, Sweden and Korea and where density is respectively around 0.67, 0.72, 0.11, 1.05 and 1.29. Traffic volume in India is likely to increase further in future due to substantial growth rate and it will cause severe congestion on all important national highways in the country. Many of the developing nations are facing different levels of challenges for providing efficient vehicular traffic operations due to mixed nature of traffic. There are many categories of vehicles operating and sharing on same carriageway width without any physical segregation between non-motorized vehicles and motorized without proper lane discipline. The operating characteristics of these varieties of vehicles vary from one location to another location with varying traffic composition. Several rural highways with two lanes in India have been widened to six and four lanes and many of the new multilane highway projects has been carried so as to meet the needs of higher traffic with the increasing number of commercial vehicles on these highways. Multilane highways requires more attention with respect to traffic flow state and capacity analysis due to different lane-changing and overtaking manoeuvres as compared to two-lane roads. [1]

SCOPE

1] Present study gives the various pcu values for different highways in morning and evening peak hours.
2] It helps to analyze the traffic flow on national highways around Bangalore city
3] It helps to observe the variation with carriageway width on highway.
4] This study simplifies the analysis of mixed traffic on national highways around Bangalore city and helps to covert different types of vehicles into equivalent number of passenger cars by using Passenger Car Unit (PCU).
5] The present study will be helpful to traffic engineers and practitioners as PCU values are often required in traffic flow and highway capacity studies.
6] New PCU values will helps in capacity estimation.

OBJECTIVES

1) To find out the new pcu values for highways around Bangalore city.
2) To find out the morning and evening flow stream of different highways around the Bangalore city.
3) To compare the pcu values between different highway around Bangalore.

2. STUDY AREA

The study area considered for this present work includes the highways around Bangalore city. To ascertain pcu values the studies are carried out along the below mentioned national highways. location map enclosed

1) Bangalore – Tumkur NH-4
2) Bangalore – mysore SH-17
3) Bangalore – kolar NH-75
4) Bangalore – Chennai NH- 7

2.1 FACTORS COVERING SELECTION OF STUDY AREA

1. Includes both develop and undeveloped area.
2. Includes industrial corridors.
3. Also includes different land use patterns.
4. Many state and district highways have connected.
5. Since income and outgoing vehicular traffic in peak hours on these national highways get varies.

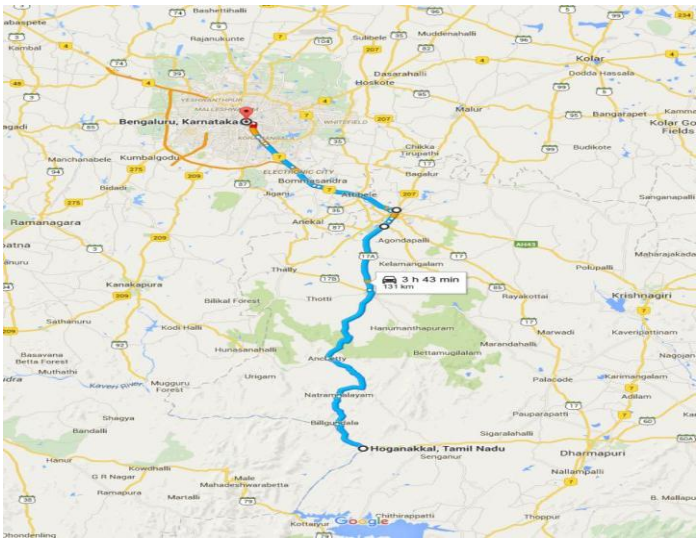

FIG : 1 Location map of Bangalore Chennai highway NH-7

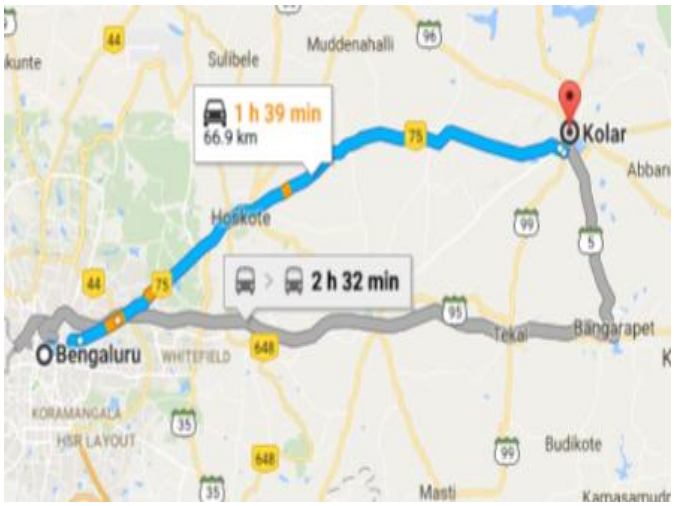

FIG : 2 Location map of Bangalore kolar highway NH-75

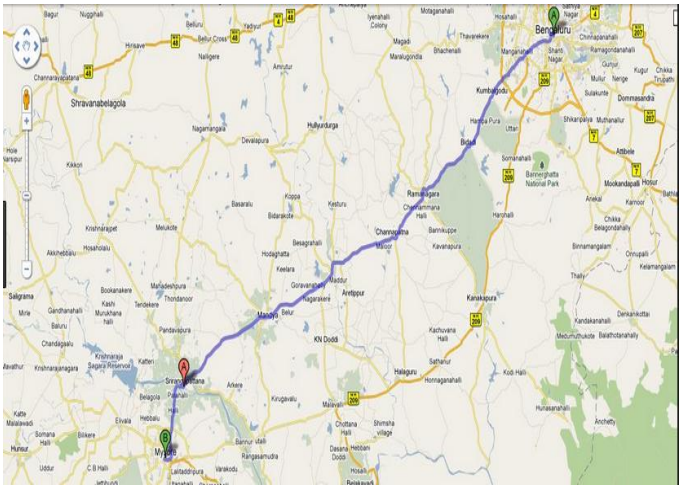

FIG : 3 Location map of Bangalore mysore highway NH-17

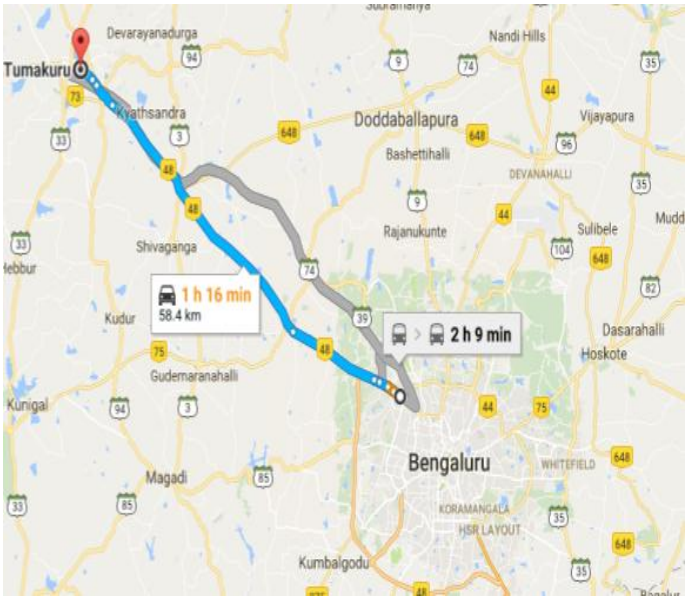

FIG : 4 Location map of Bangalore Tumkur highway NH-4

Fig:5 Bangalore -Tumkur NH-4

FIG:6 Bangalore – Kolar NH-75

2.2 ROUTE SELECTION

The first step is selection of routes and network. Detail study of route map and digitalization of the route map is comes under this step. Already explained in detail in Chapter 3

The following points will be taken in to the consideration while selecting test sections for the collection of data in this present study:

- The selected trap sections should be straight level with tangent section, clear sight distance and free from road intersection effect.
- Camera mounting point should completely cover the trap length.

3. DETERMINATION OF PASSENGER CAR UNIT

Traffic in many parts of the world is heterogeneous, where road space is shared among many traffic modes with different physical dimensions. Loose lane discipline prevails; car following is not the norm. This complicates computing of PCU. Some of the methods for determining passenger car units (PCU) are following

- Headway method
- Chandra's method
- Multiple linear regression method
- Modified Density Method
- Method Based on Relative Delay
- Simulation method

TABLE:1 DATA COLLECTION

Vehicle category	Vehicles included	Average projected rectangular area m^2
CAR	Standard car	5.39
TWO WHEELER	Scooter,motor cycle	1.20
AUTO	3 wheeler autos	4.48
BUS	Buses, mini buses	24.74
LCV	Mini truck, vans	12.81
HCV	Multi-axel trucks	17.62

TABLE: 2 Capacity of two-lane road with different carriageway width and shoulder width

Highway name	Carriageway width (m)	Shoulder width (m)
NH-4	7.0	1.20
NH-75	9.5	1.8
NH-17	7.5	1.6
NH-7	7.2	1.8

Table:3 Pcu values of vehicles as in IRC 64-1990

Sl No	Vehicle Type	Pcu
1	2- wheeler	0.5
2	Bus	3.0
3	3-wheeler	1.0
4	Lcv	3.0
5	Hcv	4.5

Table:4 Passenger car unit for different types of vehicles at different highway section at morning peak hour

Highwaysection	Car	2 Wheeler	3 Wheeler	Bus	Lcv	Hcv
NH-4	1	0.36	0.55	3.52	1.50	4.51
NH-17	1	0.26	5.46	3.00	1.47	2.23
NH-75	1	0.20	0.96	5.33	2.74	4.45
NH-7	1	0.20	1.02	5.53	2.88	4.15

Conclusions

The results are based on the field studies conducted on four different highways around Bangalore city. By considering all vehicle categories that are commonly found in highway. The new pcu values were determined for four different highways separately. The determined new pcu values are not same as the given IRC 64-1990 code .New PCU esteems got from site are very not quite the same as the qualities given in IRC 64-1990 code. It is found that PCU values obtained for motor cycle and auto rickshaw from all sections are smaller than the values given in IRC 106-1990. PCU esteems got for trailer, L.C.V and truck from all area of interstates are higher than the esteem given in IRC 106-1990.This investigation has demonstrated the effect of path width on the PCU for different categories of vehicles and on the capacity of two-lane Highways.

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