# Capacity of Road with vechile Characteristics and Road Geometrics Interface Modelling

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***Abstract***—*Capacity of roads plays a vital role in assuming better network characteristics and in providing good performance of roads. Capacity values play an important role for further modifications of roads. Various geometric measures like carriage way width, sidewalks, service roads, verge, medians, and road reserve and traffic patterns related to different roads. Passenger car equivalent (PCE) and Passenger car Unit (PCU) are typically used for road capacity analysis with heterogeneous traffic conditions. This paper presents important aspects of capacity evaluation for road designing using PCE instead of using PCU. Mathematical model is developed which uses IRC specifications on which regression analysis is performed for capacity values provided for urban roads, which are used for developing standard capacity functions. Relations between capacity and cross section elements are identified, which derives the capacity effecting zones. This relation helps in studying variation in capacity with respect to various widths of road elements. Traffic elements are also considered on par of analysing this measure with PCE property. Impact of geometrics and road elements on capacity is considered and capacity is derived on the basis of PCE and road geometric factors, which results in realistic prevailing road capacities, in Indian roads.*

***Keywords*** *— Road capacity, Passenger car equivalent (PCE), Passenger car unit (PCU), Road geometrics, Indian Road Congress (IRC).*

## I. Introduction

Road traffic in India is termed to be highly heterogeneous which comprises of different types of vehicles like buses, trucks, auto-rickshaws, bikes, scooters, cycles etc. comprising of wide range of static and dynamic characteristics. Due to the high variations in its dimensions at its physical levels and speeds, it is tedious to make these vehicles to follow traffic lanes and the vehicles generally occupy any convenient lateral position on the road depending on the road space that is available for a given instance of time. Hence, expressing traffic volume as number of vehicles for a specified section of road or traffic lanes per unit time those are available terms to be inappropriate for vehicles related to different types with its static and dynamic characteristics comprising in traffic, which generally varies for large extent. The problem for the measurement of volume of traffic measures of vehicles belonging to different types related to its equivalent passenger cars values and expressing its volume basing on Passenger Car Unit (PCU) per hour. It is always very hectic to compute the interaction between the vehicles under heterogeneous traffic conditions. Impedance measure is derived, which is termed to be a mechanism of measuring the interaction between vehicles caused by its flow, subjected to vehicle type, for a specific PCU. This measure is defined in variant with passenger cars and the relative impedance here is quantified in terms of this PCU measures. The Passenger Car Unit (PCU) or Passenger Car Equivalent (PCE) is termed to be the universally adopted unit for measuring traffic volume or capacity. Thus, equivalent passenger measure is taken to be a metric for expressing vehicular composition.

Capacity is considered as a function of traffic and road geometrics the above mentioned road types involve in the capacity calculations in present study. The study is conducted by considering various capacities based on the functioning of various types of roads and the vehicle characteristics are taken by considering passenger car units which involves traffic stream characteristics in the function. Capacity is termed to be the flow of vehicles or passengers per unit time which is independent of demand. Capacity is termed to be a probabilistic measure which varies with respect to time and position. It may vary with the environmental conditions. Performance of the roads is identified with this measure and the traffic compositions.

Since roads have certain width with varying lanes, flow is always defined in terms of width, ADT, termed as average daily traffic, defines the road capacity. Lanes, traffic type and vehicle characteristics are termed to be metrics for road capacity analysis. Analysis of road capacity varies from homogeneous to non-homogeneous with respect to strict lane distributions. Heterogeneous traffic always paves a serious challenge to the road planners. When it comes to the measure of road capacity, all types and modes of traffic can affect can either increase or decrease its capacity which purely depends on size, speed and available road geometrics. Vehicle properties are always mechanically related to road capacity. Traffic volume with its stream composition and distribution of transverse gap and longitudinal clearance of vehicles are termed to be traffic measures for capacity analysis.

Roadway characteristics like the horizontal and vertical alignments, magnitude or grades, roadway elements pavement width, type with its structural conditions, type of road, pavement and skid resistance are termed to be vital in capacity analysis. In addition to the road characteristics, environmental, climatic and traffic conditions also influence the equivalency factors for larger extent.

Roads are categorised into different types depending on the characteristics of the road. The major classification includes arterial, sub-arterial and collector streets or local streets with side-walks. Arterial roads correspond to major roads of the city or main roads which connect with express ways, national highways and national highways. These generally have with high speeds and heavy traffic. Sub-arterial roads are those which connect collector streets and local streets with its corresponding arterial roads. These are designed for slow traffic with shorter distance. Safety measures are to be coined at intersections, properties related to functionality of sub-arterial roads is very similar to arterial with difference in its travel mobility. Collector streets or local streets correspond to minor roads used in residential units, shopping and business centers. These roads need not be straight but could follow contours of land. Parking restrictions are its low level except at peak times.

Estimation of road capacity generally depends on other major factor corresponding to traffic volumes termed with passenger car units (PCU), which directly effects the capacity estimations. Level-of –service and consideration of factors corresponding to overall effects of the vehicles on traffic stream performance are the basic principles applied for the estimation of PCU values. The other important measures of traffic flow include mean travel time and time of occupancy. These generally evaluate LOS of traffic flow. Speed is another measure for performance analysis and in the estimation of PCU.

Passenger equivalent value is another measure which is used in the analysis of road capacity. PCE is generally measured depending on highway capacity, traffic delay, and traffic speed for a particular time, traffic headways and depending on certain simulation models for two and four lanes and capacity relations, especially for road blocks. Mathematical model for capacity function basing on road geometric design elements is to be derived for the calculation of PCE.

## II. Literature survey

Road capacity analysis is a major goal and there raised many methodologies for analysing these values, for a lucid change in the measures in case of any changes in measures. As per the study made by central Road Research Institute (CRRI), there is a large variant in $R^2$ factor calculated by Multiple-Linear-Regression analysis. Simple linear regression is also deployed by taking total traffic volume as an independent parameter. It has been found that the multiple-linear-regression equations developed has major deviations. The $R^2$ values, in the case of simple regression equations, are also found to be higher than in the case of multiple linear regression equations [1].

As per the methodology proposed by Hoban, regression analysis is summarized with linear speed-volume relationship, which is claimed to be used in speed-volume relations. It is given that several factors of road capacity analysis measures is varied with the slopes of the speed-volume relationships appeared [2]. Linear and quadratic forms of speed-volume relationships on urban roads in India have given relation between speed and volume. An enveloping curve technique is used by plotting a curve bounding the data points for accuracy in point of turning on the speed-volume curve [3].

An important feature of speed-flow fundamental diagram is analyzed using two-segment linear functions. It is derived that speed may remain constant with increasing flow for certain range. The break point, at which speed starts decreasing, for an extent of two-thirds or three-quarters of the maximum flows and the speed at maximum flows, in the absence of congestion [4]. Linear model has been derived for estimation of capacity of rural roads speed-flow fundamental measures has been defined for road capacity analysis [5].
Speed, density and flow characteristics are studied for establishing relations between the measures. It is derived that there is a decrease in speed with increasing traffic density, which indicates a linear relationship between them. Capacity value estimation is proved to be inadequate with the increase in traffic density [6].

The ratio of maximum value of volume and free-flow speed, termed as speed ratio is derived to read the increase of free-flow speed with respect to the decrease in speed ratio. This depicts the sharpness of speed-flow function, i.e. the aspect of speed drop with increase in flow rate. It is analyzed that, after the flow rate exceeds a limited rate of flow, there is a decrease in speed which marks below free-flow speed with an increase in flow rate towards the speed at capacity due to increase in interaction level between the vehicles. [7].

Time-dependent speed-flow model, termed as Akcelik's function is defined in developing alternative versions of HCM speed-flow models for basic free-way segments and multi-lane highways. This estimation is based on queuing theory concepts, providing a tranquil transformation between queuing-delay of steady state with function for unsaturated conditions and a deterministic-delay function for over saturated conditions [8].

There are different approaches to estimate the capacity of a road. The direct empirical approach for estimation of capacity relies on the observations related to direct field measures. The capacity estimation guidelines as depicted by various agencies like, Transportation Research Board, Indian Roads Congress and similar other agencies, which depends on empirical methods basing on theoretical methodology, in an indirect manner. Among all the methods available for deriving capacity measures, microscopic simulation technique is now a widely used as the most effective tool for studying the traffic problems [9].

Simple linear regression equations were generated, by taking the total traffic volume as independent variables and the average speed for a specific vehicle division is considered as dependent variable with intercepts agreeing with the free speed values depending on specification of roads provided. Moreover, the theoretical parabolic curve of speed-flow relationship was overlapped over these straight lines overlapping for each of the road categories. The point of intersection made by dropping lines and parabolic curves as taken to be the point of capacity [10]. Capacity standards are derived for estimating mixed traffic characteristics to determine four-lane estimation with divided carriageways, located in plain terrain for level-of-service (LOS) which is defined as volume of capacity of roads [11].

The critical study on Road-User-Cost Data Updation has paved to the aspect that when shoulders are discarded, flow at its maximum extent, for a four-lane road in terms of plain terrain can accommodate the study of capacity of four-lane divided carriageway. The authors commented that the PCU measures as defined by IRC, which is utilized for estimating these capacity measures, are to be checked for accuracy and appropriateness. The speed-volume equations, for rolling and hilly terrain, derived from equations related to plain-terrain and free-speeds in different terrains have been used as moderating factors [12].

Service-flow rates and traffic capacities for range traffic variables such as terrain type, truck traffic percentage, values in accordance to directional distributions, the peak hour factor and the K-factor are derived for presenting estimated traffic estimates. This measure helps the planners in the derivation of the count for traffic lanes for the projected traffic of given composition and nature [13]. The highway capacity manual is defined which indicates the rate of flow of traffic speed with respect to multilane highways which are generally proved to be insensitive to traffic volume up to flow rate. For the estimation of free-flow speeds, the multilane highway capacity measures are defined under ideal conditions. [14].

The study on Road-User-Cost Data Updation is used to present critical aspects relevant to capacity factors of road. The capacity of carriageways with paved shoulders on plain terrains for four-lanes is being estimated to find the capacity of road [15].

Effect of lane width on capacity with adjustment factors for capacity on substandard lane width are used to find lower than those factors given in HCM. Lane widening may also correspond to an increase the lane widening with the increase in capacity of road [16].

Simulation technique is derived to estimate the capacity of two-lane road by developing a speed-volume relationship. This relation is widely useful in finding capacity of two-lane road and traffic flow situations [17].

The overtaking demand lane changing has its impact of increase in the traffic volume at a rapid speed, whereas passing opportunities in the opposing lane decline with increase in its volume. Hence, the flow of traffic in one direction has its impact on its flow in the other direction. The problem is more acute for heterogeneous traffic flow, which is uneven. Here the traffic flow, when speed is termed to be differential for heterogeneous traffic is quite substantial. This generally increases the required count of overtaking, considerably with limited opportunities to overtake. The capacity of a two-lane road for a mixed traffic condition can be derived using $C_a = c_b.f_g.f_w.f_{ds}.f_{smv}.f_s.f_{ui}$ [18].

## III. Methodology

The data required to verify is collected in Nellore city and various mid blocks with different geometric specifications are considered.

**Table 1. Mid Blocks for Capacity Calculation**

| S. NO | MID BLOCKS |
|---|---|
| 1 | KANAKAMAHAL TO GANDHI BOMMA |
| 2 | VRC TO GANDHI BOMMA |
| 3 | GANDHI BOMMA TO VRC |
| 4 | NEHRU STATUE TO VRC |
| 5 | ATMAKUR BUS STOP TO RAMALINGAPURAM |
| 6 | BV NAGAR TO RAMALINGAPURAM |

| | |
|---|---|
| 7 | VRC TO RAMALINGAPURAM |
| 8 | RTC TO MSR |
| 9 | BV NAGAR TO MSR |
| 10 | CURRENT OFFICE TO MSR |
| 11 | CURRENT OFFICE TO AYYAPA GUDI |
| 12 | BV NAGAR TO AYYAPA GUDI |
| 13 | NH TO AYYAPA GUDI |

The traffic volume data is collected in the above study locations to determine capacity in terms of cars, three wheelers, two wheelers and heavy vehicles. The peak hour volume data is taken for the calculation of PCE values of respective vehicles and to determine capacity of the mid blocks. The traffic volumes are listed in Table 2.

**Table 2. Peak Hour Volume Data in Nellore City**

| LOCATION | CAR | 3W | 2W | HW | TOTAL |
|---|---|---|---|---|---|
| KANAKAMAHAL TO GANDHI BOMMA | 78 | 224 | 344 | 22 | 668 |
| VRC TO GANDHI BOMMA | 96 | 236 | 324 | 25 | 681 |
| GANDHI BOMMA TO VRC | 84 | 212 | 376 | 28 | 700 |
| NEHRU STATUE TO VRC | 69 | 242 | 362 | 24 | 697 |
| ATMAKUR BUS STOP TO RAMALINGAPURAM | 59 | 223 | 323 | 23 | 628 |
| BV NAGAR TO RAMALINGAPURAM | 54 | 242 | 348 | 21 | 665 |
| VRC TO RAMALINGAPURAM | 61 | 235 | 337 | 27 | 660 |
| RTC TO MSR | 89 | 226 | 319 | 24 | 658 |
| BV NAGAR TO MSR | 45 | 241 | 339 | 28 | 653 |
| CURRENT OFFICE TO MSR | 97 | 232 | 318 | 26 | 673 |
| CURRENT OFFICE TO AYYAPA GUDI | 67 | 254 | 379 | 27 | 727 |
| BV NAGAR TO AYYAPA GUDI | 79 | 239 | 321 | 26 | 665 |
| NH TO AYYAPA GUDI | 58 | 227 | 356 | 25 | 666 |

The PCE's are calculated for the mid blocks taken in the study region. The PCE values are calculated using the steps defined. The obtained PCE values are listed in table 3.

**Table 3. PCE Values in Mid Blocks**

| Mid Blocks Values | Various PCE | | | |
|---|---|---|---|---|
| KANAKAMAHAL TO GANDHI BOMMA | 1 | 1.140 | 0.149 | 3.913 |
| VRC TO GANDHI BOMMA | 1 | 1.254 | 0.126 | 4.403 |
| GANDHI BOMMA TO VRC | 1 | 1.337 | 0.171 | 4.969 |
| NEHRU STATUE TO VRC | 1 | 1.232 | 0.149 | 3.805 |
| ATMAKUR BUS STOP TO RAMALINGAPURAM | 1 | 1.393 | 0.142 | 5.188 |
| BV NAGAR TO RAMALINGAPURAM | 1 | 1.868 | 0.152 | 5.164 |
| VRC TO RAMALINGAPURAM | 1 | 1.337 | 0.159 | 5.493 |
| RTC TO MSR | 1 | 1.393 | 0.213 | 5.435 |
| BV NAGAR TO MSR | 1 | 1.463 | 0.157 | 5.707 |
| CURRENT OFFICE TO MSR | 1 | 1.368 | 0.168 | 5.336 |
| CURRENT OFFICE TO AYYAPA GUDI | 1 | 1.170 | 0.170 | 5.707 |
| BV NAGAR TO AYYAPA GUDI | 1 | 1.059 | 0.164 | 5.633 |
| NH TO AYYAPA GUDI | 1 | 1.286 | 0.163 | 5.435 |

The capacities are calculated using methods available in literature to cross check the obtained equation. These capacities are determined based on various factors effecting on the base capacity of the road based on the road type which are defined in IRC 86-1983. These capacities provide a comparative analysis between the capacities obtained using the developed mathematical model which is based on the specifications of road geometrics. The capacity is mainly based on the space available along the road. This maximum capacity is obtained on a road stretch when maximum occupying space available for vehicle user. This maximum capacity on particular road width again affected based on various geometric elements available on the road and movement of cross flow vehicles. This affects the capacity value and allows only some capacity on the road. This capacity can be calculated in various methods. The present comparative capacities are calculated from the literature where the factors that effects capacity measures

The obtained capacity function determines capacity of the road block considering various elements of the road block which provides different services on road. The obtained equation can be seen as follows.

***Capacity = -235.204 (Side Walk) – 1326.476 (Cycle Track) – 140.952 (Service Road) + 972 (Reserve) + 218.13 (Carriage Way) + 82.474 (Median) + 2588.66 (Shoulder) – 943.124 (Parking)***

The elements include side walk, cycle track, service road, reserve, carriage way, median, shoulder and parking area. There are specific widths for all these elements that could be accommodated in the space provided for the road with its kind of functionality. The present mid blocks are taken in the growing urban location where the scope of capacity estimation is possible based on the road widths and different services available along the road.

Figure 1.1 Videography Survey at B.V Nagar , Nellore

**Table4. Calculation of capacities in Mid Blocks**

| S.NO | MID BLOCK | GRD | LW | DIR SPLIT | SMV | SHOULDER COND | UEI | $F_G$ | $F_W$ | $F_{DS}$ | $F_{SMV}$ | $F_S$ | $F_{UI}$ | BASE CAP | CAPACITY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | KANAKAMAHAL TO GANDHI BOMMA | 0 | 3.30 | 50 | 10 | POOR | 0 | 1.00 | 0.88 | 1.00 | 1.00 | 0.77 | 1.00 | 3100 | 2100.56 |
| 2 | VRC TO GANDHI BOMMA | 0 | 3.30 | 60 | 10 | AVG | 0 | 1.00 | 0.88 | 0.97 | 1.00 | 0.85 | 1.00 | 3100 | 2249.236 |
| 3 | GANDHI BOMMA TO VRC | 0 | 3.50 | 60 | 10 | AVG | 0 | 1.00 | 0.97 | 0.97 | 1.00 | 0.85 | 1.00 | 3100 | 2479.272 |
| 4 | NEHRU STATUE TO VRC | 0 | 3.50 | 50 | 10 | POOR | 0 | 1.00 | 0.97 | 1.00 | 1.00 | 0.77 | 1.00 | 3100 | 2315.39 |
| 5 | ATMAKUR BUS STOP TO RAMALINGAPURAM | -1 | 3.60 | 50 | 10 | AVG | 0 | 1.03 | 1.00 | 1.00 | 1.00 | 0.85 | 1.00 | 3100 | 2714.05 |
| 6 | BV NAGAR TO RAMALINGAPURAM | 0 | 3.60 | 50 | 10 | AVG | 0 | 1.00 | 1.00 | 1.00 | 1.00 | 0.85 | 1.00 | 3100 | 2635 |
| 7 | VRC TO RAMALINGAPURAM | 1 | 3.60 | 70 | 10 | AVG | 0 | 0.97 | 1.00 | 0.94 | 1.00 | 0.85 | 1.00 | 3100 | 2402.593 |
| 8 | RTC TO MSR | 0 | 3.50 | 60 | 10 | AVG | 0 | 1.00 | 0.97 | 0.97 | 1.00 | 0.85 | 1.00 | 3100 | 2479.272 |
| 9 | BV NAGAR TO MSR | -1 | 3.00 | 60 | 10 | POOR | 0 | 1.03 | 0.76 | 0.97 | 1.00 | 0.77 | 1.00 | 3100 | 1812.487 |
| 10 | CURRENT OFFICE TO MSR | 0 | 3.50 | 60 | 10 | POOR | 0 | 1.00 | 0.97 | 0.97 | 1.00 | 0.77 | 1.00 | 3100 | 2245.928 |
| 11 | CURRENT OFFICE TO AYYAPA GUDI | 0 | 3.30 | 50 | 10 | POOR | 0 | 1.00 | 0.88 | 1.00 | 1.00 | 0.77 | 1.00 | 3100 | 2100.56 |
| 12 | BV NAGAR TO AYYAPA GUDI | -1 | 3.60 | 60 | 10 | AVG | 0 | 1.03 | 1.00 | 0.97 | 1.00 | 0.85 | 1.00 | 3100 | 2632.629 |
| 13 | NH TO AYYAPA GUDI | 0 | 3.60 | 50 | 10 | AVG | 0 | 1.00 | 1.00 | 1.00 | 1.00 | 0.85 | 1.00 | 3100 | 2635 |

Table5. Observations on Mid Blocks of Study Region

| S.NO | MID BLOCK | SIDE WALK | CYCLE TRACK | VERGE | SERVICE ROAD | RESERVE | CARRIAGE WAY | PROVISION FOR ADDITIONAL LANE | MEDIAN | UN PAVED | PARKING |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | KANAKAMAHAL TO GANDHI BOMMA | 1.5 | 0 | 0 | 0 | 1.9 | 7.6 | 0 | 0 | 0 | 1 |
| 2 | VRC TO GANDHI BOMMA | 1.5 | 0 | 0 | 0 | 2 | 7.6 | 0 | 0 | 0 | 1 |
| 3 | GANDHI BOMMA TO VRC | 1.2 | 0 | 0 | 0 | 2 | 7.6 | 0 | 1.5 | 0 | 1 |
| 4 | NEHRU STATUE TO VRC | 1.5 | 0 | 0 | 0 | 2 | 7.6 | 0 | 2 | 0 | 1 |
| 5 | ATMAKUR BUS STOP TO RAMALINGAPURAM | 1.5 | 0 | 0 | 0 | 2.2 | 7.6 | 1 | 2 | 0 | 1 |
| 6 | BV NAGAR TO RAMALINGAPURAM | 2 | 0 | 0 | 0 | 2.5 | 7 | 1 | 2.2 | 0 | 1.2 |
| 7 | VRC TO RAMALINGAPURAM | 1.5 | 0 | 0 | 0 | 2.5 | 7 | 0 | 2 | 0 | 1.5 |
| 8 | RTC TO MSR | 1.5 | 0 | 0 | 0 | 2 | 7.5 | 0 | 2.2 | 0 | 1 |
| 9 | BV NAGAR TO MSR | 1.5 | 0 | 0 | 0 | 2 | 7 | 0 | 2.2 | 0 | 1.5 |
| 10 | CURRENT OFFICE TO MSR | 2 | 0 | 0 | 0 | 2 | 7.5 | 1 | 2 | 0 | 1 |
| 11 | CURRENT OFFICE TO AYYAPA GUDI | 2 | 0 | 0 | 0 | 2.2 | 7.6 | 0 | 2.2 | 0 | 1.5 |
| 12 | BV NAGAR TO AYYAPA GUDI | 2 | 0 | 0 | 0 | 2.5 | 7.6 | 0 | 2.2 | 0 | 1.2 |
| 13 | NH TO AYYAPA GUDI | 2 | 0 | 0 | 0 | 2.5 | 7 | 0 | 2 | 0 | 1 |

Table6. Calculated Capacities for the Mid Blocks

| S.NO | MID BLOCK | CALC CAPACITY | ACTUAL CAPACITY | % VARIATION |
|---|---|---|---|---|
| 1 | KANAKAMAHAL TO GANDHI BOMMA | 2208.672 | 2100.560 | 5.14684 |
| 2 | VRC TO GANDHI BOMMA | 2305.873 | 2249.236 | 2.51805 |
| 3 | GANDHI BOMMA TO VRC | 2500.147 | 2479.272 | 0.84197 |
| 4 | NEHRU STATUE TO VRC | 24470.823 | 2315.390 | 6.71302 |
| 5 | ATMAKUR BUS STOP TO RAMALINGAPURAM | 2665.224 | 2714.050 | -1.79901 |
| 6 | BV NAGAR TO RAMALINGAPURAM | 2536.215 | 2635.000 | -3.74897 |
| 7 | VRC TO RAMALINGAPURAM | 2354.215 | 2402.593 | -2.0065 |
| 8 | RTC TO MSR | 2465.505 | 2479.272 | -0.5553 |
| 9 | BV NAGAR TO MSR | 1884.877 | 1812.487 | 3.99397 |
| 10 | CURRENT OFFICE TO MSR | 2331.407 | 2245.928 | 3.805971 |
| 11 | CURRENT OFFICE TO AYYAPA GUDI | 2092.554 | 2100.560 | -0.38112 |
| 12 | BV NAGAR TO AYYAPA GUDI | 2667.093 | 2632.629 | 1.309117 |
| 13 | NH5 TO AYYAPA GUDI | 2708.345 | 2635.000 | 2.783476 |

Study is conducted to develop a mathematical model to understand the relation of capacity function with respect to various factors that are available as per design standards. The factors are considered in terms of width of the element which is the key for increase or decrease in capacity. The capacity function so obtained is validated by calculated capacity values in a study region. The variation in capacities calculated in two methods is not more than 10%. The statistical significance of the developed model is also determined as 97.1% by means of $R^2$ – Statistic Value.

## IV. Conclusion

Factors that are considered in the development of present model include side walk, cycle track, verge, service road, reserve, carriage way, provision for additional lane, median, unpaved shoulder and parking lane. It has been shown that the capacity function varies due to passage of pedestrians as there are interrelated to each other. Capacity function is also affected by cycle traffic cross flows and their intrusion into service lanes. It has been analysed that service lane connection towards arterial roads at junction points also affects the road capacity. Reserve roads, medians, parking lanes on sub-arterials and carriage ways tend to affect the value of road capacity at larger extent. The capacity values are different from the base capacity values and are nearly equal to the theoretical models which are calculated considering other factors. This research has been expected to be extended to the vehicular and driver characteristics with precise data and more geometric elements into consideration.

Certain empirical measures are further derived and maintained with more data accumulation so as to refine the model and for use of capacity estimation improvement.

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