EVALUATION OF PCU FACTORS FOR TWO LANE SUB-URBAN ROADS

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Degree of Master of Engineering

Department of Civil Engineering

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DECLARATION OF THE CANDIDATE AND THE SUPERVISOR

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Abstract

Passenger Car Unit (PCU) or Passenger Car Equivalent (PCE) is defined as the number of passenger cars displaced in the traffic flow by any other vehicle mode under the existing roadway and traffic conditions. PCU value is used to convert non-uniformity of all vehicle modes into common unit and is used to define the capacity of the road. Nature of the traffic on developing countries like Sri Lanka is heterogeneous with wide variation in physical dimensions, weight and dynamic characteristics. Furthermore the operating characteristics of the road users and the roadway environment also vary.

PCU factors used at present in Sri Lanka have not been reviewed to reflect the present vehicle characteristics, road geometric and surface conditions.

Traffic data were collected using video filming technique to record vehicles in both directions for 2-3 hours during different phases of weekdays on sub-urban two way two lane road segments. Study locations were selected based on uniformity of road characteristics and non-obstruction sections to traffic due to bus stops, intersections etc.

In this study PCU factors are derived using method proposed by Chandra et al (1995). According to Chandra, PCU factors for different vehicles under mixed traffic condition is directly proportional to the speed ratio and inversely proportional to the space occupancy ratio with respect to the standard design vehicle i.e. a car.

$$PCUi = \frac{Vc/Vi}{Ac/Ai}$$

Vc – Speed of car
Vi–Speed of ith type vehicle
Ac – Projected rectangular area of a car
Ai–Projected rectangular area of ith type vehicle

The main findings of the study give the PCU factors for 10 vehicle categories. PCU values are similar in current study and existing literature for ‘Van’ and ‘Medium Commercial Vehicle’ categories. PCU values for above two types are 1.17 and 2.06 respectively. But other categories show a significant variation. The new PCU value for ‘Motorcycle’ and ‘Three wheeler’ are 0.2 and 0.53 respectively while the existing values for those two categories are 0.5 and 0.75 respectively. This study gives PCU 2.14 for ‘Medium Bus’ and 3.40 for ‘Large Bus’. But the existing values for above two classifications are 1.6 and 2.4 respectively. The new PCU value for ‘Small Commercial Vehicles’ and ‘Large Commercial Vehicles’ are 0.98 and 3.34 respectively while the existing values for those two categories are 1.5 and 3.8 respectively. PCU value for the new vehicle category called ‘Passenger Car (Small)’ is 0.75.

Derived PCU factors can be used for the planning and design purposes of two way two lane roads in Sri Lanka. Further research could be carried out to determine PCU factors for Expressways, Multilane highways and Intersections.

Key Words: PCU, PCE, Heterogeneous traffic flow, Highway capacity

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LIST OF ABBREVIATIONS

Abbreviation	Description
HCM	Highway Capacity Manual
LCV	Large Commercial Vehicles
LOS	Level of Service
MCV	Medium Commercial Vehicles
PCE	Passenger Car Equivalency
PCU	Passenger Car Unit
SCV	Small Commercial Vehicles
V/C	Volume to Capacity ratio

1 INTRODUCTION

1.1 General Background

Two lane roads are commonly available road type of the road network in the world as well as in Sri Lanka. Therefore any research related to the two lane geometry is essential to get accurate assessment of present road network and developing well-organized road network in the future.

Different vehicle types on the road occupy different spaces and drive at different speed. Also the driver behavior of the different types of vehicles varies considerably. Thus a uniform measure of vehicles is necessary to calculate traffic volume and capacity of the road under mixed traffic flow. To achieve this, the concept of Passenger Car Unit (PCU) was developed to convert other vehicle types into passenger car.

Passenger Car Unit (PCU) also known as Passenger Car Equivalent (PCE) was introduced in Highway Capacity Manual (HCM)-1965. PCU is the number of passenger cars that are displaced by a single heavy vehicle of a particular type under prevailing roadway, traffic and control condition.

HCM-1950 used a single factor of 2.0 to account for the impact of heavy vehicles on multi-lane highways.

Two lane highways are the majority of road network in the world. Most of the national highways in Sri Lanka are of two lane highway with two way mixed traffic condition and with poor lane discipline. Therefore estimating PCU values for two lane roads are very helpful to calculate traffic volumes of two lane roads in Sri Lanka.

1.2 Objectives

Objective of this study is to check whether the currently used PCU values are still valid or need to be revised.

1.3 Problem Statement

These days more varieties of vehicles are manufactured, some are used automatic transmission and some are used electric power with the fuel power (hybrid vehicle). Driver behavior, road way characteristics and traffic composition are far different from that prevailed at the time of derivation of present PCU values in 1996. Therefore there are chances that the available PCU factors are not actually reflecting of the present roadway and traffic condition.

PCU values of different vehicle categories are calculated by keeping a standard passenger car as the basis. But wide varieties of passenger cars are in operation in Sri Lanka at present. Passenger cars available in Sri Lankan roads belong to hatchback category and sedan category. Therefore the characteristics of the standard passenger car itself need to be defined.

1.4 Scope of the Report

Chapter 1 : Introduction. This chapter describes the general background of this study is based.

Chapter 2 : Literature Review. This chapter describes the literature referred.

Chapter 3 : Methodology and Data Collection. In this chapter, the data collected at the field are tabulated.

Chapter 4 : Analysis. In this chapter, collected data are analyzed and simulated.

Chapter 5 : Conclusion and Recommendation. In this chapter, findings are tabulated and conclusions and recommendations are made.

2 LITERATURE REVIEW

Literature review was carried out to identify the factors affecting to the PCU values and the most suitable method to evaluate PCU under Sri Lankan condition.

2.1 Factors Affecting PCU Values

PCU values depend on the following factors; (Anand et al., 1999)

I. Vehicle Characteristics: Physical and mechanical, such as length, width, power, accelerations, deceleration and braking characteristics of the vehicles.

II. Stream (traffic flow) Characteristics:

a) Mean stream speed.
b) Transverse gap or lateral clearance distribution of vehicles at different speed of flow.
c) Longitudinal gap distribution of vehicles at different speeds of flow.
d) Speed characteristics of the stream such as speed distribution, dispersion and speed differences between different adjoining vehicles in longitudinal and transverse directions.
e) Stream composition. (i.e. percentage composition of different classes of vehicles.)
f) Traffic volume to capacity ratio.
g) Pedestrian volume.
h) Flow conditions.

III. Roadway characteristics

a) Horizontal alignment.
b) Location: rural, urban, and sub-urban.
c) Stretch: mid-block, signalized intersection, police controlled intersection, uncontrolled intersections and rotary.
d) Skid resistance of pavement surface.
e) Traffic flow regulations such as one-way, two-way, divided and undivided roads.

f) Number of lanes and pavement width.
g) Sight distance.
h) Pavement surface, unevenness, type and structural condition.

IV. Environmental characteristics
a) Surroundings and local factors.
b) Obstructions.
c) Roadway location - embankment, cut, underpass, overpass, tunnel.
d) Terrain conditions: plain, rolling, hilly, mountainous.

V. Climatic conditions.
a) Fog, mist.
b) Rainy, dry.

VI. Control conditions.
a) Posted speed limit.
b) Segregation of slow and fast moving vehicles.
c) Free access, control of access.

At the data collection stage, sites can be selected in such a way that most of the above conditions are uniform. But the roadway characteristics such as pavement width, shoulder condition, directional distribution and percentage of slow moving traffic cannot be make uniform and hence those factors directly contribute to the PCU value estimation.

2.1.1 Pavement Width

Farouki et al., (1976) investigated the effect of the carriageway width on speeds of cars in the special case of free-flow conditions in suburban roads in Belfast. It was found that the mean-free speed of cars in a suburban area increases linearly with the carriageway width over a certain range of width from 5.2 to 11.3 m.

Yagar et al., (1983) studied and found that speed changes exponentially with the change in lane width. For a practical range of lane width from 3.3 to 3.8 m, it was

found that the operating speed at a given location decreases by approximately 5.7 km/h for each meter reduction in the width.

Hossain et al., (1999) investigated the vehicular free speed characteristics on two-lane national highways in Bangladesh. An analysis revealed that the free speeds of commonly available vehicles follow a normal distribution. A linear regression analysis was conducted to explore the relationship between free speed and the pavement and shoulder widths. It has been found that in a pavement width range of 5.8 to 7.5 m, the free speed of motorized vehicles increased in a range of 7.3 to 10.3 km/h for each meter of pavement widening for flat and straight sections. Increase in speed with width is more in cars as compared to that of trucks/buses resulting in higher PCU value for buses or trucks.

Chandra et al., (2003) studied the effect of lane width on PCU values and hence upon the capacity of a two-lane road under mixed traffic conditions. Data were collected at different sections of two-lane roads with the carriageway width ranging from 5.5 to 8.8 m. These data were analyzed and adjustment factors for lane width were calculated. They concluded that the lane width of two lane highways varies from less than 3.0 to 4.0 m or even more. The narrow lanes do not provide an adequate margin of error for vehicles and, therefore, speeds of individual vehicles drop. The effect of lane width is more prominent under mixed traffic conditions when vehicles do not follow one another and tend to move abreast. It is found that the PCU for a vehicle type increases with increasing lane width. The effect of lane width on the PCU is apparently linear; the slope of linearity depends on type of vehicle.

Sachdeva (2004) also investigated the effect of pavement width on PCU value for single lane, two lane and four lane roads. In general he observed an increase in PCU value with increase in lane width of for all category of vehicles, for all other identified influencing factors (shoulder condition, directional split and percentage of slow moving traffic) remaining constant. This may be attributed to more freedom of movement experienced by the individual vehicle at wider road.

2.1.2 Shoulder Condition

Chandra and Kumar (1996) investigated the effect of shoulder condition on the speed of different types of vehicles and their placement on the road during passing and overtaking maneuvers on single- and two-lane highways. They concluded that the average speed of a vehicle on a two-lane highway decreases by 5 to 8.5% depending upon the class of vehicle, when shoulder condition changed from bad to worse.

Sachdeva (2004) performed a study to observe the effect of shoulder on PCU values. He classified the shoulders into four categories namely surfaced, good, average and poor shoulder. From the study it is observed that PCU value of a vehicle on a road increases with increase in quality of shoulder. A better shoulder provides an additional usable width to a vehicle whereas inferior shoulder may even restrict the use of the available carriageway of the road. Thus a better shoulder can effectively increase the width of the carriageway and, therefore, results in higher PCU value for different vehicles due to more speed differential between car and a truck/bus. The qualitative categorization of shoulder is surfaced, good, average and poor which are assigned 5, 10, 15 and 20 numerical values respectively.

2.1.3 Directional Split

HCM (1994) studied that at an even split in each direction the capacity of a two-lane road under ideal condition is 2800 passenger car units per hour (PCU/h). It reduces to 2000 PCU/h when all traffic is in one direction only. The capacity has now been revised to 3200 PCU/h in the 2000 edition of HCM. It is assumed that the capacity is nearly independent of the directional distribution of traffic on the facility.

Chandra et al., (2001) found in a study conducted on two-lane roads in India that capacity reduces as the split moves away from 50 / 50. The capacity of a two-lane road at even split in two directions is estimated as 2920 PCU/h, which is less than the value specified in HCM (2000).

Sachdeva (2004) also investigated the effect of direction split on PCU value on two lane, intermediate lane and single lane roads and observed that PCU value for a vehicle decreases as the directional split of traffic deviates from 50/50.As the traffic

increases the overtaking requirements also increases but the overtaking opportunities depend upon the traffic from the opposite direction. If the traffic is not balanced in two directions then the overtaking opportunities will sharply reduce and vehicles will be forced to travel at low speed. This will result in overall low speed of traffic stream with less speed differential with car and hence low PCU value for a vehicle.

2.1.4 Percentage of Slow Moving Traffic

Sachdeva (2004) investigated the effect of slow moving vehicle in traffic stream with large variation from less than 10% to 50% and concluded that PCU value for bus and truck increases with increase in percentage of slow moving vehicle.

2.2 Methods Available to Evaluate PCU Value

After introducing the concept of PCU, number of studies have been started to find a suitable method to calculate PCU values in all over the world. Following methods are using for PCU calculation at present.

2.2.1 HCM Method

For two-lane highways, PCU were calculated from speed distributions of cars and trucks for given volume and grade. (Cunagin 1982)

2.2.2 Methods Based on Headway

Headway (time or space) is a measure of the space occupied by a vehicle. This is the most commonly used method for measuring PCU at signalized intersections. Many researchers have used headway as the basis of estimation.

Greenshields et al., (1947) evaluated PCU value by equation 2.1. This method is known as basic headway method.

$$PCU_i = {}^{H_i}/_{H_c} \ldots\ldots\ldots\ldots\ldots\ldots \quad (2.1)$$

Where PCU_i = passenger car unit of vehicle type

H_i = average headway of vehicle type

H_c = average headway of passenger car

Werner and Morrall (1976) proposed to determine PCU using headways when the roadway is sufficiently congested on level terrain.

$$PCU = \left(\frac{H_M}{H_B} - P_C\right) \Big/ P_T \quad \text{..... (2.2)}$$

Where H_M = average headway for a sample including all vehicle types

H_B = average headway for a sample of passenger cars only

P_C = proportion of cars

P_T = proportion of trucks

Seguin et al., (1982) proposed PCU as the ratio of average headway for a vehicle type and average headway for passenger car.

$$PCU_{ij} = H_{ij} \Big/ H_{pcj} \quad \text{..... (2.3)}$$

Where PCU_{ij} = PCU of vehicle type i under conditions j

H_{ij} = average headway for vehicle type i,

H_{pcj} = average headway for passenger car for conditions j.

Cunagin et al., (1982) studied the effect of the presence of heavy trucks on freeway traffic streams using time headway based on headway type, lane width, and traffic volume. They conclude that the presence of trucks in the traffic stream is accompanied by an increase in the mean headway. They suggested the equation 2.4 for calculating the PCU.

$$PCU_{ij} = H_{ij} \Big/ H_B \quad \text{..... (2.4)}$$

Where H_{ij} = mean lagging headway of vehicle type i under conditions j

H_B = mean lagging headway of passenger cars.

Krammes et al., (1986) derived PCU equation in terms of variables that reflect the relative importance of three factors that contribute to the overall effect of trucks on the roadway type.

$$PCU = {[(1 - P_T)H_{TP} + pH_{TT}]}/{H_P} \ldots\ldots\ldots\ldots\ldots\ldots (2.5)$$

Where P_T = proportion of trucks

H_{TP} = lagging headway of trucks following passenger cars

H_{TT} = lagging headway of trucks following trucks

H_P = lagging headway of cars following either vehicle type.

A drawback of the headway method is that it assumes that drivers are exhibiting steady state, in lane behavior. However it is difficult to separate the headways observed from drivers who are either not in steady state, or are not maintaining the lane (continuously following the same vehicle). (Metkari 2012)

2.2.3 Methods Based on Delays

This method based on the relative capacity reducing effect of heavy vehicle. It is directly related to the additional delay caused by such vehicle when compared to the passenger car.

Werner et al., (1976) used Walker method to determine PCE values. A basic assumption in the Walker method is that faster vehicles are not hindered in passing as they overtake slower vehicles, so queues do not form.

$$PCU = \frac{(OT_i/VOL_i)[1/SP_M] - [1/SP_B]}{(OT_{LPC}/VOL_{LPC})[1/SP_{PC}] - [1/SP_B]} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (2.6)$$

Where OT_i = number of overtaking of vehicle type i by passenger cars

VOL_i = volume of vehicle type i

OT_{LPC} = number of overtaking of lower performance passenger cars by passenger cars

VOL_{LPC}= volume of lower performance passenger cars

SP_M = mean speed of the mixed traffic stream

SP_B = mean speed of the base traffic stream with only high performance passenger car

SP_{PC} = mean speed of the traffic stream with only passenger cars

In the equivalent-delay method, it assumed that faster vehicles are always hindered by slower vehicles, such that queues form. Using that principle, PCU values are calculated using a linear combination of the Walker and equivalent delay in each intermediate volume level yields.

Craus et al., (1980) in their equivalent delay method considered the difference between delays caused by heavy vehicle to standard passenger cars and delay caused by slower passenger car to standard passenger cars. The equation 2.7 reflects the actual disturbance and delay caused by trucks to other traffic.

$$PCU = \frac{d_{kt}}{d_{kp}} \text{ …….. (2.7)}$$

Where d_{kt} = average delay time caused by one truck

d_{kp} = average delay time caused by one passenger car

Cunagin et al., (1983) developed PCU estimation based on speed distribution, traffic volumes, and vehicle types. The PCU values were determined by using Walker spatial-headway and equivalent-delay methods. Their method estimates PCEs using the ratio of delay experienced by a passenger car due to non-passenger vehicles to the delay experienced by a passenger car due to other passenger cars.

$$PCU = \frac{D_{ij} - D_{base}}{D_{base}} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (2.8)$$

Where D_{ij} = delay to passenger cars due to vehicle Type i under conditions j

D_{base} = delay to standard passenger cars due to slower passenger cars

2.2.4 Methods Based on Flow Rate and Density

In transportation engineering, the term traffic flow rate is used to indicate the equivalent hourly rate of vehicles passing a point per unit of time. PCE is computed based on percentage of grade, mixed vehicle flow, and truck volume to capacity ratio (John et al., 1976)

$$PCU = \frac{q_B - q_M (1 - P_T)}{q_M \times P_T} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (2.9)$$

Where q_B = equivalent passenger car only flow rate for a given v/c ratio

q_M = mixed flow rate

P_T = truck proportion in the mixed traffic flow

Huber (1982**)** developed a model for estimating PCU values for vehicles multi-lane conditions, under free flowing. PCU values are related to the ratio between the volumes of two streams at some common level of impedance. He has given equation 2.10 to calculate PCU value is

$$PCU = \frac{1}{P_T}\left(\frac{q_B}{q_M} - 1\right) + 1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots (2.10)$$

Sumner et al., (1984) further developed Huber's method by including more than one truck type in the traffic stream.

$$PCU = \frac{1}{\nabla P}\left(\frac{q_B}{q_S} - \frac{q_B}{q_M}\right) + 1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots (2.11)$$

Where q_S = additional subject flow rate

∇P = proportion of subject vehicles

Rahman et al., (2005) used a deterministic model of traffic flow to estimate the impedance-flow relationship. They also suggested that PCU values are related to speed and length of subject vehicles and to vary with the proportion of trucks in the traffic stream. They reported from the 1985 HCM, density is to be the governing parameter for LOS, although it is defined both by density and speed. It explains, density is a measure that quantifies the proximity of vehicles to each other within the traffic stream and indicates the degree of maneuverability within the traffic stream.

Mallikarjuna et al., (2006) stated that Chari et al., (1983) made an attempt to quantify density under these conditions using areal density. This is the first study that considered vehicle areas in measuring the density. Areal density is defined as sum of the total vehicle area projected on the ground per unit area of road way.

Demarchi et al., (2003) suggested the PCU formula to eliminate the possible error for mixed heavy vehicles in the traffic stream, including interaction between multiple trucks types.

$$PCU = \frac{1}{\sum_i^n P_i}\left(\frac{q_B}{q_M} - 1\right) + 1 \dots\dots\dots\dots\dots\dots\dots (2.12)$$

Where P_i = proportion of trucks of type i out of all trucks n in the mixed traffic flow

Tiwari et al., (1999) stated that density method are based on underlying homogeneous traffic concepts such as strict lane discipline, car following and a vehicle fleet that does not vary greatly in width. However, Indian highways carry heterogeneous traffic, where road space is shared among many traffic modes with different physical dimensions. Loose lane discipline prevails; car following is not the norm. Therefore methods based on homogeneous traffic concepts have limited applicability for heterogeneous traffic.So he argued that the density method used for

homogeneous traffic concept need to modify to account for heterogeneous traffic and called it as Modified density method. The equation to calculate PCU for a traffic entity group xi in highway type j, using Modified density method is;

$$(PCU_{xi})_j = \left[\frac{k_{car}/W_{85car}}{(q_{xi}/u_{xi})/W_{85xi}}\right]_j \ldots\ldots\ldots\ldots\ldots\ldots\ldots (2.13)$$

Where for the highway type *j*,

q_{xi} = flow of traffic entity group X_i in heterogeneous traffic (entities/hour)

u_{xi} = space mean speed of traffic entity group X_i (km/h)

W_{85xi} =85th percentile distribution width (m) for traffic entity group Xi in heterogeneous traffic

k_{car} = density of passenger cars in heterogeneous traffic (entities/km)

W_{85car} = 85thpercentile car distribution width, i.e., 3.7 m

2.2.5 Methods Based on Speed

Aerde et al., (1983) proposed a methodology to estimate PCE based on the relative rates of speed for each type of vehicle traveling in the main direction and for all vehicles combined traveling in the opposing direction. They found that PCE decreases for higher speed percentiles. The speed analysis using the linear regression model structure is

$$\begin{aligned} Percentile\ speed \\ &= free\ speed + C_1(number\ of\ passenger\ cars) \\ &+ C_2(number\ of\ passenger\ trucks) + C_3(number\ of\ RVs) \\ &+ C_4(number\ of\ other\ vehicles) \\ &+ C_5(number\ of\ opposing\ vehicles) \ldots\ldots\ldots\ldots\ldots\ldots\ldots (2.14) \end{aligned}$$

Where $C_1\ to\ C_5$ = coefficients of speed reductions for each vehicle type.

Using the speed reduction coefficients, the PCU for a vehicle type n is calculated as:

$$PCU_n = \frac{C_n}{C_1} \ldots\ldots\ldots\ldots\ldots\ldots\ldots (2.15)$$

Where C_n = speed reduction coefficient for vehicle type n

C_1 = speed reduction coefficient for passenger cars

Chandra et al., (1995) suggested a methodology to estimate PCE values for mixed traffic conditions. They have estimated the PCE values as a function of vehicle area and speed. According to their methodology PCE of any particular vehicle is formulated as in equation 2.16.

$$PCUi = \frac{Vc/Vi}{Ac/Ai} \dots\dots\dots\dots\dots\dots\dots (2.16)$$

Where Vc and Vi = mean speeds of car and type i vehicle respectively, in the traffic stream

Ac and Ai = their respective projected rectangular areas (length * width) on the road.

2.2.6 Methods Based on Queue Discharge Flow

Al-Kaisy et al., (2002) proposed a method for passenger car equivalents using Queue-Discharge Flow (QDF) as the equivalency criterion. The methodology was based on the assumption that the fluctuation in QDF capacity observations would be minimal if the traffic stream was uniform and consisted of passenger cars only. The vehicle counts from QDF capacity observations were used to formulate a nonlinear programming problem, where the objective function was to minimize the variation in the QDF capacity. They found that the effect of heavy vehicles on a freeway is greater when it is operating in oversaturated conditions. In addition, it was found that PCE both during dry or rainy days and during the presence of roadside maintenance work are not significantly different. Optimization procedure was given to determine PCU:

Objective function: Minimize Z(C*) (Z =Coefficient of Variation=Standard Deviation/Mean)

Design variable: PCE factor

Constraints: C*>=X1 (X1 =1600 pcphpl at site 1, X1 = 1400 pcphpl at site 2)

C*<=X2 (X2 =2800 pcphpl at site 1, X2 = 2600 pcphpl at site 2)

PCE >=X3 (X3 = 1.0)

PCE <=X4 (X4 = 10.0)

2.2.7 Methods Based on V/C Ratio

Fan (1990) investigated PCE for expressways in Singapore using volume-to-capacity (V/C) ratio instead of density or level of service because these freeways operate at LOS E. The study focused on congested flow conditions or V/C ratio above 0.67 and it is mentioned that it is unnecessary to calculate PCUs at uncongested flow conditions. Using multiple linear regressions by multiplying the observed flow by the V/C ratios, he found that commercial vehicles such as light and heavy trucks, buses, and trailers generally have higher PCU values compared with the PCUs used in United States of America and United Kingdom for the level terrain.

2.2.8 Methods Based on Vehicle hours

Hourly traffic volumes are used for determining the length and magnitude of peak periods, evaluating capacity and assessing geometric design and traffic control.

Sumner et al. (1984) proposed a method for calculating PCE values between consecutive signalized intersections on urban arterial roads using microscopic simulation, NETSIM. The values are derived from the vehicle-hours of road utilization that are added when large vehicles are introduced to the traffic stream. The resulted values were cumulative over a length of road between intersections, and PCU computations were expressed in terms of additional vehicles-hours. Values were generated for a diverse number of vehicle types under different flow conditions for various classes of urban arterial roads in United States of America.

2.2.9 Methods Based on Travel Time

Keller et al., (1984) suggested a PCE for heavy vehicles on an urban arterial network. The estimated PCEs are functions of traffic volume, vehicle classification, and signal settings. The method is based on the premise "that reduction in capacity is directly related to the additional delay caused by large vehicles in the traffic stream". PCU is measured as the ratio of the total travel times of heavy vehicles and passenger cars traveling through an urban network. This can be expressed as in equation 2.17;

$$PCU = \frac{TT_i}{TT_o} \dots\dots\dots\dots\dots\dots\dots (2.17)$$

Where TT_i = total travel time of vehicle type i over the network in hours

TT_o = total travel time of the base vehicle over the network in hours.

2.3 Methods used to Evaluate PCU Value in Sri Lanka

Kumarage (1996) used an indirect method to determine the relative PCU values using speed flow relationship for two lane highways. The relationship derived from the speed-flow relationship can be shown as in equation 2.18.

$$V_j = C_j - \beta_i Q \dots\dots\dots\dots\dots\dots\dots (2.18)$$

WhereV_j = observed mean space mean speed of vehicle type j

Q = observed flow rate in PCUs per hour

C_j = theoretical mean free speed of vehicle type j under free flow

β_i = rate at which speed of vehicle type j will diminish for a unit increase in flow rate

Weerasingha et al., (2015) used method proposed by Chandra et al., (equation 2.16) and method proposed by Tiwari et al., (equation 2.13) to determine PCU values for four lane roads in Sri Lanka.

Method proposed by Chandra et al., (equation 2.16) was used to calculate PCU values for two lane roads in Sri Lanka by Jayaratne et al., (2016).

Based on the literature review, Chandra's method and Modified density method were found more suitable methods to determine PCU values for heterogeneous traffic situation experienced in Sri Lanka. Out of the two methods, Chandra's method was selected to derive PCU values in this research. Therefore data are collected at the randomly selected locations, relevant to the parameters described in the Chandra's equation.

3 DATA COLLECTION

3.1 Introduction

Data are collected for this study by means of video recording. The video camera was placed in such a way that there is no any interruption to the traffic movement. Almost straight road sections with level terrain at five different locations of two lane highways in the western province were selected for the video recording. Other relevant road parameters were measured manually.

Vehicles are classified in to 10 categories as follows;

- Passenger Car
- Passenger Car (Small)
- Van
- Motor Cycle
- Three Wheeler
- Medium Bus
- Large Bus
- Small Commercial Vehicles (SCV)
- Medium Commercial Vehicles (MCV)
- Large Commercial Vehicles (LCV)

3.2 Field Data Collection

The data gathered locations are selected randomly. Those are situated in Negombo, Gampaha, Athurgiriya, Minuwangoda and Katunayaka. The exact locations can be summarized as follows;

- Negombo - Ch. 32+900 on Peliyagoda – Puttalam road (A-3)
- Gampaha - Ch. 8+600 on Ja-Ela - Gampaha – Yakkala road (A-33)
- Athurugiriya - Ch. 11+800 on Kotte – Bope road (B-240)
- Minuwangoda - Ch. 8+500 on Ekala – Kotadeniyawa road (B-111)
- Katunayaka - Ch. 2+150 on Katunayaka – Veyangoda road (B-208)

All these locations are mid-block sections.

Figure 3.1: Data Collected Location at Negombo (A-3 road)

Figure 3.2: Data Collected Location at Gampaha (A-33 road)

Figure 3.3: Data Collected Location at Athurugiriya (B-240 road)

Figure 3.4: Data Collected Location at Minuwangoda (B-111 road)

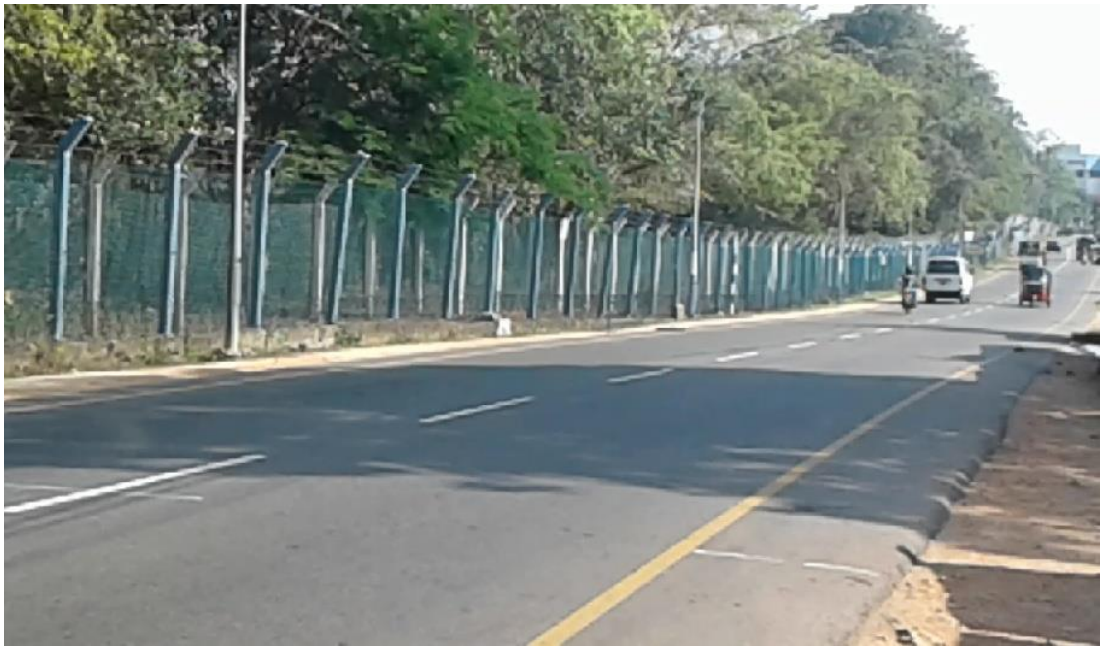

Figure 3.5: Data Collected Location at Katunayaka (B-208 road)

Measured road parameters of each video location are summarized in the Table 3.1.

Table 3.1: Measured Road Parameters of Video Location

Location	Chainage	Carriageway Width (m)	Hard Shoulder Width (m)
A-3 road	32+900	3.5	1.5
A-33 road	8+600	3.2	0.0
B-240 road	11+800	3.5	1.0
B-111 road	8+500	3.5	0.0
B-208 road	2+150	3.2	0.8

3.3 Vehicle Dimension Data Collection

Overall length and width of the different vehicle models were measured using linen tape and tabulated under each vehicle categories.

Vehicle dimensions in different vehicle models categorized under passenger cars are tabulated in Table 3.2.

Table 3.2: Vehicle dimensions for Passenger Cars

No.	Vehicle Model	Overall Length (m)	Overall Width (m)	Projected Area (m^2)
1	Toyota Prius	4.48	1.75	7.82
2	Toyota Corolla 141	4.53	1.71	7.72
3	Nissan Sunny	4.36	1.70	7.39
4	Toyota Corolla 110	4.30	1.69	7.26
5	Honda Vezel	4.30	1.77	7.60
6	Honda Insight	4.40	1.70	7.45
7	Toyota Double cab	5.26	1.86	9.76
8	Mitsubishi Double cab	5.21	1.79	9.29
9	Mitsubishi Outlander	4.70	1.81	8.50
10	Mitsubishi Pajero	4.90	1.88	9.19
11	Toyota Prado	4.76	1.89	8.97
12	Nissan Xtrail	4.64	1.82	8.45
13	Hyundai Santa Fe	4.69	1.88	8.82
14	Kia Sportage	4.48	1.86	8.31
	Weighted Average			**7.84**

Projected Area of the Passenger car variable is directly contributed to the calculated PCU value of the other category of vehicle according to the equation (2.15). Therefore weighted average was taken considering the traffic composition. Eighty percentage of the average area of item No. 1 to 6 was considered while 8% of the average area of item No. 7 to 8 was taken and 12% of the average area of the rest was considered to the weighted average.

For the other vehicle categories simple average area was taken for the calculation. Those data are tabulated from Table 3.3 to Table 3.11.

Table 3.3: Vehicle dimensions for Passenger Cars (Small)

No.	Vehicle Model	Overall Length (m)	Overall Width (m)	Projected Area (m^2)
1	Suzuki Alto 800	3.40	1.49	5.06
2	Toyota Vitz	3.89	1.70	6.59
3	Suzuki Celirio	3.60	1.60	5.76
4	Suzuki Wagon R	3.40	1.70	5.75
5	Kia Picanto	3.60	1.60	5.73
6	Suzuki Swift	3.84	1.74	6.66
7	Panda	3.60	1.65	5.94
8	Tata Nano	3.10	1.50	4.65
	Average			**5.77**

Table 3.4: Vehicle dimensions for Van

No.	Vehicle Model	Overall Length (m)	Overall Width (m)	Projected Area (m^2)
1	Toyota Van Hi-roof	5.00	1.88	9.40
2	Nissan Van	4.70	1.70	7.96
3	Nissan Van Hi-roof	4.90	1.80	8.82
	Average			**8.73**

Table 3.5: Vehicle dimensions for Motor Cycle

No.	Vehicle Model	Overall Length (m)	Overall Width (m)	Projected Area (m^2)
1	Bajaj Pulsar 200	2.02	0.80	1.62
2	Bajaj Discover 125	2.04	0.71	1.45
3	Bajaj Platina	1.99	0.77	1.53
4	Honda Dio	1.76	0.71	1.25
5	TVS Scooty pep	1.75	0.71	1.24
	Average			**1.42**

Table 3.6: Vehicle dimensions for Three Wheeler

No.	Vehicle Model	Overall Length (m)	Overall Width (m)	Projected Area (m^2)
1	Bajaj Three Wheeler	2.64	1.30	3.43
2	Piaggio Three Wheeler	2.70	1.40	3.78
	Average			**3.60**

Table 3.7: Vehicle dimensions for Medium Bus

No.	Vehicle Model	Overall Length (m)	Overall Width (m)	Projected Area (m^2)
1	Toyota Coaster	7.10	2.10	14.91
2	Tata Star	8.15	2.20	17.93
3	Nissan Civilian	7.10	2.10	14.91
	Average			**15.92**

Table 3.8: Vehicle dimensions for Large Bus

No.	Vehicle Model	Overall Length (m)	Overall Width (m)	Projected Area (m^2)
1	Layland Bus	9.70	2.50	**24.25**

Table 3.9: Vehicle dimensions for Small Commercial Vehicles

No.	Vehicle Model	Overall Length (m)	Overall Width (m)	Projected Area (m^2)
1	DimoBatta Super Ace	4.34	1.60	6.94
2	Mahendra Bolero	4.85	1.70	8.25
3	Micro L616	4.39	1.51	6.63
	Average			**7.27**

Table 3.10: Vehicle dimensions for Medium Commercial Vehicles

No.	Vehicle Model	Overall Length (m)	Overall Width (m)	Projected Area (m^2)
1	Tata Tipper	6.30	2.47	15.56
2	Layland Tipper	7.30	2.20	16.06
3	Layland Lorry	8.76	2.20	19.27
4	Tata Lorry	6.60	2.27	14.98
5	Canter FE5	6.02	2.00	12.00
6	Canter FE7	6.74	2.00	13.44
7	Isuzu Truck	5.70	2.06	11.74
	Average			**14.72**

Table 3.11: Vehicle dimensions for Large Commercial Vehicles

No.	Vehicle Model	Overall Length (m)	Overall Width (m)	Projected Area (m^2)
1	Layland 3 axle Tipper	8.05	2.50	20.13
2	Tata 3 axle Tipper	8.90	2.54	22.61
3	20ft Container Lorry	9.60	2.50	24.00
	Average			**22.24**

3.4 Speed Data Collection

To calculate the speeds of each vehicle, fixed length was identified and measured in the field. Time was noted down at the Entry and exit point of the fixed trap length from the recorded video film at analysis stage. Trap lengths at each location are tabulated in Table 3.12.

Table 3.12: Fixed Trap Length at Each Location

Location	Fixed Trap Length
A-3 road	32.4
A-33 road	31.4
B-240 road	30
B-111 road	51.5
B-208 road	30

Speed was calculated for each vehicle dividing fixed trap length by exit and entry time difference.

4 ANALYSIS

4.1 Introduction

According to the Literature review, it was identified that the method proposed by Chandra et al., (1995) and Modified Density method are more suitable techniques to calculate PCU values for heterogeneous traffic. Since the Sri Lankan traffic conditions are more or less similar to the heterogeneous traffic situations, Chandra's method was used to calculate PCU values in this research. Therefore parameters relevant to the equation 2.16 were calculated from the field data.

$$PCUi = \frac{Vc/Vi}{Ac/Ai}$$

Where Vc and Vi = mean speeds of car and type I vehicle respectively, in the traffic stream

Ac and Ai = their respective projected rectangular areas (length * width) on the road.

4.2 Speed of observed vehicles

Speed is a measure of vehicle performance. It is an accurately measurable parameter. Speed of each observed vehicle was calculated with the help of recorded video and fixed trap length of each location. Then average speed of all vehicle categories could be calculated. Standard deviation of speed of sample vehicle category was calculated using equation 4.1.

$$\sigma = \sqrt{\frac{\sum(x - \bar{x})}{(n-1)}} \dots\dots\dots\dots\dots\dots\dots (4.1)$$

Calculated average speed and standard deviation of speed at each location are tabulated from Table 4.1 to Table 4.5.

Table 4.1: Average Speed and Standard Deviation of Speed at Negombo

Vehicle Classification	Avg. Speed (km/h)	Standard Deviation of Speed
Passenger Car	41.27	8.74
Passenger Car (Small)	40.88	8.95
Van	40.74	12.17
Motor Cycle	38.74	8.89
Three Wheeler	35.22	5.92
Medium Bus	40.03	6.37
Large Bus	38.31	10.19
Small Commercial Vehicles (SCV)	39.48	8.37
Medium Commercial Vehicles (MCV)	37.08	7.37
Large Commercial Vehicles (LCV)	33.21	9.29

Table 4.2: Average Speed and Standard Deviation of Speed at Gampaha

Vehicle Classification	Avg. Speed (km/h)	Standard Deviation of Speed
Passenger Car	42.13	8.37
Passenger Car (Small)	41.58	5.82
Van	42.58	11.15
Motor Cycle	42.75	12.98
Three Wheeler	37.36	5.98
Medium Bus	48.51	6.33
Large Bus	37.35	5.73
Small Commercial Vehicles (SCV)	41.35	8.75
Medium Commercial Vehicles (MCV)	40.69	8.77
Large Commercial Vehicles (LCV)	34.25	4.06

Table 4.3: Average Speed and Standard Deviation of Speed at Athurugiriya

Vehicle Classification	Avg. Speed (km/h)	Standard Deviation of Speed
Passenger Car	39.93	9.28
Passenger Car (Small)	39.66	9.39
Van	38.17	8.66
Motor Cycle	40.74	11.02
Three Wheeler	36.39	10.31
Medium Bus	39.66	10.31
Large Bus	31.96	9.12
Small Commercial Vehicles (SCV)	37.33	8.03
Medium Commercial Vehicles (MCV)	37.49	7.14
Large Commercial Vehicles (LCV)	36.43	6.32

Table 4.4: Average Speed and Standard Deviation of Speed at Minuwangoda

Vehicle Classification	Avg. Speed (km/h)	Standard Deviation of Speed
Passenger Car	43.68	10.30
Passenger Car (Small)	40.14	8.46
Van	37.90	4.74
Motor Cycle	39.35	7.50
Three Wheeler	37.45	5.76
Medium Bus	42.78	4.94
Large Bus	39.06	5.01
Small Commercial Vehicles (SCV)	39.80	6.78
Medium Commercial Vehicles (MCV)	39.69	5.60
Large Commercial Vehicles (LCV)	39.09	2.48

Table 4.5: Average Speed and Standard Deviation of Speed at Katunayaka

Vehicle Classification	Avg. Speed (km/h)	Standard Deviation of Speed
Passenger Car	48.03	14.08
Passenger Car (Small)	47.86	10.25
Van	48.66	10.69
Motor Cycle	37.80	6.76
Three Wheeler	40.84	7.35
Medium Bus	41.54	8.27
Large Bus	50.95	13.81
Small Commercial Vehicles (SCV)	47.43	12.34
Medium Commercial Vehicles (MCV)	43.51	8.81
Large Commercial Vehicles (LCV)	38.64	13.74

4.3 Calculation of PCU Values

Average Projected area is summarized on Table 4.6 based on the measured length and width in the Chapter 3.

Table 4.6: Average Projected Area

Vehicle Classification	Projected Area (m2)
Passenger Car	7.84
Passenger Car (Small)	5.77
Van	8.73
Motor Cycle	1.42
Three Wheeler	3.60
Medium Bus	15.92
Large Bus	24.25
Small Commercial Vehicles (SCV)	7.27
Medium Commercial Vehicles (MCV)	14.72
Large Commercial Vehicles (LCV)	22.24

Speeds of each vehicle were calculated pre defining a fixed length in the field and measuring the time lapsed for the each vehicle to pass the pre-defined length from the video. Then PCU values of each location are calculated using equation 2.16 and tabulated in Table 4.7.

Table 4.7: Calculated PCU Values at Different Locations

Vehicle Classification	PCU Values				
	At Negombo	At Gampaha	At Athuruguriya	At Minuwangoda	At Katunayaka
Passenger Car	1.00	1.00	1.00	1.00	1.00
Passenger Car (Small)	0.74	0.75	0.74	0.80	0.74
Van	1.13	1.10	1.16	1.28	1.10
Motor Cycle	0.19	0.18	0.18	0.20	0.23
Three Wheeler	0.54	0.52	0.50	0.54	0.54
Medium Bus	2.09	1.76	2.04	2.07	2.35
Large Bus	3.33	3.49	3.87	3.46	2.92
SCV	0.97	0.94	0.99	1.02	0.94
MCV	2.09	1.94	2.00	2.07	2.07
LCV	3.53	3.49	3.11	3.17	3.53

Average PCU values of above 5 locations were calculated and tabulated in Table 4.8.

Table 4.8: Average PCU Values

Vehicle Classification	Average PCU
Passenger Car	1.00
Passenger Car (Small)	0.75
Van	1.16
Motor Cycle	0.20
Three Wheeler	0.53
Medium Bus	2.06
Large Bus	3.41
Small Commercial Vehicles (SCV)	0.97
Medium Commercial Vehicles (MCV)	2.03
Large Commercial Vehicles (LCV)	3.36

4.4 Comparison of PCU Values

The Comparison of PCU values are illustrates in Table 4.9 from local literature along with the values derived in this research.

Table 4.9: Comparison of PCU Values

Vehicle Classification	This Study	Kumarage (1996)	RDA (1998)	Jayaratne et al., (2016)
Passenger Car	1.00	1.00	1.00	1.00
Passenger Car (Small)	0.75	-	-	-
Van	1.16	1.1	-	1.2
Motor Cycle	0.20	0.5	0.4	0.2
Three Wheeler	0.53	0.75	0.8	0.6
Medium Bus	2.06	1.6	1.8	-
Large Bus	3.41	2.4	2.4	4.1
Small Commercial Vehicles (SCV)	0.97	1.5	1.5	1.2
Medium Commercial Vehicles (MCV)	2.03	2.0	2.0	-
Large Commercial Vehicles (LCV)	3.36	3.8	3.8	3.2

PCU values are similar in current study and study done by Kumarage (1996) of Van and Medium Commercial Vehicle categories. Except in the Large Bus category PCU values are more or less similar in this study and the study done by the Jayaratne et al., (2016)

4.5 Analysis of PCU Values

4.5.1 PCU Variation with Heavy Vehicles

The main influencing parameter for PCU in each vehicle categories is its travelling speed. Therefore with the increase of heavy vehicles in the stream there is a tendency of reduced travelling speed in the entire traffic stream. This means that the PCU

values are higher at higher percentage of heavy vehicles. This phenomenon is analyzed in this study.

In this research following vehicle categories are classified as Heavy vehicles.

- Large bus
- Medium Commercial Vehicles
- Large Commercial Vehicles

Heavy vehicles counted from the videos in each location are tabulated in Table 4.10.

Table 4.10: Heavy Vehicle percentage

Location	Heavy Vehicle Percentage (%)
A-3 road	12.5
A-33 road	9.6
B-240 road	14
B-111 road	20.6
B-208 road	3.6

Graph showing PCU variation with heavy vehicle percentage is illustrated in Figure 4.1.

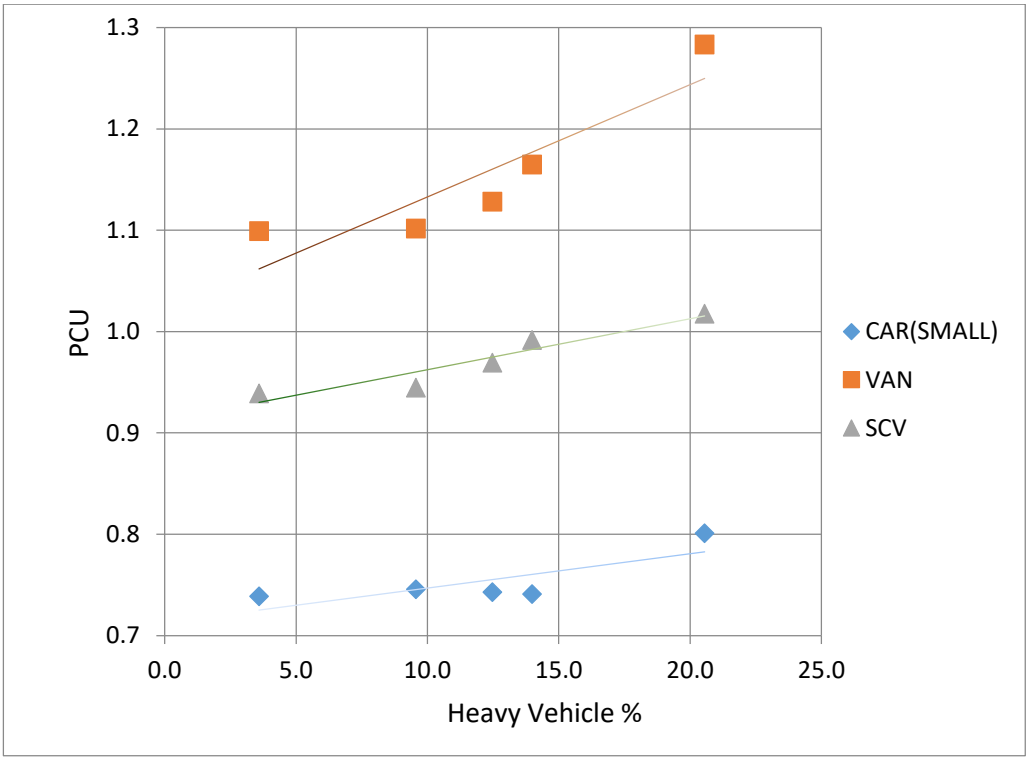

Figure 4.1: PCU Variation with Heavy Vehicle Percentage

4.6 Simulation of Derived Data Using VISSIM Software

4.6.1 Introduction to VISSIM Software

VISSIM is a microscopic and behavior based traffic simulation computer program that models traffic operations. Internally VISSIM consists of three different parts. i.e. Traffic flow model, Traffic control model and Data analysis package.

4.6.2 Introduction to the simulation method

Traffic compositions of each road in both directions are converted to PCU values using PCU factors derived in this research. The calculated traffic flow (in PCU/hr) was traveled in the software assigning suitable values for the variables as input data. Then the simulated speed given by the software in each road was taken as output data. Simulated speed values and observed speed values (observed speeds are

calculated as average speed in section 4.2) in each road are plotted in a graph. If the line connecting each point in the graph follows 45° inclination with the X-axis, then it is accepted that the PCU values used to convert the traffic flow are correct.

Data tabulated in Table 4.11, are fed as input data to the VISSIM software in each road for the simulation purposes.

Table 4.11: Input data to VISSIM software

Location	Variables					
	Traffic flow (PCU/hr)	Opposing Traffic flow (PCU/hr)	Observed speed (km/h)	Standard Deviation of speed	Simulated Road Length (m)	Lane Width (m)
A-3 road	1050	1219	41	9	49.27	5
A-33 road	464	384	42	8	49.40	3.2
B-240 road	754	842	40	9	49.74	4.5
B-111 road	653	635	44	10	49.31	3.5
B-208 road	833	508	48	14	49.87	4.0

Average simulated travel times elapsed to run fixed length was noted down from the simulated model in each road as shown in Table 4.12.

Table 4.12: Simulated travel time

Location	Simulated Travel Time (sec)
A-3 road	4.58
A-33 road	3.3
B-240 road	4.75
B-111 road	4.26
B-208 road	4.03

Then simulated speed could be calculated by dividing travel time from simulated road length. Calculated simulated speeds are shown in Table 4.13.

Table 4.13: Simulated speed

Location	Simulated Speed (km/h)
A-3 road	38.73
A-33 road	53.89
B-240 road	37.70
B-111 road	41.67
B-208 road	44.54

A graph was plotted simulated speed against observed speed as shown in Figure 4.2.

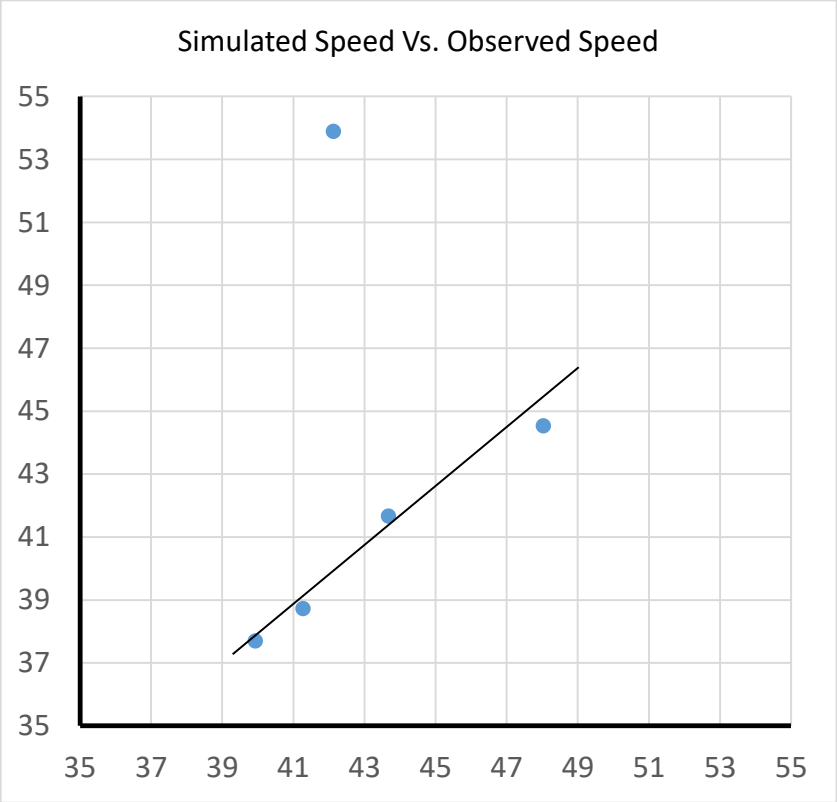

Figure 4.2: The graph showing simulated speed vs. observed speed

It could be observed that one speed data point is not following the 45° inclination line in Figure 4.2. That means PCU values derived relevant to Ja-Ela - Gampaha – Yakkala road (A-33) are seems not reliable. Traffic flow in that road is minimum compared to the other roads. Although traffic is less, observed vehicle speed is very much similar to the other roads. That means driver behavior is same although the vehicle flow is less in that particular road. But the software simulates it as high speed road since the flow is very low. In reality it was not happen.

5 CONCLUSION & RECOMMENDATIONS

5.1 Conclusion & Recommendations

In this research, PCU values are calculated with the help of method proposed by Chandra for almost all vehicle types commonly found in Sri Lankan roads. PCU values for different categories of vehicles are calculated for five sections of 2 lane roads. Significant variation of PCU vales are observed with the previous study except for two vehicle categories. Calculated values are analyzed with the heavy vehicle percentage. Calculated PCU values are tabulated in Table 5.1.

Table 5.1: Calculated PCU values

Vehicle Classification	**PCU**
Passenger Car	1.00
Passenger Car (Small)	0.75
Van	1.16
Motor Cycle	0.20
Three Wheeler	0.53
Medium Bus	2.06
Large Bus	3.41
Small Commercial Vehicles (SCV)	0.97
Medium Commercial Vehicles (MCV)	2.03
Large Commercial Vehicles (LCV)	3.36

Since the calculated PCU values in Ja-Ela - Gampaha – Yakkala road (A-33) are not reliable as mentioned the earlier chapter when simulated with the VISSIM software, it is recommended to use average PCU values derived from the other four road sections as tabulated in Table 5.2.

Table 5.2: Recommended PCU values

Vehicle Classification	**PCU**
Passenger Car	1.00
Passenger Car (Small)	0.75
Van	1.17
Motor Cycle	0.20
Three Wheeler	0.53
Medium Bus	2.14
Large Bus	3.40
Small Commercial Vehicles (SCV)	0.98
Medium Commercial Vehicles (MCV)	2.06
Large Commercial Vehicles (LCV)	3.34

In this study data at four locations are used to determine the PCU values in two lane sub-urban roads. Further studies with more locations are necessary to verify the above results before using practical applications.

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APPENDIX-A : TRAFFIC DATA COLLECTED AT NEGOMBO ON PELIYAGODA - PUTTALAM ROAD (A-03)

Table A-1: Speed Data Collected at Negombo on Peliyagoda - Puttalam Road (A-03)

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Passenger Car	10.77	14.00	32.40	36.07
Passenger Car	21.17	23.53	32.40	49.28
Passenger Car	9.07	11.53	32.40	47.29
Passenger Car	57.60	60.03	32.40	47.93
Passenger Car	22.93	25.83	32.40	40.22
Passenger Car	24.13	27.10	32.40	39.32
Passenger Car	27.07	31.03	32.40	29.41
Passenger Car	31.07	34.63	32.40	32.70
Passenger Car	34.77	37.83	32.40	38.03
Passenger Car	37.57	40.07	32.40	46.66
Passenger Car	44.27	47.43	32.40	36.83
Passenger Car	7.43	10.77	32.40	34.99
Passenger Car	9.13	12.40	32.40	35.71
Passenger Car	11.37	14.40	32.40	38.45
Passenger Car	24.73	27.07	32.40	49.99
Passenger Car	18.30	20.07	32.40	66.02
Passenger Car	3.27	6.50	32.40	36.07
Passenger Car	6.60	9.93	32.40	34.99
Passenger Car	8.50	11.83	32.40	34.99
Passenger Car	17.00	20.47	32.40	33.65
Passenger Car	22.50	25.77	32.40	35.71
Passenger Car	40.43	42.50	32.40	56.44
Passenger Car	58.97	60.97	32.40	58.32
Passenger Car	19.57	23.73	32.40	27.99
Passenger Car	23.70	27.73	32.40	28.92
Passenger Car	54.37	57.13	32.40	42.16
Passenger Car	57.97	61.00	32.40	38.45
Passenger Car	18.80	21.63	32.40	41.17
Passenger Car	31.13	33.03	32.40	61.39
Passenger Car	58.90	62.10	32.40	36.45
Passenger Car	5.77	8.03	32.40	51.46

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Passenger Car	1.90	4.17	32.40	51.46
Passenger Car	7.87	10.83	32.40	39.32
Passenger Car	59.47	62.27	32.40	41.66
Passenger Car	2.73	5.53	32.40	41.66
Passenger Car	54.03	56.63	32.40	44.86
Passenger Car	55.83	58.07	32.40	52.23
Passenger Car	47.53	50.27	32.40	42.67
Passenger Car	5.23	8.23	32.40	38.88
Passenger Car	12.80	15.47	32.40	43.74
Passenger Car	14.03	17.53	32.40	33.33
Passenger Car	5.63	8.83	32.40	36.45
Passenger Car	14.27	17.30	32.40	38.45
Passenger Car	46.00	49.70	32.40	31.52
Passenger Car	47.23	51.87	32.40	25.17
Passenger Car	49.63	53.80	32.40	27.99
Passenger Car	51.70	55.17	32.40	33.65
Passenger Car	55.07	59.30	32.40	27.55
Passenger Car	0.93	3.50	32.40	45.44
Passenger Car	2.87	5.60	32.40	42.67
Passenger Car	7.50	11.07	32.40	32.70
Passenger Car	48.77	51.60	32.40	41.17
Passenger Car	21.63	24.83	32.40	36.45
Passenger Car	45.43	48.03	32.40	44.86
Passenger Car	57.03	59.00	32.40	59.31
Passenger Car	11.10	13.43	32.40	49.99
Passenger Car	13.70	16.07	32.40	49.28
Passenger Car	15.07	18.17	32.40	37.63
Passenger Car	17.43	20.23	32.40	41.66
Passenger Car	19.40	22.50	32.40	37.63
Passenger Car	22.30	25.07	32.40	42.16
Passenger Car	24.40	27.60	32.40	36.45
Passenger Car	39.80	43.50	32.40	31.52
Passenger Car	59.20	63.27	32.40	28.68
Passenger Car	32.27	35.43	32.40	36.83
Passenger Car	57.43	60.07	32.40	44.29
Passenger Car	0.57	3.07	32.40	46.66
Passenger Car	4.80	7.07	32.40	51.46

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Passenger Car	7.90	10.00	32.40	55.54
Passenger Car	53.03	55.30	32.40	51.46
Passenger Car	58.60	61.00	32.40	48.60
P. Car (Small)	12.83	15.10	32.40	51.46
P. Car (Small)	45.20	47.00	32.40	64.80
P. Car (Small)	56.20	58.43	32.40	52.23
P. Car (Small)	57.90	59.97	32.40	56.44
P. Car (Small)	43.93	46.80	32.40	40.69
P. Car (Small)	56.03	59.27	32.40	36.07
P. Car (Small)	21.27	23.73	32.40	47.29
P. Car (Small)	22.20	25.70	32.40	33.33
P. Car (Small)	45.83	48.97	32.40	37.23
P. Car (Small)	24.93	28.20	32.40	35.71
P. Car (Small)	4.07	7.47	32.40	34.31
P. Car (Small)	5.57	8.80	32.40	36.07
P. Car (Small)	47.40	50.07	32.40	43.74
P. Car (Small)	4.43	7.13	32.40	43.20
P. Car (Small)	36.80	39.50	32.40	43.20
P. Car (Small)	56.07	58.90	32.40	41.17
P. Car (Small)	22.00	26.80	32.40	24.30
P. Car (Small)	26.37	29.27	32.40	40.22
P. Car (Small)	37.17	39.27	32.40	55.54
P. Car (Small)	45.10	48.63	32.40	33.01
P. Car (Small)	50.30	53.27	32.40	39.32
P. Car (Small)	6.07	9.27	32.40	36.45
P. Car (Small)	14.13	17.37	32.40	36.07
P. Car (Small)	58.30	60.53	32.40	52.23
P. Car (Small)	4.60	7.47	32.40	40.69
P. Car (Small)	15.20	17.80	32.40	44.86
P. Car (Small)	32.00	35.07	32.40	38.03
P. Car (Small)	46.07	49.07	32.40	38.88
P. Car (Small)	49.47	53.13	32.40	31.81
P. Car (Small)	29.03	33.23	32.40	27.77
P. Car (Small)	32.03	35.77	32.40	31.24
Van	8.07	11.40	32.40	34.99
Van	5.27	7.90	32.40	44.29
Van	30.43	32.07	32.40	71.41

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Van	17.17	18.97	32.40	64.80
Van	18.63	20.03	32.40	83.31
Van	37.87	40.97	32.40	37.63
Van	40.47	43.03	32.40	45.44
Van	13.07	16.93	32.40	30.17
Van	19.93	22.80	32.40	40.69
Van	56.37	59.40	32.40	38.45
Van	59.43	62.37	32.40	39.76
Van	50.80	53.87	32.40	38.03
Van	55.07	58.23	32.40	36.83
Van	57.27	60.37	32.40	37.63
Van	3.90	6.30	32.40	48.60
Van	30.13	33.07	32.40	39.76
Van	34.00	37.27	32.40	35.71
Van	8.17	11.03	32.40	40.69
Van	44.10	47.03	32.40	39.76
Van	45.93	48.83	32.40	40.22
Van	53.77	56.93	32.40	36.83
Van	36.53	39.47	32.40	39.76
Van	35.77	39.63	32.40	30.17
Van	42.97	46.80	32.40	30.43
Van	36.47	39.13	32.40	43.74
Van	56.03	59.27	32.40	36.07
Van	11.23	14.57	32.40	34.99
Van	14.37	18.50	32.40	28.22
Van	18.47	22.80	32.40	26.92
Van	29.93	34.00	32.40	28.68
Van	1.13	4.13	32.40	38.88
Motor Cycle	3.77	8.63	32.40	23.97
Motor Cycle	5.63	9.03	32.40	34.31
Motor Cycle	11.57	14.93	32.40	34.65
Motor Cycle	44.00	47.47	32.40	33.65
Motor Cycle	53.13	55.17	32.40	57.36
Motor Cycle	5.03	8.50	32.40	33.65
Motor Cycle	25.70	27.53	32.40	63.62
Motor Cycle	32.20	35.13	32.40	39.76
Motor Cycle	33.13	36.60	32.40	33.65

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Motor Cycle	19.83	23.07	32.40	36.07
Motor Cycle	32.03	35.93	32.40	29.91
Motor Cycle	48.50	50.53	32.40	57.36
Motor Cycle	26.77	29.90	32.40	37.23
Motor Cycle	31.93	34.03	32.40	55.54
Motor Cycle	43.07	47.47	32.40	26.51
Motor Cycle	51.03	54.83	32.40	30.69
Motor Cycle	54.07	58.37	32.40	27.13
Motor Cycle	1.07	4.37	32.40	35.35
Motor Cycle	16.70	18.70	32.40	58.32
Motor Cycle	34.53	37.30	32.40	42.16
Motor Cycle	35.80	39.23	32.40	33.97
Motor Cycle	59.40	63.10	32.40	31.52
Motor Cycle	3.27	6.37	32.40	37.63
Motor Cycle	26.63	30.03	32.40	34.31
Motor Cycle	7.23	10.83	32.40	32.40
Motor Cycle	18.13	21.87	32.40	31.24
Motor Cycle	38.03	40.87	32.40	41.17
Motor Cycle	1.17	4.07	32.40	40.22
Motor Cycle	33.07	36.20	32.40	37.23
Motor Cycle	34.03	37.00	32.40	39.32
Motor Cycle	37.30	40.50	32.40	36.45
Motor Cycle	9.30	13.13	32.40	30.43
Motor Cycle	37.17	39.63	32.40	47.29
Motor Cycle	47.07	49.47	32.40	48.60
Motor Cycle	49.47	52.13	32.40	43.74
Motor Cycle	56.87	59.20	32.40	49.99
Motor Cycle	10.17	14.20	32.40	28.92
Motor Cycle	35.93	39.60	32.40	31.81
Motor Cycle	55.03	58.47	32.40	33.97
Motor Cycle	3.27	6.57	32.40	35.35
Motor Cycle	24.03	27.17	32.40	37.23
Motor Cycle	24.63	27.80	32.40	36.83
Motor Cycle	36.83	40.37	32.40	33.01
Motor Cycle	40.77	44.10	32.40	34.99
Motor Cycle	9.03	12.40	32.40	34.65
Motor Cycle	42.73	46.10	32.40	34.65

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Motor Cycle	8.77	12.27	32.40	33.33
Motor Cycle	30.03	32.80	32.40	42.16
Motor Cycle	33.23	36.97	32.40	31.24
Motor Cycle	35.90	38.17	32.40	51.46
Motor Cycle	41.17	43.47	32.40	50.71
Motor Cycle	55.37	58.00	32.40	44.29
Motor Cycle	55.83	58.20	32.40	49.28
Motor Cycle	57.80	60.60	32.40	41.66
Three Wheeler	7.40	11.07	32.40	31.81
Three Wheeler	14.93	18.13	32.40	36.45
Three Wheeler	40.87	43.73	32.40	40.69
Three Wheeler	54.40	57.07	32.40	43.74
Three Wheeler	9.90	12.70	32.40	41.66
Three Wheeler	40.80	43.00	32.40	53.02
Three Wheeler	45.17	48.17	32.40	38.88
Three Wheeler	1.73	5.63	32.40	29.91
Three Wheeler	14.87	18.17	32.40	35.35
Three Wheeler	48.07	50.90	32.40	41.17
Three Wheeler	17.03	21.27	32.40	27.55
Three Wheeler	41.57	44.60	32.40	38.45
Three Wheeler	8.77	12.30	32.40	33.01
Three Wheeler	23.40	30.30	32.40	16.90
Three Wheeler	17.70	20.57	32.40	40.69
Three Wheeler	46.30	49.00	32.40	43.20
Three Wheeler	54.10	57.57	32.40	33.65
Three Wheeler	57.83	61.10	32.40	35.71
Three Wheeler	8.17	10.97	32.40	41.66
Three Wheeler	31.77	34.50	32.40	42.67
Three Wheeler	44.17	47.53	32.40	34.65
Three Wheeler	53.17	57.13	32.40	29.41
Three Wheeler	58.97	62.83	32.40	30.17
Three Wheeler	5.27	8.50	32.40	36.07
Three Wheeler	10.80	14.87	32.40	28.68
Three Wheeler	25.93	29.70	32.40	30.97
Three Wheeler	6.60	10.03	32.40	33.97
Three Wheeler	7.70	11.07	32.40	34.65
Three Wheeler	21.10	24.97	32.40	30.17

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Three Wheeler	48.00	51.70	32.40	31.52
Three Wheeler	3.80	7.20	32.40	34.31
Three Wheeler	12.70	15.87	32.40	36.83
Three Wheeler	41.43	44.47	32.40	38.45
Three Wheeler	28.37	32.63	32.40	27.34
Three Wheeler	32.00	35.07	32.40	38.03
Three Wheeler	30.07	34.13	32.40	28.68
Three Wheeler	54.53	57.80	32.40	35.71
Three Wheeler	0.97	3.87	32.40	40.22
Three Wheeler	26.07	29.47	32.40	34.31
Three Wheeler	30.03	34.57	32.40	25.73
Three Wheeler	7.00	9.90	32.40	40.22
Three Wheeler	23.47	26.57	32.40	37.63
Three Wheeler	2.80	6.83	32.40	28.92
Three Wheeler	17.60	20.40	32.40	41.66
Three Wheeler	19.63	22.87	32.40	36.07
Three Wheeler	20.07	24.07	32.40	29.16
Three Wheeler	34.40	38.07	32.40	31.81
Three Wheeler	48.23	51.80	32.40	32.70
Three Wheeler	51.03	54.57	32.40	33.01
Three Wheeler	51.80	55.47	32.40	31.81
Three Wheeler	38.37	41.03	32.40	43.74
Three Wheeler	44.00	47.13	32.40	37.23
Three Wheeler	44.87	48.03	32.40	36.83
Medium Bus	54.80	57.70	32.40	40.22
Medium Bus	31.07	33.63	32.40	45.44
Medium Bus	33.03	35.63	32.40	44.86
Medium Bus	49.17	51.37	32.40	53.02
Medium Bus	11.40	15.23	32.40	30.43
Medium Bus	0.00	2.97	32.40	39.32
Medium Bus	1.80	4.77	32.40	39.32
Medium Bus	49.87	52.73	32.40	40.69
Medium Bus	12.47	15.50	32.40	38.45
Medium Bus	8.63	12.40	32.40	30.97
Medium Bus	50.23	53.43	33.40	37.58
Large Bus	53.40	56.17	32.40	42.16
Large Bus	5.03	8.37	32.40	34.99

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Large Bus	12.10	14.47	32.40	49.28
Large Bus	25.20	29.30	32.40	28.45
Large Bus	37.83	40.00	32.40	53.83
Large Bus	49.17	51.70	32.40	46.04
Large Bus	31.97	34.53	32.40	45.44
Large Bus	45.63	48.93	32.40	35.35
Large Bus	56.93	59.97	32.40	38.45
Large Bus	7.07	12.37	32.40	22.01
Large Bus	19.80	24.40	32.40	25.36
SCV	21.03	25.30	32.40	27.34
SCV	30.10	32.07	32.40	59.31
SCV	34.27	36.90	32.40	44.29
SCV	49.83	52.07	32.40	52.23
SCV	53.63	56.37	32.40	42.67
SCV	3.90	7.13	32.40	36.07
SCV	15.03	17.50	32.40	47.29
SCV	55.13	58.47	32.40	34.99
SCV	52.97	55.93	32.40	39.32
SCV	5.60	8.60	32.40	38.88
SCV	52.70	55.07	32.40	49.28
SCV	27.17	30.53	32.40	34.65
SCV	12.13	15.20	32.40	38.03
SCV	16.57	20.03	32.40	33.65
SCV	28.30	32.00	32.40	31.52
SCV	34.40	38.07	32.40	31.81
SCV	43.90	47.73	32.40	30.43
SCV	2.27	5.27	32.40	38.88
MCV	35.83	39.13	32.40	35.35
MCV	17.60	20.57	32.40	39.32
MCV	21.20	24.17	32.40	39.32
MCV	14.80	18.07	32.40	35.71
MCV	17.20	20.10	32.40	40.22
MCV	29.57	32.53	32.40	39.32
MCV	54.07	56.53	32.40	47.29
MCV	8.03	10.80	32.40	42.16
MCV	28.90	31.47	32.40	45.44
MCV	12.13	15.07	32.40	39.76

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
MCV	35.03	38.27	32.40	36.07
MCV	29.90	32.17	32.40	51.46
MCV	56.70	60.37	32.40	31.81
MCV	27.73	31.73	32.40	29.16
MCV	49.97	53.30	32.40	34.99
MCV	44.17	47.57	32.40	34.31
MCV	6.07	9.63	32.40	32.70
MCV	37.37	41.37	32.40	29.16
MCV	41.83	45.07	32.40	36.07
MCV	15.47	18.57	32.40	37.63
MCV	52.53	56.47	32.40	29.65
MCV	35.97	39.53	32.40	32.70
MCV	51.27	55.00	32.40	31.24
MCV	11.13	14.13	32.40	38.88
MCV	44.83	47.97	32.40	37.23
MCV	52.10	54.07	32.40	59.31
MCV	56.63	58.97	32.40	49.99
MCV	40.27	43.40	32.40	37.23
MCV	27.00	30.27	32.40	35.71
MCV	51.20	55.03	32.40	30.43
MCV	55.43	59.10	32.40	31.81
MCV	33.07	37.10	32.40	28.92
MCV	39.87	44.90	32.40	23.17
LCV	31.80	35.00	32.40	36.45
LCV	1.40	4.73	32.40	34.99
LCV	47.90	50.07	32.40	53.83
LCV	38.40	43.17	32.40	24.47
LCV	38.33	42.37	32.40	28.92
LCV	7.60	11.13	32.40	33.01
LCV	41.53	44.80	32.40	35.71
LCV	7.80	13.27	32.40	21.34
LCV	4.53	8.40	32.40	30.17

APPENDIX-B : TRAFFIC DATA COLLECTED AT GAMPAHA ON JA ELA - GAMPAHA - YAKKALA ROAD (A-33)

Table B-1: Speed Data Collected at Gampaha on JaEla – Gampaha - Yakkala Road (A-33)

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Passenger Car	44.03	46.17	31.40	52.99
Passenger Car	1.70	4.30	31.40	43.48
Passenger Car	23.40	26.20	31.40	40.37
Passenger Car	47.10	49.47	31.40	47.76
Passenger Car	54.23	56.87	31.40	42.93
Passenger Car	34.53	36.30	31.40	63.98
Passenger Car	59.17	62.37	31.40	35.33
Passenger Car	6.20	8.50	31.40	49.15
Passenger Car	6.27	9.23	31.40	38.10
Passenger Car	55.03	57.43	31.40	47.10
Passenger Car	46.30	49.13	31.40	39.90
Passenger Car	54.10	57.37	31.40	34.60
Passenger Car	3.87	6.17	31.40	49.15
Passenger Car	19.20	22.07	31.40	39.43
Passenger Car	39.50	42.80	31.40	34.25
Passenger Car	5.90	9.63	31.40	30.28
Passenger Car	8.00	11.80	31.40	29.75
Passenger Car	39.63	42.27	31.40	42.93
Passenger Car	48.97	52.00	31.40	37.27
Passenger Car	40.07	42.43	31.40	47.76
Passenger Car	47.83	50.03	31.40	51.38
Passenger Car	18.13	21.17	31.40	37.27
Passenger Car	40.23	42.83	31.40	43.48
Passenger Car	17.13	20.83	31.40	30.55
Passenger Car	12.60	15.03	31.40	46.45
Passenger Car	5.93	10.00	31.40	27.80
Passenger Car	45.63	48.77	31.40	36.08
Passenger Car	51.70	54.50	31.40	40.37
Passenger Car	14.00	16.37	31.40	47.76
Passenger Car	16.37	19.17	31.40	40.37
Passenger Car	29.30	32.00	31.40	41.87

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Passenger Car	16.97	19.50	31.40	44.62
Passenger Car	45.37	47.07	31.40	66.49
Passenger Car	8.80	11.57	31.40	40.86
Passenger Car	36.40	39.73	31.40	33.91
Passenger Car	51.63	54.03	31.40	47.10
Passenger Car	3.87	6.27	31.40	47.10
Passenger Car	13.83	16.03	31.40	51.38
Passenger Car	35.47	37.93	31.40	45.83
Passenger Car	41.53	44.87	31.40	33.91
Passenger Car	43.03	46.07	31.40	37.27
Passenger Car	45.37	49.00	31.40	31.11
P. Car (Small)	25.57	28.00	31.40	46.45
P. Car (Small)	55.00	57.97	31.40	38.10
P. Car (Small)	7.50	10.63	31.40	36.08
P. Car (Small)	56.07	59.03	31.40	38.10
P. Car (Small)	2.07	6.20	31.40	27.35
P. Car (Small)	58.73	60.87	31.40	52.99
P. Car (Small)	25.03	27.47	31.40	46.45
P. Car (Small)	2.03	4.77	31.40	41.36
P. Car (Small)	3.63	6.03	31.40	47.10
P. Car (Small)	4.83	7.47	31.40	42.93
P. Car (Small)	0.23	3.10	31.40	39.43
P. Car (Small)	27.27	30.10	31.40	39.90
P. Car (Small)	8.13	10.57	31.40	46.45
P. Car (Small)	53.07	55.73	31.40	42.39
P. Car (Small)	55.60	58.73	31.40	36.08
P. Car (Small)	44.43	47.03	31.40	43.48
P. Car (Small)	56.87	59.30	31.40	46.45
P. Car (Small)	27.47	30.50	31.40	37.27
Van	24.17	26.47	31.40	49.15
Van	28.30	30.07	31.40	63.98
Van	51.60	55.57	31.40	28.50
Van	37.20	39.33	31.40	52.99
Van	52.60	56.00	31.40	33.25
Van	4.67	7.50	31.40	39.90
Van	1.07	3.93	31.40	39.43
Van	9.50	13.53	31.40	28.03

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Van	42.60	45.37	31.40	40.86
Van	48.80	50.90	31.40	53.83
Van	24.63	26.40	31.40	63.98
Van	6.07	9.00	31.40	38.54
Van	39.73	41.47	31.40	65.22
Van	44.03	46.37	31.40	48.45
Van	23.00	26.50	31.40	32.30
Van	51.03	54.37	31.40	33.91
Van	34.37	37.47	31.40	36.46
Van	29.67	32.33	31.40	42.39
Van	4.53	7.83	31.40	34.25
Van	11.47	14.40	31.40	38.54
Van	6.60	9.53	31.40	38.54
Van	28.23	30.70	31.40	45.83
Van	6.03	9.67	31.40	31.11
Motor Cycle	0.27	2.70	31.40	46.45
Motor Cycle	48.70	50.03	31.40	84.78
Motor Cycle	49.63	51.07	31.40	78.87
Motor Cycle	19.57	22.37	31.40	40.37
Motor Cycle	40.97	44.40	31.40	32.92
Motor Cycle	52.20	54.27	31.40	54.70
Motor Cycle	4.53	6.83	31.40	49.15
Motor Cycle	6.83	9.27	31.40	46.45
Motor Cycle	25.13	28.50	31.40	33.58
Motor Cycle	53.07	55.80	31.40	41.36
Motor Cycle	30.80	33.60	31.40	40.37
Motor Cycle	50.03	53.40	31.40	33.58
Motor Cycle	53.47	55.87	31.40	47.10
Motor Cycle	59.83	62.37	31.40	44.62
Motor Cycle	57.87	61.40	31.40	31.99
Motor Cycle	17.40	21.00	31.40	31.40
Motor Cycle	4.93	7.40	31.40	45.83
Motor Cycle	8.97	12.83	31.40	29.23
Motor Cycle	17.50	20.13	31.40	42.93
Motor Cycle	19.77	22.47	31.40	41.87
Motor Cycle	41.00	44.03	31.40	37.27
Motor Cycle	41.07	44.70	31.40	31.11

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Motor Cycle	50.20	53.03	31.40	39.90
Motor Cycle	55.03	58.00	31.40	38.10
Motor Cycle	56.93	59.53	31.40	43.48
Motor Cycle	14.03	16.37	31.40	48.45
Motor Cycle	16.47	19.63	31.40	35.70
Motor Cycle	9.47	11.57	31.40	53.83
Motor Cycle	31.10	34.57	31.40	32.61
Motor Cycle	45.60	49.10	31.40	32.30
Motor Cycle	54.60	60.03	31.40	20.80
Motor Cycle	14.10	17.10	31.40	37.68
Motor Cycle	5.53	7.77	31.40	50.61
Motor Cycle	57.20	59.00	31.40	62.80
Motor Cycle	39.27	41.60	31.40	48.45
Motor Cycle	42.13	45.13	31.40	37.68
Motor Cycle	5.87	8.77	31.40	38.98
Motor Cycle	16.20	19.13	31.40	38.54
Motor Cycle	25.77	27.07	31.40	86.95
Motor Cycle	26.27	29.77	31.40	32.30
Motor Cycle	34.60	36.77	31.40	52.17
Motor Cycle	34.80	36.87	31.40	54.70
Motor Cycle	35.53	38.73	31.40	35.33
Motor Cycle	36.47	39.60	31.40	36.08
Motor Cycle	38.30	41.00	31.40	41.87
Motor Cycle	47.70	50.83	31.40	36.08
Motor Cycle	0.90	5.03	31.40	27.35
Motor Cycle	4.03	7.87	31.40	29.49
Motor Cycle	35.97	38.57	31.40	43.48
Motor Cycle	48.97	52.10	31.40	36.08
Motor Cycle	54.87	57.57	31.40	41.87
Motor Cycle	56.03	58.63	31.40	43.48
Three Wheeler	42.07	44.37	31.40	49.15
Three Wheeler	8.03	10.93	31.40	38.98
Three Wheeler	59.53	62.17	31.40	42.93
Three Wheeler	3.70	6.40	31.40	41.87
Three Wheeler	44.47	47.87	31.40	33.25
Three Wheeler	57.57	60.17	31.40	43.48
Three Wheeler	36.13	39.20	31.40	36.86

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Three Wheeler	8.30	11.53	31.40	34.96
Three Wheeler	40.57	43.47	31.40	38.98
Three Wheeler	24.57	27.87	31.40	34.25
Three Wheeler	3.23	6.60	31.40	33.58
Three Wheeler	54.37	57.43	31.40	36.86
Three Wheeler	39.00	41.97	31.40	38.10
Three Wheeler	38.70	41.43	31.40	41.36
Three Wheeler	5.53	8.53	31.40	37.68
Three Wheeler	16.00	19.17	31.40	35.70
Three Wheeler	21.20	24.00	31.40	40.37
Three Wheeler	31.77	34.83	31.40	36.86
Three Wheeler	45.27	48.83	31.40	31.69
Three Wheeler	4.70	9.30	31.40	24.57
Three Wheeler	20.97	23.87	31.40	38.98
Three Wheeler	11.10	13.87	31.40	40.86
Three Wheeler	15.77	18.30	31.40	44.62
Three Wheeler	33.43	36.30	31.40	39.43
Three Wheeler	13.60	16.90	31.40	34.25
Three Wheeler	15.40	18.63	31.40	34.96
Three Wheeler	21.37	24.00	31.40	42.93
Three Wheeler	41.50	44.27	31.40	40.86
Three Wheeler	15.73	19.07	31.40	33.91
Three Wheeler	28.63	30.93	31.40	49.15
Three Wheeler	53.60	56.50	31.40	38.98
Three Wheeler	46.23	49.20	31.40	38.10
Three Wheeler	56.07	60.40	31.40	26.09
Three Wheeler	3.80	7.93	31.40	27.35
Three Wheeler	7.83	12.97	31.40	22.02
Three Wheeler	55.03	58.07	31.40	37.27
Three Wheeler	35.60	38.03	31.40	46.45
Three Wheeler	40.30	43.03	31.40	41.36
Three Wheeler	7.90	10.87	31.40	38.10
Three Wheeler	25.80	28.90	31.40	36.46
Three Wheeler	53.07	57.00	31.40	28.74
Three Wheeler	39.50	42.07	31.40	44.04
Three Wheeler	33.60	37.47	31.40	29.23
Three Wheeler	34.53	37.50	31.40	38.10

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Medium Bus	59.03	61.17	31.40	52.99
Medium Bus	42.87	45.43	31.40	44.04
Large Bus	28.97	32.60	31.40	31.11
Large Bus	4.07	7.00	31.40	38.54
Large Bus	12.93	15.60	31.40	42.39
SCV	53.50	55.57	31.40	54.70
SCV	18.07	21.33	31.40	34.60
SCV	57.13	60.30	31.40	35.70
SCV	31.40	33.80	31.40	47.10
SCV	36.07	39.70	31.40	31.11
SCV	47.93	51.80	31.40	29.23
SCV	15.03	17.00	31.40	57.48
SCV	0.00	2.33	31.40	48.45
SCV	11.17	13.50	31.40	48.45
SCV	16.30	18.93	31.40	42.93
SCV	45.43	47.83	31.40	47.10
SCV	16.57	19.63	31.40	36.86
SCV	56.70	58.77	31.40	54.70
SCV	11.57	14.20	31.40	42.93
SCV	23.70	26.53	31.40	39.90
SCV	35.07	38.37	31.40	34.25
SCV	42.60	44.93	31.40	48.45
SCV	16.70	19.60	31.40	38.98
SCV	28.20	31.47	31.40	34.60
SCV	28.40	32.23	31.40	29.49
SCV	14.93	18.53	31.40	31.40
MCV	3.83	6.40	31.40	44.04
MCV	2.23	4.07	31.40	61.66
MCV	48.40	50.83	31.40	46.45
MCV	34.10	37.17	31.40	36.86
MCV	55.97	59.47	31.40	32.30
MCV	52.40	55.03	31.40	42.93
MCV	2.30	8.37	31.40	18.63
MCV	38.27	41.07	31.40	40.37
MCV	13.07	16.17	31.40	36.46
MCV	5.93	8.93	31.40	37.68
MCV	37.03	39.07	31.40	55.59

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
MCV	39.03	41.90	31.40	39.43
MCV	15.17	18.77	31.40	31.40
MCV	21.47	23.97	31.40	45.22
MCV	21.27	24.03	31.40	40.86
MCV	24.17	27.07	31.40	38.98
MCV	40.57	43.10	31.40	44.62
MCV	10.77	13.60	31.40	39.90
MCV	28.83	31.90	31.40	36.86
MCV	14.87	17.47	31.40	43.48
LCV	2.43	5.73	31.40	34.25

APPENDIX-C : TRAFFIC DATA COLLECTED AT AHURUGIRIYA ON KOTTE - BOPE ROAD (B-240)

Table C-1: Speed Data Collected at Athrugiriya on Kotte – Bope Road (B-240)

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Passenger Car	49.50	52.73	30.00	33.40
Passenger Car	51.03	54.20	30.00	34.11
Passenger Car	5.07	8.87	30.00	28.42
Passenger Car	21.50	24.30	30.00	38.57
Passenger Car	23.40	26.30	30.00	37.24
Passenger Car	9.80	13.17	30.00	32.08
Passenger Car	11.17	14.60	30.00	31.46
Passenger Car	16.83	20.13	30.00	32.73
Passenger Car	27.27	29.97	30.00	40.00
Passenger Car	29.87	32.30	30.00	44.38
Passenger Car	31.37	33.70	30.00	46.29
Passenger Car	42.00	44.20	30.00	49.09
Passenger Car	51.53	54.13	30.00	41.54
Passenger Car	30.50	32.73	30.00	48.36
Passenger Car	3.13	5.27	30.00	50.63
Passenger Car	22.97	25.77	30.00	38.57
Passenger Car	47.30	50.17	30.00	37.67
Passenger Car	54.03	56.10	30.00	52.26
Passenger Car	45.20	48.00	30.00	38.57
Passenger Car	6.27	8.17	30.00	56.84
Passenger Car	49.77	51.60	30.00	58.91
Passenger Car	13.40	16.70	30.00	32.73
Passenger Car	46.77	50.20	30.00	31.46
Passenger Car	1.87	4.03	30.00	49.85
Passenger Car	49.30	52.17	30.00	37.67
Passenger Car	39.00	41.60	30.00	41.54
Passenger Car	58.60	61.93	30.00	32.40
Passenger Car	18.20	21.07	30.00	37.67
Passenger Car	15.43	19.00	30.00	30.28
Passenger Car	17.10	19.57	30.00	43.78
Passenger Car	35.63	37.70	30.00	52.26
Passenger Car	51.07	53.03	30.00	54.92

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Passenger Car	7.23	9.50	30.00	47.65
Passenger Car	22.17	24.47	30.00	46.96
Passenger Car	30.77	32.93	30.00	49.85
Passenger Car	54.27	56.57	30.00	46.96
Passenger Car	31.50	33.97	30.00	43.78
Passenger Car	32.83	35.57	30.00	39.51
Passenger Car	46.10	48.20	30.00	51.43
Passenger Car	49.27	52.37	30.00	34.84
Passenger Car	38.17	40.37	30.00	49.09
Passenger Car	49.97	52.97	30.00	36.00
Passenger Car	56.03	59.10	30.00	35.22
Passenger Car	57.07	59.93	30.00	37.67
Passenger Car	43.47	45.30	30.00	58.91
Passenger Car	12.30	16.17	30.00	27.93
Passenger Car	23.60	25.83	30.00	48.36
Passenger Car	27.13	29.93	30.00	38.57
Passenger Car	5.83	8.03	30.00	49.09
Passenger Car	31.17	33.27	30.00	51.43
Passenger Car	58.27	60.53	30.00	47.65
Passenger Car	25.37	26.73	30.00	79.02
Passenger Car	3.27	5.87	30.00	41.54
Passenger Car	34.93	37.30	30.00	45.63
Passenger Car	26.07	28.97	30.00	37.24
Passenger Car	15.70	19.43	30.00	28.93
Passenger Car	10.47	13.23	30.00	39.04
Passenger Car	29.97	32.83	30.00	37.67
Passenger Car	3.07	6.13	30.00	35.22
Passenger Car	43.57	46.53	30.00	36.40
Passenger Car	58.93	61.00	30.00	52.26
Passenger Car	46.60	48.80	30.00	49.09
Passenger Car	8.20	11.70	30.00	30.86
Passenger Car	11.00	14.23	30.00	33.40
Passenger Car	24.57	27.03	30.00	43.78
Passenger Car	59.13	63.03	30.00	27.69
Passenger Car	31.00	33.47	30.00	43.78
Passenger Car	2.30	5.10	30.00	38.57
Passenger Car	54.43	58.10	30.00	29.45

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Passenger Car	47.70	50.40	30.00	40.00
Passenger Car	50.23	54.13	30.00	27.69
Passenger Car	54.93	58.40	30.00	31.15
Passenger Car	22.07	24.50	30.00	44.38
Passenger Car	0.97	5.37	30.00	24.55
Passenger Car	48.60	51.97	30.00	32.08
Passenger Car	0.17	3.47	30.00	32.73
Passenger Car	2.77	6.60	30.00	28.17
Passenger Car	8.00	11.70	30.00	29.19
Passenger Car	35.03	38.50	30.00	31.15
Passenger Car	13.70	17.00	30.00	32.73
Passenger Car	15.03	18.83	30.00	28.42
Passenger Car	29.73	32.47	30.00	39.51
Passenger Car	31.53	34.20	30.00	40.50
Passenger Car	52.83	56.00	30.00	34.11
Passenger Car	9.50	12.87	30.00	32.08
Passenger Car	25.80	29.03	30.00	33.40
Passenger Car	2.50	5.43	30.00	36.82
Passenger Car	48.27	51.97	30.00	29.19
P. Car (Small)	7.83	10.83	30.00	36.00
P. Car (Small)	40.07	43.73	30.00	29.45
P. Car (Small)	33.17	37.57	30.00	24.55
P. Car (Small)	50.03	54.43	30.00	24.55
P. Car (Small)	2.13	4.80	30.00	40.50
P. Car (Small)	41.17	43.47	30.00	46.96
P. Car (Small)	5.27	9.17	30.00	27.69
P. Car (Small)	34.03	37.23	30.00	33.75
P. Car (Small)	35.30	38.10	30.00	38.57
P. Car (Small)	40.53	42.07	30.00	70.43
P. Car (Small)	46.60	48.97	30.00	45.63
P. Car (Small)	5.13	7.63	30.00	43.20
P. Car (Small)	37.53	39.83	30.00	46.96
P. Car (Small)	53.57	55.87	30.00	46.96
P. Car (Small)	48.20	51.40	30.00	33.75
P. Car (Small)	3.83	6.13	30.00	46.96
P. Car (Small)	41.60	43.93	30.00	46.29
P. Car (Small)	42.07	45.03	30.00	36.40

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
P. Car (Small)	45.97	48.83	30.00	37.67
P. Car (Small)	11.47	14.73	30.00	33.06
P. Car (Small)	24.57	27.47	30.00	37.24
P. Car (Small)	31.90	34.03	30.00	50.63
P. Car (Small)	25.03	27.03	30.00	54.00
P. Car (Small)	35.27	37.30	30.00	53.11
P. Car (Small)	41.07	44.17	30.00	34.84
P. Car (Small)	13.57	16.03	30.00	43.78
P. Car (Small)	9.53	12.93	30.00	31.76
P. Car (Small)	33.63	36.07	30.00	44.38
P. Car (Small)	9.53	12.53	30.00	36.00
P. Car (Small)	16.57	19.10	30.00	42.63
P. Car (Small)	31.97	35.13	30.00	34.11
P. Car (Small)	36.03	39.80	30.00	28.67
P. Car (Small)	47.10	50.23	30.00	34.47
P. Car (Small)	11.23	14.37	30.00	34.47
P. Car (Small)	39.73	42.03	30.00	46.96
P. Car (Small)	16.13	19.57	30.00	31.46
Van	48.00	51.03	30.00	35.60
Van	53.43	56.70	30.00	33.06
Van	34.13	36.87	30.00	39.51
Van	56.53	59.03	30.00	43.20
Van	3.83	6.27	30.00	44.38
Van	49.13	52.83	30.00	29.19
Van	2.50	5.30	30.00	38.57
Van	43.47	47.07	30.00	30.00
Van	16.00	19.03	30.00	35.60
Van	15.20	17.43	30.00	48.36
Van	40.20	42.37	30.00	49.85
Van	2.53	4.07	30.00	70.43
Van	44.87	47.40	30.00	42.63
Van	51.00	53.27	30.00	47.65
Van	43.97	46.23	30.00	47.65
Van	30.17	34.10	30.00	27.46
Van	28.13	30.47	30.00	46.29
Van	7.00	9.23	30.00	48.36
Van	33.03	35.60	30.00	42.08

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Van	26.27	28.80	30.00	42.63
Van	35.13	37.70	30.00	42.08
Van	23.07	27.30	30.00	25.51
Van	47.93	50.57	30.00	41.01
Van	24.03	27.40	30.00	32.08
Van	34.77	37.43	30.00	40.50
Van	54.50	57.30	30.00	38.57
Van	27.03	29.77	30.00	39.51
Van	56.27	58.77	30.00	43.20
Van	15.97	18.50	30.00	42.63
Van	26.87	29.87	30.00	36.00
Van	47.87	50.10	30.00	48.36
Van	2.07	4.80	30.00	39.51
Van	59.20	62.23	30.00	35.60
Van	41.50	44.93	30.00	31.46
Van	10.63	14.07	30.00	31.46
Van	7.00	10.70	30.00	29.19
Van	54.13	58.50	30.00	24.73
Van	36.53	40.00	30.00	31.15
Van	33.23	36.47	30.00	33.40
Van	30.50	34.17	30.00	29.45
Van	33.07	37.73	30.00	23.14
Van	50.80	53.17	30.00	45.63
Van	17.40	20.70	30.00	32.73
Van	3.57	7.30	30.00	28.93
Van	4.90	8.03	30.00	34.47
Van	27.27	30.53	30.00	33.06
Motor Cycle	43.23	46.23	30.00	36.00
Motor Cycle	32.17	35.00	30.00	38.12
Motor Cycle	31.83	34.37	30.00	42.63
Motor Cycle	54.43	57.60	30.00	34.11
Motor Cycle	55.27	58.13	30.00	37.67
Motor Cycle	41.53	44.20	30.00	40.50
Motor Cycle	49.27	51.97	30.00	40.00
Motor Cycle	5.60	7.77	30.00	49.85
Motor Cycle	13.07	15.43	30.00	45.63
Motor Cycle	48.23	51.23	30.00	36.00

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Motor Cycle	43.20	46.63	30.00	31.46
Motor Cycle	54.73	56.07	30.00	81.00
Motor Cycle	5.70	8.10	30.00	45.00
Motor Cycle	18.53	21.03	30.00	43.20
Motor Cycle	9.53	11.07	30.00	70.43
Motor Cycle	42.07	44.30	30.00	48.36
Motor Cycle	50.93	52.60	30.00	64.80
Motor Cycle	9.13	11.47	30.00	46.29
Motor Cycle	5.70	8.63	30.00	36.82
Motor Cycle	15.27	18.07	30.00	38.57
Motor Cycle	23.53	26.03	30.00	43.20
Motor Cycle	24.40	26.73	30.00	46.29
Motor Cycle	5.20	7.40	30.00	49.09
Motor Cycle	14.00	17.47	30.00	31.15
Motor Cycle	37.13	40.00	30.00	37.67
Motor Cycle	47.40	51.40	30.00	27.00
Motor Cycle	18.03	21.90	30.00	27.93
Motor Cycle	21.43	24.03	30.00	41.54
Motor Cycle	40.43	44.57	30.00	26.13
Motor Cycle	47.43	51.37	30.00	27.46
Motor Cycle	48.17	52.20	30.00	26.78
Motor Cycle	54.07	57.40	30.00	32.40
Motor Cycle	16.40	18.73	30.00	46.29
Motor Cycle	46.13	48.93	30.00	38.57
Motor Cycle	50.03	53.27	30.00	33.40
Motor Cycle	3.50	6.03	30.00	42.63
Motor Cycle	11.87	15.07	30.00	33.75
Motor Cycle	23.07	26.60	30.00	30.57
Motor Cycle	25.60	27.70	30.00	51.43
Motor Cycle	42.70	45.17	30.00	43.78
Motor Cycle	5.57	8.63	30.00	35.22
Motor Cycle	29.20	31.97	30.00	39.04
Motor Cycle	41.63	44.10	30.00	43.78
Motor Cycle	52.63	54.80	30.00	49.85
Motor Cycle	42.13	45.40	30.00	33.06
Motor Cycle	43.47	45.40	30.00	55.86
Motor Cycle	45.80	47.93	30.00	50.63

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Motor Cycle	56.60	59.07	30.00	43.78
Motor Cycle	2.77	7.03	30.00	25.31
Motor Cycle	10.40	14.00	30.00	30.00
Motor Cycle	25.07	29.20	30.00	26.13
Motor Cycle	27.27	29.83	30.00	42.08
Three Wheeler	2.00	4.03	30.00	53.11
Three Wheeler	29.83	33.80	30.00	27.23
Three Wheeler	37.60	40.83	30.00	33.40
Three Wheeler	40.77	44.30	30.00	30.57
Three Wheeler	7.00	11.23	30.00	25.51
Three Wheeler	19.10	21.97	30.00	37.67
Three Wheeler	38.37	42.30	30.00	27.46
Three Wheeler	49.77	52.63	30.00	37.67
Three Wheeler	54.10	63.57	30.00	11.41
Three Wheeler	18.83	21.03	30.00	49.09
Three Wheeler	26.13	28.83	30.00	40.00
Three Wheeler	33.17	36.60	30.00	31.46
Three Wheeler	37.50	39.87	30.00	45.63
Three Wheeler	14.57	16.07	30.00	72.00
Three Wheeler	25.50	27.90	30.00	45.00
Three Wheeler	51.47	53.90	30.00	44.38
Three Wheeler	3.73	7.20	30.00	31.15
Three Wheeler	4.50	6.77	30.00	47.65
Three Wheeler	59.93	61.97	30.00	53.11
Three Wheeler	45.50	50.27	30.00	22.66
Three Wheeler	1.03	4.17	30.00	34.47
Three Wheeler	26.17	28.07	30.00	56.84
Three Wheeler	27.87	30.40	30.00	42.63
Three Wheeler	36.03	38.77	30.00	39.51
Three Wheeler	45.80	50.03	30.00	25.51
Three Wheeler	0.47	3.43	30.00	36.40
Three Wheeler	15.07	18.10	30.00	35.60
Three Wheeler	14.60	17.60	30.00	36.00
Three Wheeler	17.60	20.90	30.00	32.73
Three Wheeler	22.50	26.53	30.00	26.78
Three Wheeler	57.57	59.97	30.00	45.00
Three Wheeler	5.20	9.23	30.00	26.78

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Three Wheeler	0.40	6.00	30.00	19.29
Three Wheeler	28.60	31.27	30.00	40.50
Three Wheeler	27.97	31.47	30.00	30.86
Three Wheeler	46.27	49.20	30.00	36.82
Three Wheeler	47.53	50.60	30.00	35.22
Three Wheeler	3.80	7.17	30.00	32.08
Three Wheeler	32.60	36.00	30.00	31.76
Three Wheeler	37.43	40.27	30.00	38.12
Three Wheeler	44.73	49.47	30.00	22.82
Three Wheeler	4.43	7.37	30.00	36.82
Three Wheeler	40.80	43.27	30.00	43.78
Three Wheeler	10.80	14.47	30.00	29.45
Three Wheeler	13.10	16.23	30.00	34.47
Three Wheeler	44.07	47.27	30.00	33.75
Three Wheeler	57.17	59.60	30.00	44.38
Three Wheeler	6.13	9.17	30.00	35.60
Three Wheeler	12.77	16.40	30.00	29.72
Three Wheeler	22.87	25.60	30.00	39.51
Medium Bus	55.57	57.87	30.00	46.96
Medium Bus	35.93	38.13	30.00	49.09
Medium Bus	6.30	10.30	30.00	27.00
Medium Bus	35.07	38.10	30.00	35.60
Large Bus	28.23	32.00	30.00	28.67
Large Bus	58.23	60.03	30.00	60.00
Large Bus	30.97	34.53	30.00	30.28
Large Bus	16.30	20.60	30.00	25.12
Large Bus	40.07	43.47	30.00	31.76
Large Bus	59.37	62.83	30.00	31.15
Large Bus	41.73	45.03	30.00	32.73
Large Bus	41.37	45.23	30.00	27.93
Large Bus	5.17	8.00	30.00	38.12
Large Bus	41.83	45.90	30.00	26.56
Large Bus	24.20	28.03	30.00	28.17
Large Bus	51.60	55.93	30.00	24.92
Large Bus	43.63	47.23	30.00	30.00
SCV	21.10	24.03	30.00	36.82
SCV	25.10	27.87	30.00	39.04

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
SCV	2.77	5.63	30.00	37.67
SCV	12.03	16.17	30.00	26.13
SCV	12.27	15.30	30.00	35.60
SCV	6.07	9.20	30.00	34.47
SCV	33.90	36.13	30.00	48.36
SCV	38.80	41.60	30.00	38.57
SCV	47.27	50.10	30.00	38.12
SCV	4.97	7.77	30.00	38.57
SCV	57.43	62.03	30.00	23.48
SCV	38.13	40.23	30.00	51.43
SCV	42.00	44.23	30.00	48.36
SCV	5.47	8.07	30.00	41.54
SCV	41.07	44.73	30.00	29.45
SCV	1.03	4.10	30.00	35.22
SCV	26.50	30.07	30.00	30.28
SCV	46.17	49.23	30.00	35.22
SCV	23.10	25.23	30.00	50.63
SCV	30.10	32.23	30.00	50.63
SCV	52.40	55.37	30.00	36.40
SCV	55.90	58.43	30.00	42.63
SCV	48.93	51.70	30.00	39.04
SCV	38.97	40.93	30.00	54.92
SCV	21.40	25.27	30.00	27.93
SCV	26.73	29.23	30.00	43.20
SCV	28.30	30.80	30.00	43.20
SCV	42.70	45.70	30.00	36.00
SCV	51.83	55.00	30.00	34.11
SCV	29.87	32.83	30.00	36.40
SCV	55.63	57.77	30.00	50.63
SCV	18.30	21.93	30.00	29.72
SCV	30.03	34.60	30.00	23.65
SCV	2.77	5.73	30.00	36.40
SCV	16.03	18.93	30.00	37.24
SCV	13.40	16.00	30.00	41.54
SCV	39.77	43.03	30.00	33.06
SCV	44.30	46.97	30.00	40.50
SCV	34.97	38.57	30.00	30.00

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
SCV	5.07	9.87	30.00	22.50
SCV	6.60	10.03	30.00	31.46
SCV	32.40	36.27	30.00	27.93
MCV	13.03	15.57	30.00	42.63
MCV	33.43	36.47	30.00	35.60
MCV	34.97	37.23	30.00	47.65
MCV	19.50	22.87	30.00	32.08
MCV	47.17	50.13	30.00	36.40
MCV	45.00	47.57	30.00	42.08
MCV	21.27	23.77	30.00	43.20
MCV	44.87	47.47	30.00	41.54
MCV	59.40	62.57	30.00	34.11
MCV	2.13	5.37	30.00	33.40
MCV	16.47	19.97	30.00	30.86
MCV	13.73	17.37	30.00	29.72
MCV	26.80	30.17	30.00	32.08
MCV	19.43	21.03	30.00	67.50
MCV	33.53	36.23	30.00	40.00
MCV	32.43	35.03	30.00	41.54
MCV	27.13	30.07	30.00	36.82
MCV	15.03	18.70	30.00	29.45
MCV	55.07	60.57	30.00	19.64
MCV	6.27	9.30	30.00	35.60
MCV	33.50	36.53	30.00	35.60
MCV	26.70	29.63	30.00	36.82
MCV	29.10	32.17	30.00	35.22
MCV	44.20	47.53	30.00	32.40
MCV	46.90	50.17	30.00	33.06
MCV	7.87	11.03	30.00	34.11
MCV	24.97	27.73	30.00	39.04
MCV	45.50	48.17	30.00	40.50
MCV	35.23	37.70	30.00	43.78
MCV	1.10	3.93	30.00	38.12
MCV	20.90	24.27	30.00	32.08
MCV	43.53	45.87	30.00	46.29
MCV	55.23	58.10	30.00	37.67
MCV	49.07	51.40	30.00	46.29

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
MCV	55.07	58.13	30.00	35.22
MCV	16.83	19.53	30.00	40.00
MCV	38.00	40.73	30.00	39.51
MCV	46.60	49.80	30.00	33.75
MCV	53.43	56.23	30.00	38.57
MCV	15.90	18.03	30.00	50.63
MCV	5.30	8.43	30.00	34.47
MCV	38.63	41.17	30.00	42.63
MCV	40.90	43.73	30.00	38.12
MCV	5.03	7.20	30.00	49.85
MCV	20.47	22.80	30.00	46.29
MCV	21.13	23.17	30.00	53.11
MCV	54.77	57.87	30.00	34.84
MCV	9.43	12.77	30.00	32.40
MCV	21.97	25.20	30.00	33.40
MCV	19.80	23.43	30.00	29.72
MCV	38.50	41.40	30.00	37.24
MCV	19.60	23.37	30.00	28.67
MCV	23.50	26.17	30.00	40.50
MCV	37.47	40.20	30.00	39.51
MCV	8.07	12.07	30.00	27.00
MCV	35.57	38.00	30.00	44.38
MCV	19.97	22.40	30.00	44.38
MCV	45.30	48.40	30.00	34.84
MCV	58.93	63.47	30.00	23.82
MCV	25.23	27.93	30.00	40.00
MCV	44.50	47.60	30.00	34.84
MCV	46.57	49.77	30.00	33.75
MCV	52.17	55.17	30.00	36.00
MCV	11.43	14.30	30.00	37.67
MCV	26.47	29.03	30.00	42.08
MCV	1.07	4.70	30.00	29.72
MCV	23.13	26.43	30.00	32.73
MCV	55.17	58.10	30.00	36.82
MCV	29.47	32.57	30.00	34.84
MCV	14.80	18.40	30.00	30.00
LCV	46.07	48.67	30.00	41.54

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
LCV	1.30	3.83	30.00	42.63
LCV	7.53	10.50	30.00	36.40
LCV	59.17	61.77	30.00	41.54
LCV	53.50	56.20	30.00	40.00
LCV	11.63	14.83	30.00	33.75
LCV	48.27	53.03	30.00	22.66
LCV	12.63	16.00	30.00	32.08
LCV	32.60	35.50	30.00	37.24

APPENDIX-D : TRAFFIC DATA COLLECTED AT MINUWANGODA ON EKALA-KOTADENIYAWA ROAD (B-111)

Table D-1: Speed Data Collected at Minuwangoda on Ekala – Kotadeniyawa Road (B-111)

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Passenger Car	32.07	36.80	51.50	39.17
Passenger Car	40.40	45.43	51.50	36.83
Passenger Car	14.43	19.73	51.50	34.98
Passenger Car	21.17	26.03	51.50	38.10
Passenger Car	39.70	42.20	51.50	74.16
Passenger Car	50.23	53.77	51.50	52.47
Passenger Car	3.07	6.70	51.50	51.03
Passenger Car	28.07	32.37	51.50	43.12
Passenger Car	2.03	6.43	51.50	42.14
Passenger Car	32.50	37.03	51.50	40.90
Passenger Car	55.03	59.97	51.50	37.58
Passenger Car	52.80	57.87	51.50	36.59
Passenger Car	55.13	59.80	51.50	39.73
Passenger Car	59.93	63.23	51.50	56.18
Passenger Car	28.47	33.80	51.50	34.76
Passenger Car	32.07	36.57	51.50	41.20
P. Car (Small)	19.90	23.20	51.50	56.18
P. Car (Small)	48.03	52.87	51.50	38.36
P. Car (Small)	19.37	25.00	51.50	32.91
P. Car (Small)	43.63	47.50	51.50	47.95
P. Car (Small)	13.03	19.27	51.50	29.74
P. Car (Small)	34.83	39.97	51.50	36.12
P. Car (Small)	0.73	5.53	51.50	38.63
P. Car (Small)	17.90	22.40	51.50	41.20
Van	42.17	47.00	51.50	38.36
Van	10.47	16.30	51.50	31.78
Van	44.23	48.10	51.50	47.95
Van	50.27	55.13	51.50	38.10
Van	54.73	60.13	51.50	34.33
Van	7.23	12.13	51.50	37.84
Van	24.20	29.73	51.50	33.51
Van	37.87	42.40	51.50	40.90

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Van	0.03	4.87	51.50	38.36
Motor Cycle	10.73	15.70	51.50	37.33
Motor Cycle	22.00	28.97	51.50	26.61
Motor Cycle	30.07	35.03	51.50	37.33
Motor Cycle	37.63	44.37	51.50	27.53
Motor Cycle	50.50	55.07	51.50	40.60
Motor Cycle	4.53	9.20	51.50	39.73
Motor Cycle	30.77	34.83	51.50	45.59
Motor Cycle	52.17	56.73	51.50	40.60
Motor Cycle	55.47	61.00	51.50	33.51
Motor Cycle	6.43	12.50	51.50	30.56
Motor Cycle	8.07	12.03	51.50	46.74
Motor Cycle	11.37	16.37	51.50	37.08
Motor Cycle	11.37	15.03	51.50	50.56
Motor Cycle	58.27	62.63	51.50	42.46
Motor Cycle	52.60	56.97	51.50	42.46
Motor Cycle	9.17	14.20	51.50	36.83
Motor Cycle	16.30	20.80	51.50	41.20
Motor Cycle	31.83	35.07	51.50	57.34
Motor Cycle	33.03	37.27	51.50	43.80
Motor Cycle	35.13	39.07	51.50	47.14
Motor Cycle	57.07	64.47	51.50	25.05
Motor Cycle	13.83	18.77	51.50	37.58
Motor Cycle	21.83	26.13	51.50	43.12
Motor Cycle	47.10	52.00	51.50	37.84
Motor Cycle	3.80	7.47	51.50	50.56
Motor Cycle	6.07	11.87	51.50	31.97
Motor Cycle	7.83	12.90	51.50	36.59
Motor Cycle	9.77	14.70	51.50	37.58
Motor Cycle	17.00	20.50	51.50	52.97
Motor Cycle	20.97	25.87	51.50	37.84
Motor Cycle	33.60	37.93	51.50	42.78
Motor Cycle	36.07	41.10	51.50	36.83
Motor Cycle	43.80	47.97	51.50	44.50
Motor Cycle	47.50	53.80	51.50	29.43
Motor Cycle	49.63	55.00	51.50	34.55
Motor Cycle	59.57	64.80	51.50	35.43

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Motor Cycle	0.53	4.07	51.50	52.47
Motor Cycle	12.07	17.50	51.50	34.12
Motor Cycle	50.07	54.20	51.50	44.85
Motor Cycle	2.23	6.13	51.50	47.54
Motor Cycle	4.13	9.00	51.50	38.10
Motor Cycle	51.80	56.60	51.50	38.63
Motor Cycle	9.27	14.03	51.50	38.90
Motor Cycle	48.23	51.40	51.50	58.55
Motor Cycle	11.70	17.20	51.50	33.71
Motor Cycle	17.57	24.37	51.50	27.26
Motor Cycle	18.23	22.93	51.50	39.45
Motor Cycle	21.13	26.70	51.50	33.31
Motor Cycle	43.50	49.10	51.50	33.11
Motor Cycle	5.63	11.57	51.50	31.25
Motor Cycle	14.03	19.23	51.50	35.65
Motor Cycle	21.37	26.03	51.50	39.73
Three Wheeler	12.50	17.60	51.50	36.35
Three Wheeler	35.07	40.30	51.50	35.43
Three Wheeler	48.30	54.00	51.50	32.53
Three Wheeler	51.17	56.03	51.50	38.10
Three Wheeler	6.93	11.93	51.50	37.08
Three Wheeler	9.20	13.50	51.50	43.12
Three Wheeler	28.03	32.70	51.50	39.73
Three Wheeler	16.60	20.93	51.50	42.78
Three Wheeler	50.57	55.00	51.50	41.82
Three Wheeler	52.70	57.97	51.50	35.20
Three Wheeler	9.17	14.73	51.50	33.31
Three Wheeler	16.53	21.27	51.50	39.17
Three Wheeler	19.13	26.20	51.50	26.24
Three Wheeler	23.30	27.30	51.50	46.35
Three Wheeler	37.07	42.60	51.50	33.51
Three Wheeler	8.97	13.27	51.50	43.12
Three Wheeler	23.73	28.83	51.50	36.35
Three Wheeler	13.20	17.70	51.50	41.20
Three Wheeler	58.13	67.30	51.50	20.23
Three Wheeler	27.87	32.37	51.50	41.20
Three Wheeler	25.47	29.50	51.50	45.97

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Three Wheeler	35.80	40.20	51.50	42.14
Three Wheeler	39.73	44.27	51.50	40.90
Three Wheeler	48.90	54.07	51.50	35.88
Three Wheeler	51.03	56.77	51.50	32.34
Three Wheeler	25.73	31.07	51.50	34.76
Three Wheeler	59.20	64.30	51.50	36.35
Medium Bus	10.50	14.83	51.50	42.78
Large Bus	50.10	55.00	51.50	37.84
Large Bus	17.60	22.90	51.50	34.98
Large Bus	25.03	29.03	51.50	46.35
Large Bus	47.03	52.03	51.50	37.08
SCV	40.13	44.17	51.50	45.97
SCV	40.73	45.80	51.50	36.59
SCV	43.67	50.40	51.50	27.53
SCV	49.10	52.50	51.50	54.53
SCV	55.60	60.43	51.50	38.36
SCV	34.17	39.33	51.50	35.88
SCV	45.13	49.40	51.50	43.45
SCV	33.63	37.87	51.50	43.80
SCV	20.63	25.73	51.50	36.35
SCV	36.23	41.37	51.50	36.12
SCV	54.53	58.90	51.50	42.46
SCV	27.03	32.10	51.50	36.59
MCV	11.20	15.97	51.50	38.90
MCV	29.23	33.60	51.50	42.46
MCV	33.13	38.23	51.50	36.35
MCV	35.43	40.60	51.50	35.88
MCV	46.40	51.47	51.50	36.59
MCV	54.03	60.07	51.50	30.73
MCV	16.37	21.23	51.50	38.10
MCV	55.70	60.43	51.50	39.17
MCV	33.13	38.23	51.50	36.35
MCV	24.50	29.07	51.50	40.60
MCV	37.80	42.43	51.50	40.01
MCV	48.20	52.00	51.50	48.79
MCV	16.87	23.03	51.50	30.06
MCV	53.03	58.87	51.50	31.78

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
MCV	56.70	61.87	51.50	35.88
MCV	50.90	55.20	51.50	43.12
MCV	41.73	47.03	51.50	34.98
MCV	53.20	56.90	51.50	50.11
MCV	53.17	57.37	51.50	44.14
MCV	54.13	58.70	51.50	40.60
MCV	8.50	13.47	51.50	37.33
MCV	40.93	44.87	51.50	47.14
MCV	42.93	46.47	51.50	52.47
MCV	3.50	7.90	51.50	42.14
MCV	38.73	43.83	51.50	36.35
MCV	0.10	5.80	51.50	32.53
MCV	21.10	25.37	51.50	43.45
MCV	53.00	57.30	51.50	43.12
MCV	54.93	59.37	51.50	41.82
LCV	26.43	31.07	51.50	40.01
LCV	37.77	42.50	51.50	39.17
LCV	56.40	60.87	51.50	41.51
LCV	51.90	57.10	51.50	35.65

APPENDIX-E : TRAFFIC DATA COLLECTED AT KATUNAYAKA ON KATUNAYAKA - VEYANGODA ROAD (B-208)

Table E-1: Speed Data Collected at Katunayaka on Katunayaka – Veyangoda Road (B-208)

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Passenger Car	15.37	18.50	30.00	34.47
Passenger Car	27.63	29.97	30.00	46.29
Passenger Car	46.03	49.23	30.00	33.75
Passenger Car	54.57	58.80	30.00	25.51
Passenger Car	59.90	63.83	30.00	27.46
Passenger Car	14.03	15.07	30.00	104.52
Passenger Car	54.23	56.90	30.00	40.50
Passenger Car	59.03	61.47	30.00	44.38
Passenger Car	12.30	14.57	30.00	47.65
Passenger Car	13.63	16.30	30.00	40.50
Passenger Car	22.17	24.97	30.00	38.57
Passenger Car	30.87	33.77	30.00	37.24
Passenger Car	31.93	35.13	30.00	33.75
Passenger Car	55.70	58.20	30.00	43.20
Passenger Car	6.43	10.57	30.00	26.13
Passenger Car	12.30	15.83	30.00	30.57
Passenger Car	37.10	40.63	30.00	30.57
Passenger Car	40.93	45.10	30.00	25.92
Passenger Car	17.87	20.50	30.00	41.01
Passenger Car	29.17	32.43	30.00	33.06
Passenger Car	30.77	33.90	30.00	34.47
Passenger Car	58.90	61.07	30.00	49.85
Passenger Car	29.93	32.60	30.00	40.50
Passenger Car	40.73	43.60	30.00	37.67
Passenger Car	51.87	55.23	30.00	32.08
Passenger Car	59.90	62.20	30.00	46.96
Passenger Car	9.77	12.07	30.00	46.96
Passenger Car	17.97	20.17	30.00	49.09
Passenger Car	38.80	40.63	30.00	58.91
Passenger Car	45.07	48.17	30.00	34.84

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Passenger Car	37.07	39.43	30.00	45.63
Passenger Car	2.00	4.57	30.00	42.08
Passenger Car	3.57	6.40	30.00	38.12
Passenger Car	8.17	11.10	30.00	36.82
Passenger Car	15.50	18.07	30.00	42.08
Passenger Car	2.43	5.10	30.00	40.50
Passenger Car	8.40	10.30	30.00	56.84
Passenger Car	33.73	36.17	30.00	44.38
Passenger Car	58.90	60.90	30.00	54.00
Passenger Car	16.57	18.90	30.00	46.29
Passenger Car	44.03	47.10	30.00	35.22
Passenger Car	51.60	54.87	30.00	33.06
Passenger Car	53.03	56.83	30.00	28.42
Passenger Car	14.63	17.23	30.00	41.54
Passenger Car	15.07	18.43	30.00	32.08
Passenger Car	30.40	32.07	30.00	64.80
Passenger Car	31.60	33.70	30.00	51.43
Passenger Car	16.83	18.90	30.00	52.26
Passenger Car	19.57	21.97	30.00	45.00
Passenger Car	38.23	42.13	30.00	27.69
Passenger Car	2.50	4.83	30.00	46.29
Passenger Car	11.30	14.03	30.00	39.51
Passenger Car	14.77	17.00	30.00	48.36
Passenger Car	28.17	30.27	30.00	51.43
Passenger Car	42.03	43.97	30.00	55.86
Passenger Car	43.17	45.17	30.00	54.00
Passenger Car	20.30	23.53	30.00	33.40
Passenger Car	21.87	23.97	30.00	51.43
Passenger Car	27.97	30.27	30.00	46.96
Passenger Car	1.60	3.37	30.00	61.13
Passenger Car	2.37	4.57	30.00	49.09
Passenger Car	11.97	14.03	30.00	52.26
Passenger Car	14.03	16.93	30.00	37.24
Passenger Car	38.43	40.13	30.00	63.53
Passenger Car	46.07	47.70	30.00	66.12
Passenger Car	48.30	50.10	30.00	60.00
Passenger Car	6.50	8.30	30.00	60.00

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Passenger Car	52.27	54.77	30.00	43.20
Passenger Car	55.70	58.20	30.00	43.20
Passenger Car	1.10	3.27	30.00	49.85
Passenger Car	12.10	14.30	30.00	49.09
Passenger Car	18.07	19.83	30.00	61.13
Passenger Car	21.23	23.43	30.00	49.09
Passenger Car	24.90	27.00	30.00	51.43
Passenger Car	35.37	37.07	30.00	63.53
Passenger Car	36.90	39.23	30.00	46.29
Passenger Car	51.83	54.07	30.00	48.36
Passenger Car	1.47	3.87	30.00	45.00
Passenger Car	23.83	26.23	30.00	45.00
Passenger Car	33.17	34.07	30.00	120.00
Passenger Car	46.83	48.93	30.00	51.43
Passenger Car	57.63	59.07	30.00	75.35
Passenger Car	11.50	14.03	30.00	42.63
Passenger Car	24.03	26.57	30.00	42.63
Passenger Car	32.77	34.20	30.00	75.35
Passenger Car	39.40	41.43	30.00	53.11
Passenger Car	2.07	5.20	30.00	34.47
Passenger Car	7.70	9.47	30.00	61.13
Passenger Car	58.87	60.57	30.00	63.53
Passenger Car	29.07	31.60	30.00	42.63
Passenger Car	37.57	39.27	30.00	63.53
Passenger Car	38.57	40.53	30.00	54.92
Passenger Car	40.63	42.07	30.00	75.35
Passenger Car	41.53	43.63	30.00	51.43
Passenger Car	46.50	49.10	30.00	41.54
Passenger Car	54.03	56.23	30.00	49.09
Passenger Car	57.57	59.07	30.00	72.00
Passenger Car	14.47	16.03	30.00	68.94
Passenger Car	42.70	45.30	30.00	41.54
Passenger Car	58.13	59.97	30.00	58.91
Passenger Car	12.10	14.40	30.00	46.96
Passenger Car	23.00	25.57	30.00	42.08
Passenger Car	39.93	42.60	30.00	40.50
Passenger Car	52.47	54.60	30.00	50.63

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Passenger Car	2.87	5.40	30.00	42.63
Passenger Car	35.50	37.77	30.00	47.65
Passenger Car	51.97	53.90	30.00	55.86
Passenger Car	53.87	56.63	30.00	39.04
Passenger Car	22.03	24.93	30.00	37.24
Passenger Car	23.97	26.70	30.00	39.51
Passenger Car	30.17	32.97	30.00	38.57
Passenger Car	38.90	40.73	30.00	58.91
Passenger Car	15.17	17.53	30.00	45.63
Passenger Car	19.10	21.20	30.00	51.43
Passenger Car	27.30	29.07	30.00	61.13
Passenger Car	33.87	36.50	30.00	41.01
Passenger Car	37.40	39.70	30.00	46.96
Passenger Car	38.53	40.97	30.00	44.38
Passenger Car	50.90	53.13	30.00	48.36
Passenger Car	59.17	60.47	30.00	83.08
Passenger Car	0.73	2.93	30.00	49.09
Passenger Car	18.20	19.93	30.00	62.31
Passenger Car	44.93	47.17	30.00	48.36
P. Car (Small)	39.00	41.43	30.00	44.38
P. Car (Small)	45.93	48.53	30.00	41.54
P. Car (Small)	47.13	49.83	30.00	40.00
P. Car (Small)	20.63	23.50	30.00	37.67
P. Car (Small)	42.07	45.10	30.00	35.60
P. Car (Small)	49.07	52.57	30.00	30.86
P. Car (Small)	48.87	53.37	30.00	24.00
P. Car (Small)	17.47	20.10	30.00	41.01
P. Car (Small)	7.17	9.57	30.00	45.00
P. Car (Small)	17.03	19.50	30.00	43.78
P. Car (Small)	19.63	22.40	30.00	39.04
P. Car (Small)	22.97	25.60	30.00	41.01
P. Car (Small)	35.07	37.77	30.00	40.00
P. Car (Small)	40.70	42.73	30.00	53.11
P. Car (Small)	19.20	21.07	30.00	57.86
P. Car (Small)	52.03	53.67	30.00	66.12
P. Car (Small)	29.17	31.07	30.00	56.84
P. Car (Small)	30.20	32.03	30.00	58.91

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
P. Car (Small)	36.23	38.27	30.00	53.11
P. Car (Small)	13.63	16.30	30.00	40.50
P. Car (Small)	44.47	46.03	30.00	68.94
P. Car (Small)	40.07	43.17	30.00	34.84
P. Car (Small)	54.30	56.93	30.00	41.01
P. Car (Small)	57.43	59.07	30.00	66.12
P. Car (Small)	6.70	8.80	30.00	51.43
P. Car (Small)	7.90	10.07	30.00	49.85
P. Car (Small)	56.50	58.93	30.00	44.38
P. Car (Small)	58.90	60.60	30.00	63.53
P. Car (Small)	4.73	7.07	30.00	46.29
P. Car (Small)	17.20	18.90	30.00	63.53
P. Car (Small)	30.60	32.53	30.00	55.86
P. Car (Small)	40.07	42.50	30.00	44.38
P. Car (Small)	4.00	6.30	30.00	46.96
P. Car (Small)	48.50	50.83	30.00	46.29
P. Car (Small)	50.03	52.80	30.00	39.04
P. Car (Small)	52.00	54.13	30.00	50.63
P. Car (Small)	56.13	58.03	30.00	56.84
P. Car (Small)	21.73	23.53	30.00	60.00
P. Car (Small)	48.13	50.17	30.00	53.11
P. Car (Small)	52.13	55.23	30.00	34.84
P. Car (Small)	56.90	59.47	30.00	42.08
P. Car (Small)	20.87	23.07	30.00	49.09
P. Car (Small)	40.30	42.63	30.00	46.29
P. Car (Small)	45.13	46.93	30.00	60.00
Van	13.57	16.60	30.00	35.60
Van	36.77	39.43	30.00	40.50
Van	45.03	47.63	30.00	41.54
Van	47.57	51.40	30.00	28.17
Van	48.87	52.73	30.00	27.93
Van	50.00	52.07	30.00	52.26
Van	7.57	9.07	30.00	72.00
Van	29.87	32.63	30.00	39.04
Van	58.73	61.50	30.00	39.04
Van	39.17	40.73	30.00	68.94
Van	43.30	46.00	30.00	40.00

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Van	21.00	23.53	30.00	42.63
Van	49.97	52.77	30.00	38.57
Van	56.37	60.40	30.00	26.78
Van	33.73	35.70	30.00	54.92
Van	7.20	9.63	30.00	44.38
Van	8.43	11.17	30.00	39.51
Van	19.87	21.50	30.00	66.12
Van	38.13	40.20	30.00	52.26
Van	56.90	59.27	30.00	45.63
Van	35.53	38.00	30.00	43.78
Van	25.87	28.07	30.00	49.09
Van	10.07	12.10	30.00	53.11
Van	49.27	51.20	30.00	55.86
Van	1.97	3.83	30.00	57.86
Van	25.80	27.70	30.00	56.84
Van	58.27	60.17	30.00	56.84
Van	50.37	52.17	30.00	60.00
Van	54.57	56.53	30.00	54.92
Van	2.53	4.47	30.00	55.86
Van	6.90	8.53	30.00	66.12
Van	9.07	11.43	30.00	45.63
Van	47.03	49.43	30.00	45.00
Van	2.23	4.33	30.00	51.43
Van	23.27	25.40	30.00	50.63
Van	35.03	36.93	30.00	56.84
Van	52.70	54.67	30.00	54.92
Van	28.87	31.10	30.00	48.36
Van	4.93	7.23	30.00	46.96
Van	19.07	20.53	30.00	73.64
Van	39.03	41.37	30.00	46.29
Van	43.83	46.50	30.00	40.50
Van	54.17	56.57	30.00	45.00
Van	54.07	56.60	30.00	42.63
Van	54.93	57.53	30.00	41.54
Van	40.77	43.00	30.00	48.36
Van	59.03	61.53	30.00	43.20
Motor Cycle	3.07	7.20	30.00	26.13

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Motor Cycle	18.17	20.83	30.00	40.50
Motor Cycle	34.87	37.07	30.00	49.09
Motor Cycle	35.77	38.53	30.00	39.04
Motor Cycle	39.93	42.63	30.00	40.00
Motor Cycle	41.90	44.90	30.00	36.00
Motor Cycle	47.90	51.90	30.00	27.00
Motor Cycle	52.13	55.60	30.00	31.15
Motor Cycle	54.47	57.97	30.00	30.86
Motor Cycle	55.03	59.50	30.00	24.18
Motor Cycle	3.13	6.23	30.00	34.84
Motor Cycle	42.00	44.83	30.00	38.12
Motor Cycle	52.57	55.17	30.00	41.54
Motor Cycle	0.40	3.20	30.00	38.57
Motor Cycle	3.17	5.80	30.00	41.01
Motor Cycle	15.80	18.93	30.00	34.47
Motor Cycle	23.07	26.50	30.00	31.46
Motor Cycle	26.80	29.87	30.00	35.22
Motor Cycle	29.03	31.57	30.00	42.63
Motor Cycle	37.20	40.17	30.00	36.40
Motor Cycle	56.10	59.27	30.00	34.11
Motor Cycle	2.77	5.10	30.00	46.29
Motor Cycle	3.37	7.00	30.00	29.72
Motor Cycle	6.73	9.07	30.00	46.29
Motor Cycle	9.40	12.53	30.00	34.47
Motor Cycle	19.20	22.83	30.00	29.72
Motor Cycle	22.83	25.07	30.00	48.36
Motor Cycle	23.50	26.40	30.00	37.24
Motor Cycle	26.27	28.87	30.00	41.54
Motor Cycle	31.50	35.30	30.00	28.42
Motor Cycle	56.97	59.90	30.00	36.82
Motor Cycle	2.43	5.80	30.00	32.08
Motor Cycle	16.07	19.37	30.00	32.73
Motor Cycle	21.30	23.20	30.00	56.84
Motor Cycle	21.30	24.00	30.00	40.00
Motor Cycle	42.43	44.80	30.00	45.63
Motor Cycle	46.63	49.17	30.00	42.63
Motor Cycle	48.57	51.57	30.00	36.00

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Motor Cycle	52.57	55.43	30.00	37.67
Motor Cycle	57.37	59.80	30.00	44.38
Motor Cycle	3.10	5.63	30.00	42.63
Motor Cycle	22.27	24.97	30.00	40.00
Motor Cycle	28.00	30.87	30.00	37.67
Motor Cycle	38.43	42.40	30.00	27.23
Motor Cycle	48.60	51.70	30.00	34.84
Motor Cycle	51.27	54.63	30.00	32.08
Motor Cycle	53.93	56.60	30.00	40.50
Motor Cycle	55.73	59.00	30.00	33.06
Motor Cycle	58.53	61.23	30.00	40.00
Motor Cycle	6.80	9.13	30.00	46.29
Motor Cycle	8.30	10.90	30.00	41.54
Motor Cycle	13.83	15.97	30.00	50.63
Three Wheeler	8.73	11.73	30.00	36.00
Three Wheeler	22.30	25.00	30.00	40.00
Three Wheeler	25.03	27.77	30.00	39.51
Three Wheeler	29.40	32.00	30.00	41.54
Three Wheeler	30.37	33.10	30.00	39.51
Three Wheeler	3.97	7.27	30.00	32.73
Three Wheeler	10.57	12.80	30.00	48.36
Three Wheeler	34.37	37.40	30.00	35.60
Three Wheeler	39.57	43.50	30.00	27.46
Three Wheeler	58.97	62.53	30.00	30.28
Three Wheeler	3.23	6.43	30.00	33.75
Three Wheeler	5.63	8.50	30.00	37.67
Three Wheeler	45.47	49.13	30.00	29.45
Three Wheeler	27.73	30.57	30.00	38.12
Three Wheeler	42.80	45.17	30.00	45.63
Three Wheeler	13.00	15.70	30.00	40.00
Three Wheeler	31.73	35.10	30.00	32.08
Three Wheeler	37.43	40.47	30.00	35.60
Three Wheeler	52.93	55.03	30.00	51.43
Three Wheeler	15.57	17.87	30.00	46.96
Three Wheeler	31.00	33.27	30.00	47.65
Three Wheeler	47.93	50.63	30.00	40.00
Three Wheeler	59.73	62.07	30.00	46.29

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Three Wheeler	5.53	8.17	30.00	41.01
Three Wheeler	16.97	19.60	30.00	41.01
Three Wheeler	1.03	3.97	30.00	36.82
Three Wheeler	21.83	24.30	30.00	43.78
Three Wheeler	12.30	14.80	30.00	43.20
Three Wheeler	39.90	45.97	30.00	17.80
Three Wheeler	21.20	23.93	30.00	39.51
Three Wheeler	50.93	53.27	30.00	46.29
Three Wheeler	19.57	23.50	30.00	27.46
Three Wheeler	21.77	25.17	30.00	31.76
Three Wheeler	36.00	38.10	30.00	51.43
Three Wheeler	45.40	47.53	30.00	50.63
Three Wheeler	5.10	7.13	30.00	53.11
Three Wheeler	48.83	51.90	30.00	35.22
Three Wheeler	30.40	32.87	30.00	43.78
Three Wheeler	54.30	56.53	30.00	48.36
Three Wheeler	7.73	10.27	30.00	42.63
Three Wheeler	24.03	27.00	30.00	36.40
Three Wheeler	46.93	49.20	30.00	47.65
Three Wheeler	59.90	62.30	30.00	45.00
Three Wheeler	5.73	7.90	30.00	49.85
Three Wheeler	22.87	25.73	30.00	37.67
Three Wheeler	41.83	44.50	30.00	40.50
Three Wheeler	41.23	43.87	30.00	41.01
Three Wheeler	7.03	9.63	30.00	41.54
Three Wheeler	21.00	23.43	30.00	44.38
Three Wheeler	26.70	29.60	30.00	37.24
Three Wheeler	41.97	44.43	30.00	43.78
Three Wheeler	46.43	48.87	30.00	44.38
Three Wheeler	6.73	9.00	30.00	47.65
Three Wheeler	30.03	33.07	30.00	35.60
Three Wheeler	52.20	54.07	30.00	57.86
Three Wheeler	2.07	4.97	30.00	37.24
Three Wheeler	17.60	19.73	30.00	50.63
Medium Bus	59.90	63.57	30.00	29.45
Medium Bus	52.90	55.63	30.00	39.51
Medium Bus	1.57	3.63	30.00	52.26

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
Medium Bus	58.10	60.53	30.00	44.38
Medium Bus	18.93	21.50	30.00	42.08
Large Bus	55.53	58.03	30.00	43.20
Large Bus	43.07	46.20	30.00	34.47
Large Bus	47.90	50.40	30.00	43.20
Large Bus	3.90	6.97	30.00	35.22
Large Bus	8.27	10.50	30.00	48.36
Large Bus	51.63	53.07	30.00	75.35
Large Bus	52.97	55.17	30.00	49.09
Large Bus	48.03	49.70	30.00	64.80
Large Bus	39.60	41.83	30.00	48.36
Large Bus	21.83	23.43	30.00	67.50
SCV	57.87	61.63	30.00	28.67
SCV	35.23	38.00	30.00	39.04
SCV	55.87	58.17	30.00	46.96
SCV	25.70	27.07	30.00	79.02
SCV	9.83	12.70	30.00	37.67
SCV	55.53	57.87	30.00	46.29
SCV	12.07	14.83	30.00	39.04
SCV	26.70	28.57	30.00	57.86
SCV	33.23	35.00	30.00	61.13
SCV	23.07	26.77	30.00	29.19
SCV	43.37	45.90	30.00	42.63
SCV	27.10	29.10	30.00	54.00
SCV	32.90	35.27	30.00	45.63
SCV	23.03	25.20	30.00	49.85
SCV	34.97	36.80	30.00	58.91
SCV	0.03	2.20	30.00	49.85
SCV	5.50	8.13	30.00	41.01
SCV	29.90	31.73	30.00	58.91
SCV	25.43	28.47	30.00	35.60
MCV	14.37	16.93	30.00	42.08
MCV	59.43	61.90	30.00	43.78
MCV	48.63	50.93	30.00	46.96
MCV	1.30	3.97	30.00	40.50
MCV	4.00	7.70	30.00	29.19
MCV	55.20	57.53	30.00	46.29

Vehicle Type	Entry time (s)	Exit time (s)	Dist.(m)	Speed (km/h)
MCV	39.17	42.20	30.00	35.60
MCV	40.17	43.27	30.00	34.84
MCV	38.37	40.93	30.00	42.08
MCV	42.57	44.40	30.00	58.91
MCV	19.17	20.93	30.00	61.13
MCV	1.07	3.73	30.00	40.50
MCV	13.40	15.87	30.00	43.78
LCV	32.93	36.67	30.00	28.93
LCV	34.83	37.07	30.00	48.36