TRAFFIC VOLUME STUDY OF VIRUDHUNAGAR

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Abstract: **Traffic engineering uses engineering methods and techniques to achieve the safe and time efficient movement of people and goods on roadway. The safe and time efficient movement of the people and goods depends on traffic flow, which is directly connected to the traffic characteristics. The three main parameters of a traffic flow are volume, speed and density. In the absence of effective planning and traffic management of the city, the current road infrastructure cannot cater the future needs of city. Pedestrian and vehicle volumes have increased significantly in the last decade due to the change of the economics of the middle-class families. The current work studies the traffic characteristics in Virudhunagar at selected priority junctions. In this work emphasis is given on traffic volume and the analysis will be carried out through primary traffic flow surveys at the selected junctions in Virudhunagar. Traffic flow is studied by manual methods. For better understanding of the present status of traffic flow at the junction, traffic survey is conducted. Traffic volume is usually expressed in terms of PCU.**

IndexTerms - **Volume of flow, Rate of flow, Average Daily Traffic (ADT), Average Annual Daily Traffic (AADT), Passenger Car Unit**

INTRODUCTION

Traffic engineers and planners need information about traffic. They need information to design and manage road and traffic system. They use the information for planning and designing traffic facilities, selecting geometric standards, economic analysis and determination of priorities. They use this to justify warrant of traffic control devices such as signs, traffic signals, pavement markings, school and pedestrian crossings. They also use this information to study the effectiveness of introduced schemes, diagnosing given situations and finding appropriate solutions, forecasting the effects of projected strategies, calibrating and validating traffic models.

Transportation system is a dynamic system. Information about traffic must be regularly updated to keep pace with ever-changing transportation system. Data must be collected and analyzed systematically to get representative information. Traffic surveys are the means of obtaining information about traffic. This is a systematic way of collecting data to be used for various traffic engineering purposes.

Scope Of Traffic Volume Studies:

The traffic volume count study is carried out to get following useful information:

- Magnitudes, classifications and the time and directional split of vehicular flows. Magnitude is represented by volume of traffic.
- Vehicles are classified into some predefined classes based on vehicle size and capacity. In a two-way road, vehicles moving towards two directions are counted separately to get the proportion. Time and directional split is useful to identify tidal flow.
- Proportions of vehicles in traffic stream. Proportion of vehicles indicates whether public or private transport dominates the traffic system. It also indicates the choice of road users.
- Hourly, daily, yearly and seasonal variation of vehicular flows. These variations are needed to establish expansion factors for future use. Using expansion factors, AADT can be calculated from short count.
- Flow fluctuation on different approaches at a junction or different parts of a road network system.

Measurement at point

The data required by a traffic engineer can mainly be observed on field rather than at laboratory. Now the field studies can be classified into three types depending upon the length of observation:

- Measurement at a point
- Measurement over a short section
- Measurement over a long section

Out of these we will be discussing the first type here. Flow is the main traffic parameter measured at a point. Flow can be defined as the no of vehicles passing a section per unit time. Traffic volume studies are mainly carried out to obtain factual data concerning the movement of vehicles at selected point on the street or highway system.

METHODOLOGY

Types of Volume Measurement

Volume count varies considerably with time. Hence, several types of measurement of volume are commonly adopted to average these variations. These measurements are described below:

Average Annual Daily Traffic (AADT)

This is given by the total no. of vehicles passing through a section in a year divided by 365.

This can be used for following purposes:

- Measuring the present demand for service by the street or highway
- Developing the major or arterial street
- Evaluating the present traffic flow with respect to the street system
- Locating areas where new facilities or improvements to existing facilities are needed.

Average Annual Weekday Traffic (AAWT)

This is defined as the average 24-hour traffic volume occurring on weekdays over a full year.

Average Daily Traffic (ADT)

An average 24-hour traffic volume at a given location for some period of time less than a year. It may be measured for six months, a season, a month, a week, or as little as two days. An ADT is a valid number only for the period over which it was measured.

Average Weekday Traffic (AWT)

An average 24-hour traffic volume occurring on weekdays for some period of time less than one year, such as for a month or a season.

Type of Counts

Various types of traffic counts are carried out, depending on the anticipated use of the data to be collected. They include:

Cordon Count

These are made at the perimeter of an enclosed area (CBD, shopping center etc.). Vehicles or persons entering and leaving the area during a specified time period are counted.

Screen Line Count

These are classified counts taken at all streets intersecting an imaginary line (screen line) bisecting the area. These counts are used to determine trends, expand urban travel data, traffic assignment etc.

Pedestrian Count

These are used in evaluating sidewalk and crosswalk needs, justifying pedestrian signals, traffic signal timings etc.

Intersection Count

These are measured at the intersections and are used in planning turn prohibitions, designing channelization, computing capacity, analyzing high accident intersections etc.

Counting Techniques

Number of vehicles can be counted either manually or by machine depending upon the duration of study, accuracy required, location of study area etc.

Manual counting

In its simplest form an observer counts the numbers of vehicles along with its type, passing through the section for a definite time interval. For light volumes, tally marks on a form are adequate. Mechanical or electrical counters are used for heavy traffic. Although it is good to take some manual observations for every counting for checking the instruments, some other specific uses of manual counts are following:

- Turning and through movement studies
- Classification and occupancy studies
- For analysis of crosswalks, sidewalks, street corner space and other pedestrian facilities

Automatic counting

These can be used to obtain vehicular counts at non-intersection points. Total volume, direc-tional volume or lane volumes can be obtained depending upon the equipment available.

Permanent Counters

These are installed to obtain control counts on a continuous basis. A detector (sensor) which responds on the passage of vehicle past a selected point is an essential part of this type of counters. These can be mainly grouped into contact types, pulsed types, radar types. Among the contact type counters, pneumatic tubes are mostly used. Air pulse actuated by vehicle wheels, pass along the tube thereby increasing the count. Pulsed types mainly depend upon the interruption of a beam generated from a station located near the site, which is detected by the receiver. In radar types, a continuous beam of energy is directed towards the vehicle. The frequency shift of energy reflected from approaching vehicle is conceived by sensors. Due to tedious reduction of the voluminous amount of data obtained, use of such counters was decreasing. But the use of computers and data readable counters has reversed the trend.

Portable Counters

These are used to obtain temporary or short term counts. Generally these make use of a transducer unit actuated by energy pulses. Each axle or vehicle passage operates a switch attached to a counter which is usually set to register one unit for every two axles. If significant number of multi-axle vehicles is present, an error is introduced. A correction factor, obtained from a sample classification count, is introduced to reduce this error. This can further be sub-divided into two types:

[1] **Recording counters** provides a permanent record of volumes by printing the total volume. These may be set for various counting intervals.

[2] **Non-Recording Counters** must be read by an observer at desired intervals.

Counting Periods

The time and length that a specific location should be counted depends upon the data desired and the application in which the data are used. Counting periods vary from short counts at spot points to continuous counts at permanent stations. Hourly counts are generally significant in all engineering design, while daily and annual traffic is important in economic calculations, road system classification and investment programmes. Continuous counts are made to establish national and local highway use, trends of use and behaviour and for estimating purposes. Some of the more commonly used intervals are:

Passenger Car Unit (PCU)

Passenger Car Unit (PCU) is a metric used in Transportation Engineering, to assess traffic-flow rate on a highway. A Passenger Car Unit is a measure of the impact that a mode of transport has on traffic variables (such as headway, speed, density) compared to a single standard passenger

Determination of PCU

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

- Modified Density Method

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

It may be appropriate to use different values for the same vehicle type according to circum-stances like volume of traffic, speed of vehicle, lane width and several external factors

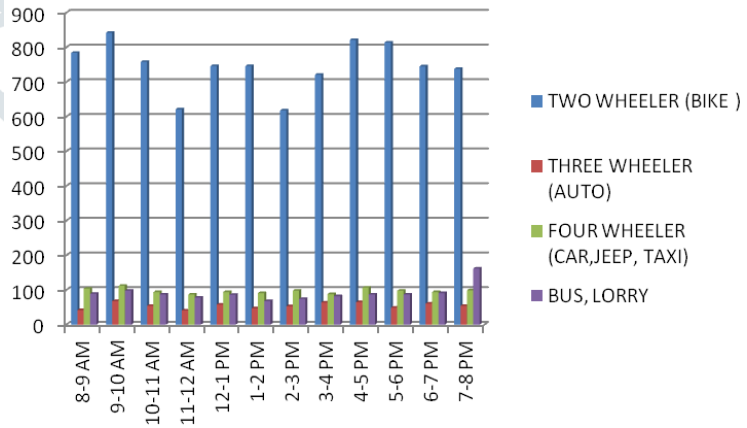
DATA COLLECTION

Date and Time
03.02.2020 , 8.00 A.M to 7.00P.M

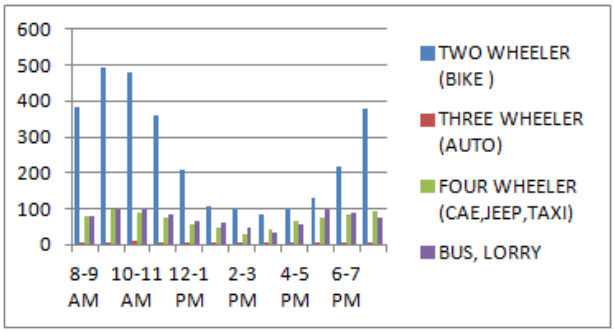
Weather condition
Sky was clear

Location
Allampatti, PRC Tippo, Karumari Madam,Mariamman Koil, Pandiyan Nagar

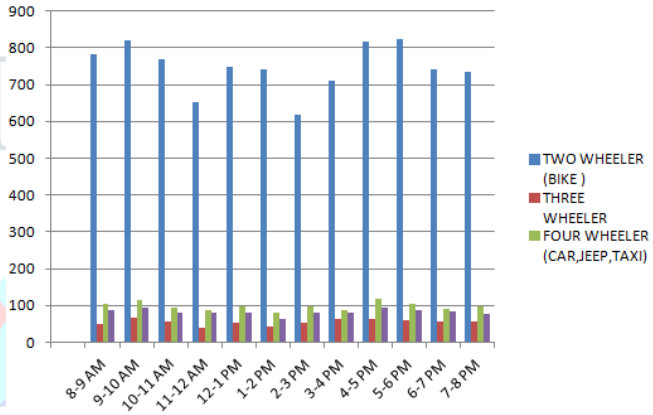
ALLAMPATTI					
TIME	**TWO WHEELER (BIKE)**	**THREE WHEELER (AUTO)**	**FOUR WHEELER (CAR,JEEP TAXI)**	**BUS, LORRY**	**TOTAL**
8-9 AM	784	42	104	89	1019
9-10 AM	842	68	112	98	1120
10-11 AM	758	54	94	87	993
11-12 AM	621	41	87	78	827
12-1 PM	746	58	94	86	984
1-2 PM	746	47	91	68	952
2-3 PM	618	53	98	74	843
3-4 PM	721	64	88	82	955
4-5 PM	821	65	107	87	1080
5-6 PM	814	49	98	87	1048
6-7 PM	745	61	94	91	991
7-8 PM	738	54	99	162	1053
TOTAL	8954	656	1166	1089	



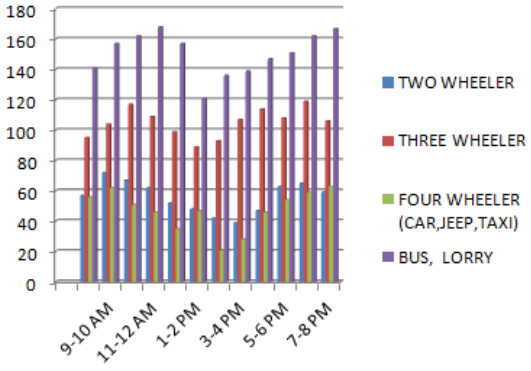
PANDIYAN NAGAR					
TIME	TWO WHEELER (BIKE)	THREE WHEELER (AUTO)	FOUR WHEELER (CAE,JEEP, TAXI)	BUS, LORRY	TOTAL
8-9 AM	382	4	78	81	545
9-10 AM	492	8	97	97	694
10-11 AM	478	9	89	98	674
11-12 AM	362	7	74	82	525
12-1 PM	210	3	58	67	338
1-2 PM	108	1	47	59	215
2-3 PM	97	1	31	47	176
3-4 PM	86	5	42	32	165
4-5 PM	98	4	68	58	228
5-6 PM	128	3	75	96	302
6-7 PM	218	6	82	89	395
7-8 PM	378	7	94	76	555
TOTAL	3037	58	835	882	



KARUMARRI MADAM					
TIME	TWO WHEELER (BIKE)	THREE WHEELER (AUTO)	FOUR WHEELER (CAR,JEEP, TAXI)	BUS, LORRY	TOTAL
8-9 AM	782	49	103	87	1021
9-10 AM	820	67	115	95	1097
10-11 AM	768	58	95	82	1003
11-12 AM	651	41	89	79	860
12-1 PM	748	52	98	82	980
1-2 PM	743	43	82	64	932
2-3 PM	618	52	97	79	846
3-4 PM	712	63	89	81	945
4-5 PM	817	64	117	93	1091
5-6 PM	823	59	104	89	1075
6-7 PM	743	56	92	83	974
7-8 PM	735	57	97	76	965
TOTAL	8960	661	1178	990	



MARIYAMMAN KOVIL					
TIME	TWO WHEELER	THREE WHEELER	FOUR WHEELER (CAR,JEEP, TAXI)	BUS, LORRY	TOTAL
8-9 AM	57	95	56	141	349
9-10 AM	72	104	62	157	395
10-11 AM	67	117	51	162	397
11-12 AM	62	109	46	168	385
12-1 PM	52	99	35	157	343
1-2 PM	48	89	47	121	305
2-3 PM	42	93	21	136	292
3-4 PM	39	107	28	139	313
4-5 PM	47	114	46	147	354
5-6 PM	63	108	54	151	376
6-7 PM	65	119	59	162	405
7-8 PM	59	106	63	167	395
TOTAL	673	1260	568	1808	



PRC TIPPO					
TIME	TWO WHEELER	THREE WHEELER	FOUR WHEELER (CAR,JEEP, TAXI)	BUS, LORRY	TOTAL
8-9 AM	57	95	56	141	349
9-10 AM	72	104	62	157	395
10-11 AM	67	117	51	162	397
11-12 AM	62	109	46	168	385
12-1 PM	52	99	35	157	343
1-2 PM	48	89	47	121	305
2-3 PM	42	93	21	136	292
3-4 PM	39	107	28	139	313
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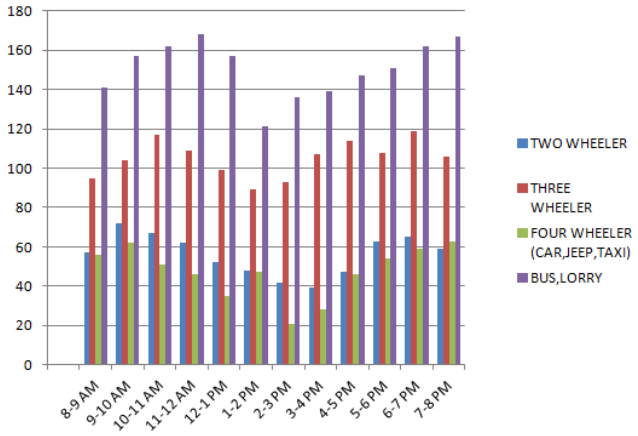
5-6 PM	63	108	54	151	376
6-7 PM	65	119	59	162	405
7-8 PM	59	106	63	167	395



ANALYSIS OF DATA

PCU Value

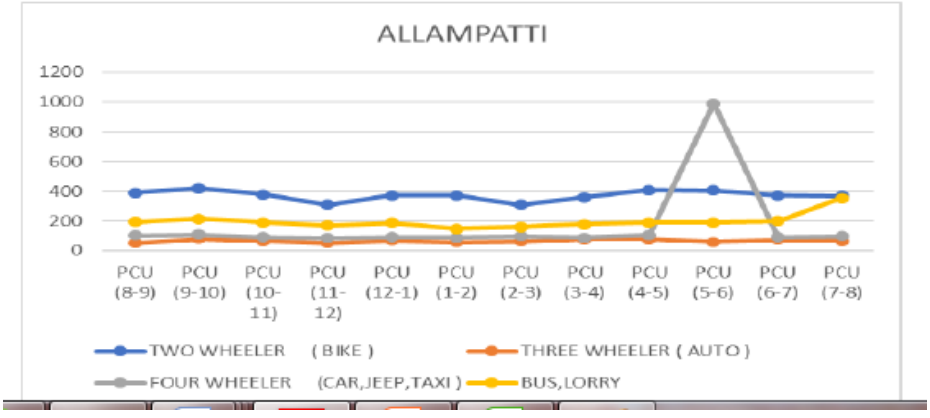
Vehicles	PCU Value
Bike	0.5
Car	1.0
Bus	2.2
Jeep	1
Auto	1.2
Lorry	2.2
Taxi	1

PCU Calculation and Chart

PCU Calculation of allampatti :

ALLAMPATTI													
TYPES OF VEHICLE	PCU (8-9)	PCU (9-10)	PCU (10-11)	PCU (11-12)	PCU (12-1)	PCU (1-2)	PCU (2-3)	PCU (3-4)	PCU (4-5)	PCU (5-6)	PCU (6-7)	PCU (7-8)	TOTAL
TWO WHEELER (BIKE)	383	421	379	338.6	373	373	389	360.6	410.6	407	372.6	369	4477
THREE WHEELER (AUTO)	88.4	81.6	64.8	49.2	63.6	66.4	63.6	76.8	78	68.8	73.2	64.8	787.2
FOUR WHEELER (CAR,JEEP,TAXI)	184	112	94	87	94	93	98	88	107	388	94	93	2056
BUS,LORRY	186.8	215.6	393.4	171.6	189.2	349.6	163.8	180.4	191.4	181.4	200.2	156.4	2385.8
TOTAL	742.2	830.2	729.2	618.3	725.8	670	633.4	705.7	786.3	1045.2	739.9	683.2	

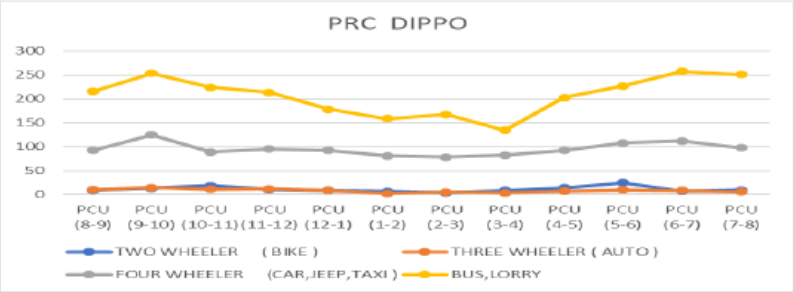
Bar chart in allampatti :



PCU Calculation in PRC Tippo :

PRC-DIPPO													
TYPES OF VEHICLE	PCU (8-9)	PCU (9-10)	PCU (10-11)	PCU (11-12)	PCU (12-1)	PCU (1-2)	PCU (2-3)	PCU (3-4)	PCU (4-5)	PCU (5-6)	PCU (6-7)	PCU (7-8)	TOTAL
TWO WHEELER (BIKE)	8	33	38.5	38.5	8.5	6.5	4	8.5	13.5	24.5	7	9	133.5
THREE WHEELER (AUTO)	9.6	14.4	30.8	12	8.4	2.4	4.8	3.6	7.2	5.8	8.4	6	97.2
FOUR WHEELER (CAR,JEEP,TAXI)	92	125	89	95	92	81	78	82	92	108	112	98	1144
BUS,LORRY	215.6	253	224.4	213.4	178.2	158.4	167.2	134.2	202.4	226.8	257.4	250.8	2481.8
TOTAL	326.2	405.4	342.7	330.9	287.1	248.3	254	228.3	315.1	368.7	384.8	363.8	

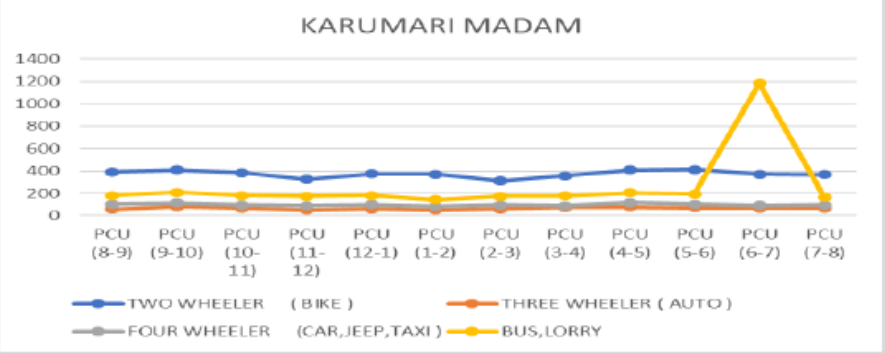
Bar chart in PRC Tippo :



PCU Calculation of karumarri madam :

KARUNARI MADAM													
TYPES OF VEHICLE	PCU (8-9)	PCU (9-10)	PCU (10-11)	PCU (11-12)	PCU (12-1)	PCU (1-2)	PCU (2-3)	PCU (3-4)	PCU (4-5)	PCU (5-6)	PCU (6-7)	PCU (7-8)	TOTAL
TWO WHEELER (BIKE)	391	418	384	336.5	374	371.5	383	356	418.5	411.5	371.5	367.5	4480
THREE WHEELER (AUTO)	58.5	61.4	69.6	49.3	62.4	61.6	62.4	75.6	76.8	78.8	67.2	68.4	792.9
FOUR WHEELER (CAR,JEEP,TAXI)	103	115	95	89	98	83	97	89	117	104	83	97	1084
BUS,LORRY	188.4	203	180.4	173.8	180.4	140.8	173.8	179.2	184.6	195.8	1192.6	167.2	2167
TOTAL	732.3	814.4	729	637.5	714.8	646.9	642.2	699.8	886.9	782.1	733.3	708.1	

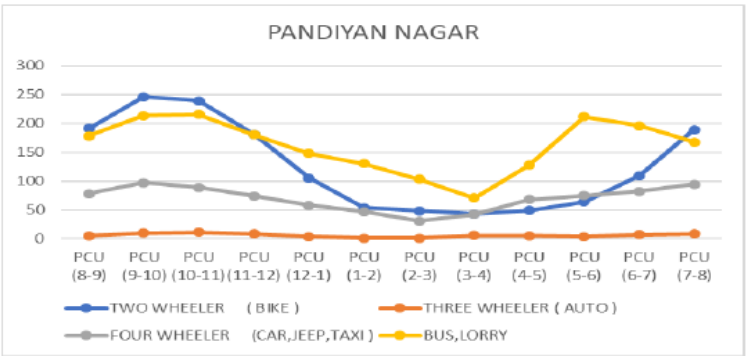
Bar chart in karumarri madam :



PCU Calculation of pandiyan nagar :

PANDIYAN NAGAR													
TYPES OF VEHICLE	PCU (8-9)	PCU (9-10)	PCU (10-11)	PCU (11-12)	PCU (12-1)	PCU (1-2)	PCU (2-3)	PCU (3-4)	PCU (4-5)	PCU (5-6)	PCU (6-7)	PCU (7-8)	TOTAL
TWO WHEELER (BIKE)	191	246	239	181	185	94	48.5	43	49	64	309	113	1518.5
THREE WHEELER (AUTO)	4.8	9.6	10.8	8.4	3.6	1.2	3.3	6	4.8	3.6	7.2	8.4	69.6
FOUR WHEELER (CAR,JEEP,TAXI)	78	97	89	74	68	47	33	42	68	75	83	94	835
BUS,LORRY	178.2	213.4	215.6	180.4	147.4	129.8	103.4	70.4	127.6	211.2	135.8	167.2	1940.4
TOTAL	452	566	554.4	443.8	334	252	184.2	161.4	249.4	353.8	334	458.6	

Bar chart in pandiyan nagar :



CONCLUSIONS

Measurement over a section is probably one of the easiest field parameter that can be measured.
Various types of volume count sand counting techniques have been discussed in brief.
Along with this a brief insight in to various methods of calculating Passenger Car unit has been provided.
Light vehicle (car, jeep, etc.) occupied about 65% of total vehicle.
Percentage of public transport is very low which is about 2%.
Percentage of utility auto-rickshaw is in between15-20%

Recommendations

There are some recommendations based on the study took place. They are as follows-

- Manual count method data automatic collection process should be used
- More public transport facility should be provided to support the need of inhabitants
- Data were collected for1 hour by each group, which may not represent the hourly fluctuation of traffic

Scope for further study

- Flow fluctuation on different approaches at a junction
- Proportions of vehicles in traffic stream
- Effectiveness of a traffic control measure
- Planning traffic operation and control of existing facility
- Design intersection, signal timing, channelization
- Structural design of pavements, geometric design and roadway capacity

ACKNOWLEDGMENT

Hereby we Sincerely thanks all the well wishers in VSVN Polytechnic College, Virudhunagar and Traffic Department, Vriudhunagar for giving this wonderful opportunity to undergo the Project titled Traffic Volume study of Virudhunagar present this paper

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[2] "Traffic volume study of Kaluburagi " report submitted to Shreeshail A Policepatil1, Vishal2, Roopa3, Suresh4, Shrishail5, PDA College of Engineering, Kalaburagi, Karnataka