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RESEARCH ARTICLE OPEN ACCESS

Classified Traffic Volume Study at Ghatekesar Junction

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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 roadways. The safe and efficient movement of the people and goods is dependent 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 the city. The current work studies traffic characteristics in the city of Ghatkesar at Railway Junction. In this work emphasis was given on traffic and the analysis was carried out through primary traffic flow surveys at Railway Junction in Ghatkesar. Traffic flow is studied by manual methods. For better understanding of the present status of traffic flow at the Junction, traffic survey is conducted. Calculation of Passenger Car Unit (PCU's) for different vehicle types was provided by our respected course co-coordinators of the course CE. With the help of the data collection, an attempt has been made to understand the traffic patterns during different time periods. Traffic control at the Junction is also dependent on traffic flow characteristics. Hence the results from the present study are helpful in controlling the traffic at the intersection and also in suggesting some of the remedial measures to improve the traffic safety in the region. Remedial measures such as widening the road, by providing more public transport can be recommended based on the outcomes of the works

Keywords — **Volume count, PCU, Railway Junction**

INTRODUCTION

This quote describes almost everything about the importance of transportation. Transportation is Carrying civilization to a brighter future. Now a day's transportation is one of the most burning Issues in every territory of the world. Every country is approaching differently according to their needs and solving their transportations problems within their capabilities. In designing buildings we need to determine loads coming to the structure to calculate reinforcement to be provided for safe functioning of the structure. Here in transportation volume serves the same purpose. For planning, designing and operation of transportation system the first and foremost requirement is volume. Volume is simply the number of vehicles passing a section of a roadway. Expressing traffic volume as number of vehicles passing a given section of road or traffic lane per unit time will be inappropriate when several types of vehicles with widely varying static and dynamic are comprised in the traffic. The problem of measuring volume of such traffic has been addressed by converting the different types of vehicles into equivalent passenger cars and expressing the volume in terms of Passenger Car Unit (PCU) per hour. The interaction between moving vehicles under such heterogeneous traffic condition is highly complex. Again volume is not constant. It increases with time. So a continuous method of calculating volume is matter of great importance for smooth functioning of transportation system if volume data is not found on a continuous basis then the transportation system may fail and the economy of the country may face a difficulty.

Traffic studies carried out to analyze the traffic characteristics, which help in deciding the geometric design of the highway and traffic control for safe and efficient traffic movements. Here Traffic volume study was used to identify the problem and for collection of data.
Traffic volume is the number of vehicles crossing a section of road per unit of time at any selected period. Traffic volume are a quantity measure of flow, the commonly used units are vehicles per day and vehicles per hour. A complete traffic volume study may include the classified volume study by recording the volume of various types and classes of traffic, the distribution by direction and turning movements and distinction on different lanes per unit time.

LITERATURE REVIEW

The main problem in developing the analytical speed-flow relationship is heterogeneity of traffic stream. The vehicles in the mix produce different impedance due to their varied static and dynamic characteristics. Hence simply adding the number of vehicles does not give the authentic speed flow relationship. For this reason, the vehicles are normally presented in terms of standard type of vehicle using certain conversion factors. Generally, passenger car is adopted as standard vehicle and this factor is known as passenger car unit (PCU). Many researchers have developed methods to estimate PCU for a vehicle type. The interesting point to note is that each of these studies has resulted into different PCU values for the same type of vehicle. There exists large variation in PCU values being adopted in different parts of the world

Indianapolis airport authority conducted the traffic volume study during 12 hours period at Indianapolis international airport, study included each 15 minute interval for a full 12 hour a day (6:00 AM – 6:00 PM) with detailed counts of truck types, buses and Owner vehicles.

Ministry of works and transport Road department, Botswana. Primary source of traffic data collection in Botswana is through establishment of regular manual traffic counting programmers and spontaneous automatic counters along the the public highway network. Presently, 64 permanent manual traffic count stations are located country wide managed by roads department

METHODOLOGY

Two methods are available for conducting traffic volume counts: (1) manual and (2) automatic. Manual counts are typically used to gather data for determination of vehicle classification, turning movements, direction of travel, pedestrian movements, or vehicle occupancy. Automatic counts are typically used to gather data for determination of vehicle hourly patterns, daily or seasonal variations and growth trends, or annual traffic estimates. The selection of study method should be determined using the count period. The count period should be representative of the time of day, day of month, and month of year for the study area. For example, counts at a summer resort would not be taken in January. The count period should avoid special event or compromising weather conditions (Sharma 1994). Count periods may range from 5 minutes to 1 year. Typical count periods are 15 minutes or 2 hours for peak periods, 4 hours for morning and afternoon peaks, 6 hours for morning, midday, and afternoon peaks, and 12 hours for daytime periods (Robertson 1994). For example, if you were conducting a 2-hour peak period count, eight 15-minute counts would be required. The study methods for short duration counts are described in this chapter in order from least expensive (manual) to most expensive (automatic), assuming the user is starting with no equipment.

PRESENT INVESTIGATION

1.1 Study Location

Traffic study done at a small intersection of Traffic at Railway Junction, Ghatkesar Town where vehicles turn towards Bogaram road.

- Date : 23/05/2017 to 30/05/2017
- Counting Period : 15 minute (short count)
- Weather Condition :It was initially a sunny day but afterwards it became cloudy
- Survey Location : Ghatkesar Railway Junction
- Observation : Classified Vehicle Count
- Method : Manual Method.
- Duration :15 minutes (Short Count)
- Equipment's : Data Sheet, Stop Watch.

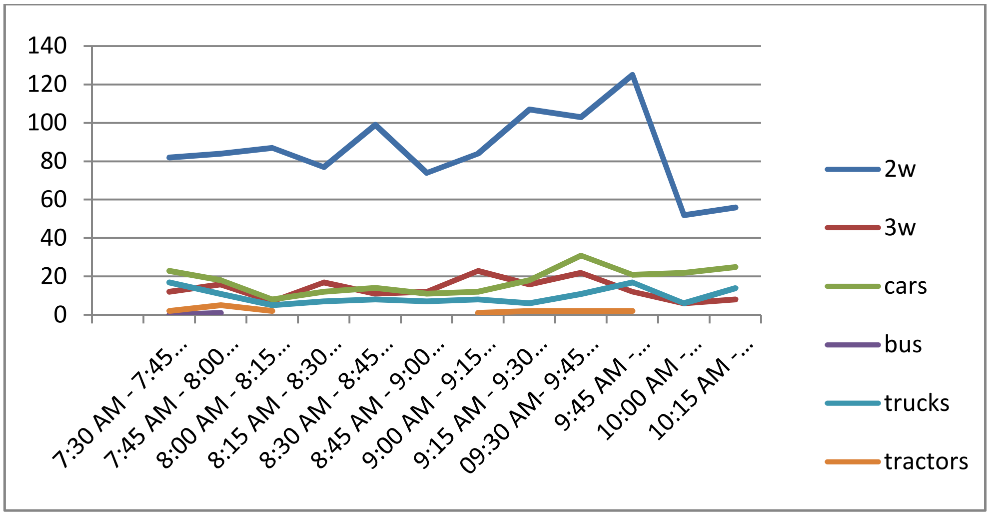
1.2 Study Method

We have adapted Manual Method. In this method, data is collected using a Data Sheet. Data recorded on data sheets, data can be recorded with tick mark on a pre prepared field form. A stopwatch is necessary to measures desired count interval.

CLASSIFIED TRAFFIC VOLUME COUNT

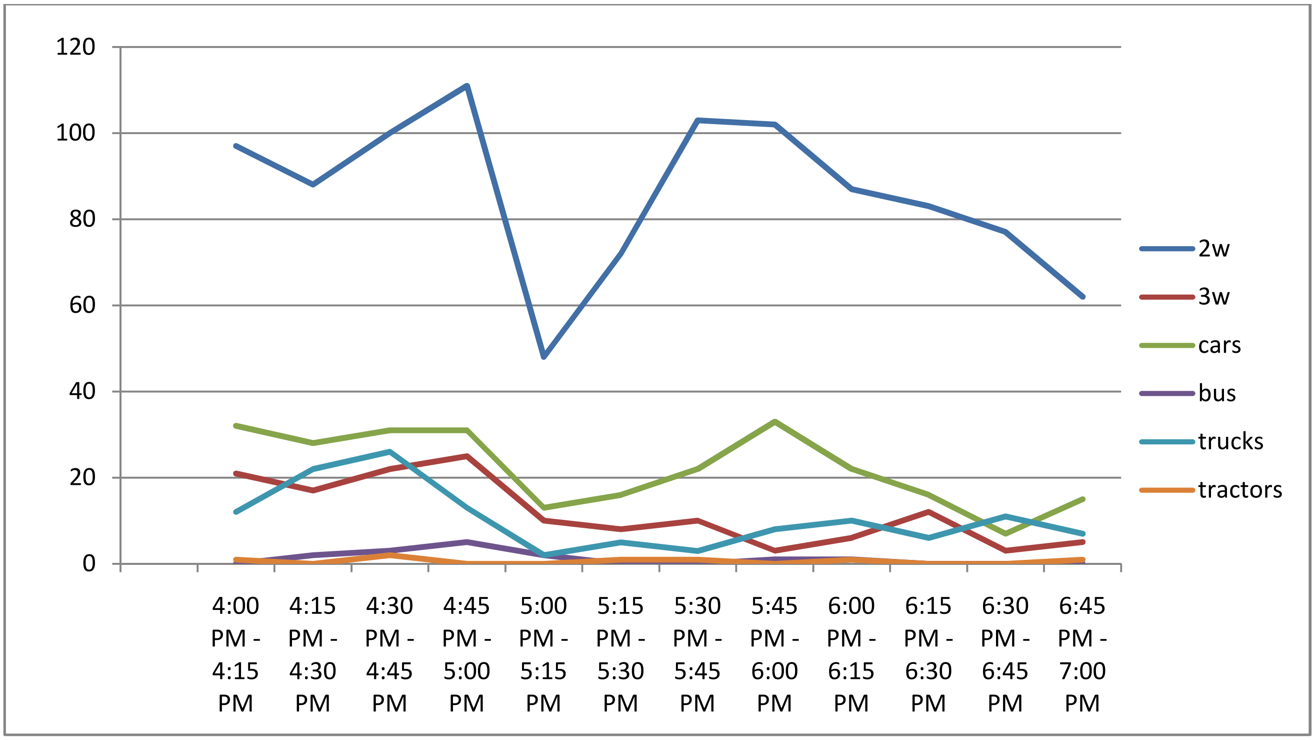
1.3 WEEKDAY- TUESDAY 23/05/2017

TUESDAY 7.30 AM TO 10.30 AM	**No. of Vehicles0**							**TOTAL**
	Time Interval	**Bikes/2W**	**Auto/3W**	**Cars/4W**	**Bus**	**Trucks**	**Tractors**	
	7.30-7.45	82	12	23	0	17	2	136
	7.45-8.00	84	16	18	1	11	5	135
	8.00-8.15	87	7	8	0	5	0	109
	8.15-8.30	77	1	12	0	7	4	113
	8.30-8.45	94	11	14	1	8	0	13
	8.45-9.00	74	12	11	0	7	1	104
	9.00-9.15	84	23	12	0	8	2	128
	9.15-9.30	107	16	18	2	6	2	151
	9:30-9:45	103	22	31	0	11	2	169
	9:45-10:00	125	12	21	2	17	2	185
	10:00-10:15	52	6	22	0	6	0	86
	10:15-10:30	56	8	25	0	14	1	104
	Total	1030	162	215	6	117	21	1557



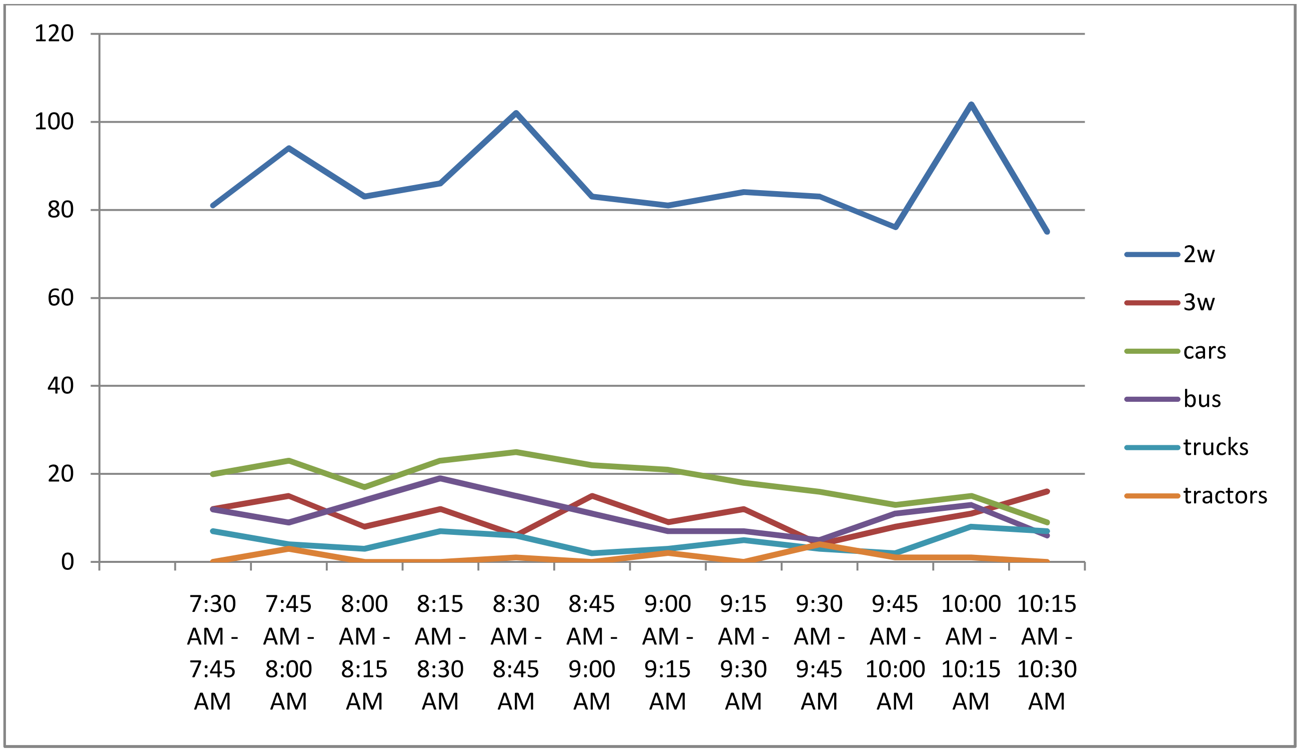
1.4 WEEKDAY- TUESDAY 23/05/2017

	No. of Vehicles							TOTAL
	Time Interval	**Bikes/2W**	**Auto/3W**	**Cars/4W**	**Bus**	**Trucks**	**Tractors**	
TUESDAY 4.30 PM TO 7.00 PM	4:00-4:15	97	21	32	0	12	0	163
	4:15-4:30	88	17	28	2	22	2	157
	4.30-4.45	100	22	31	3	16	0	184
	4.45-5.00	111	25	31	5	13	0	185
	5.00-5.15	48	10	13	2	2	0	75
	5.15-5.30	72	8	16	0	5	1	102
	5.30-5.45	103	10	22	0	3	1	138
	5.45-6.00	102	3	33	1	8	0	147
	6.00-6.15	87	6	22	1	10	1	127
	6.15-6.30	83	12	16	0	6	0	117
	6:30-6:45	77	3	7	0	11	0	98
	6:45-7:00	62	5	15	0	7	1	90
	Total	1030	142	266	14	125	7	1583



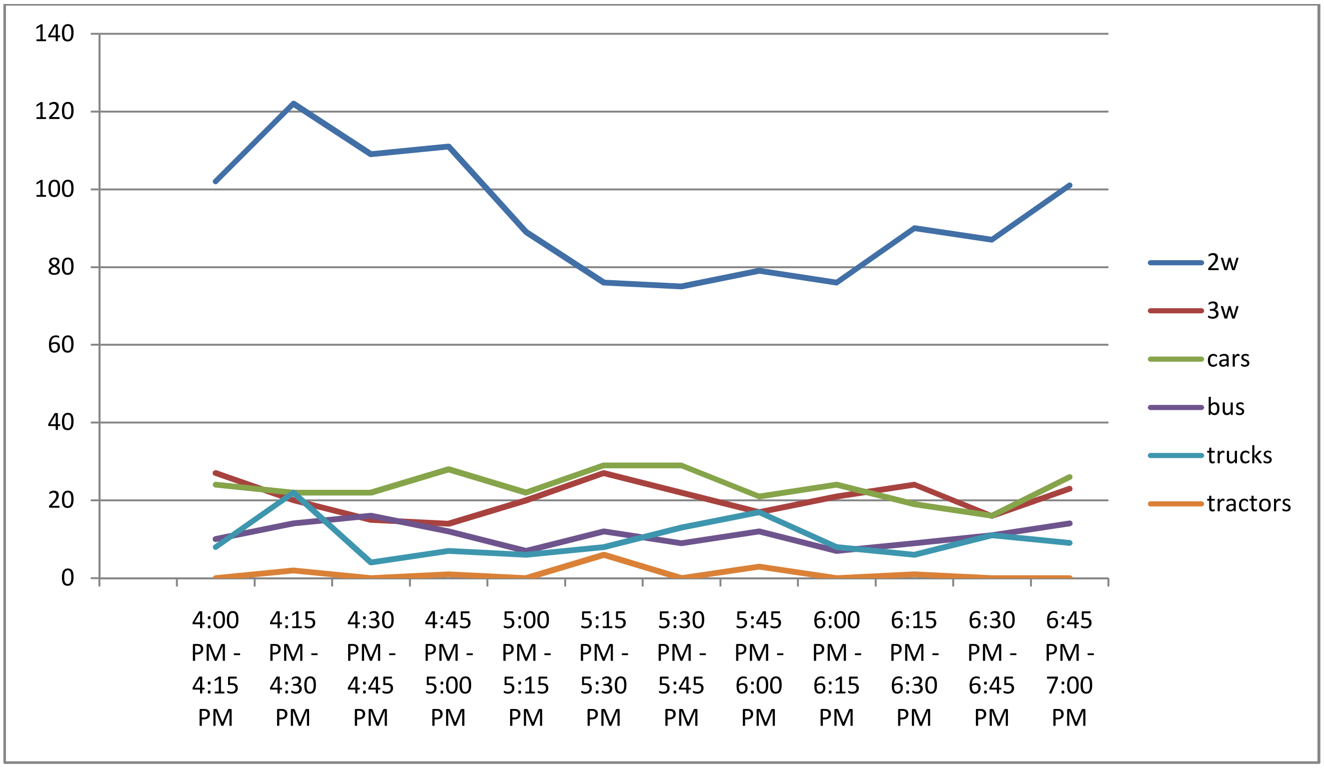
1.5 WEEKEND-SUNDAY 28/05/2017

	No. of Vehicles0							TOTAL
	Time Interval	Bikes/2W	Auto/3W	Cars/4W	Bus	Trucks	Tractors	
SUNDAY 7.30 AM TO 10.30 AM	7.30-7.45	81	12	20	12	7	0	132
	7.45-8.00	94	15	23	9	4	3	148
	8.00-8.15	83	8	17	14	3	0	125
	8.15-8.30	86	12	23	19	7	0	147
	8.30-8.45	102	6	25	15	6	1	155
	8.45-9.00	83	15	22	11	2	0	133
	9.00-9.15	81	9	21	7	3	2	123
	9.15-9.30	84	12	18	7	5	0	126
	9:30-9:45	83	4	16	5	3	4	115
	9:45-10:00	76	8	13	11	2	1	128
	10:00-10:15	104	11	15	13	8	1	152
	10:15-10:30	75	16	9	6	7	0	113
	Total	1032	128	222	129	57	12	1597



1.6 WEEKEND-SUNDAY 28/05/2017

	No. of Vehicles							TOTAL
TUESDAY 4.30 PM TO 7.00 PM	Time Interval	Bikes/2W	Auto/3W	Cars/4W	Bus	Trucks	Tractors	
	4:00-4:15	102	27	24	10	8	0	175
	4:15-4:30	122	20	22	14	22	2	193
	4.30-4.45	109	15	22	16	4	0	166
	4.45-5.00	111	14	28	12	7	1	173
	5.00-5.15	89	20	22	7	6	0	148
	5.15-5.30	76	27	29	12	8	6	158
	5.30-5.45	75	22	29	9	13	0	148
	5.45-6.00	79	17	21	12	17	3	149
	6.00-6.15	76	21	24	7	8	0	136
	6.15-6.30	90	24	19	9	6	1	149
	6:30-6:45	87	16	16	11	11	0	141
	6:45-7:00	101	23	26	14	9	0	173
	Total	1117	246	282	133	119	13	1909



PCU CALCULATIONS

1.7 Suggested PCU Values For Urban Roads By IRC.(Ref. 2)

Sl. No.	Vehicle classes	Equivalency factor
1	Passenger car, tempo, auto rickshaw and agricultural tractor.	1.00
2	Bus, truck and agricultural tractor-trailer unit.	3.00
3	Motor cycle, scooter, and peddle cycle.	0.50
4	Cycle rickshaw.	1.50
5	Horse drawn vehicles.	4.00

6	Small bullock cart and hand cart.	6.00
7	Large bullock.	8.00

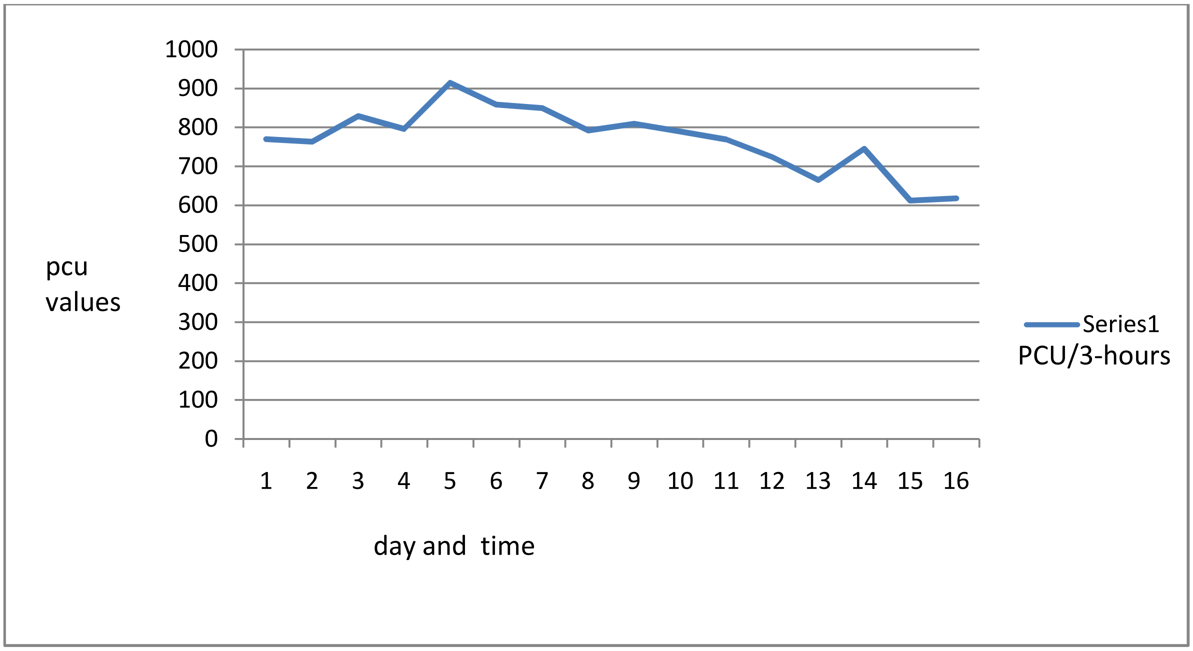
1.8 Tentative Equivalency Factor Suggested By IRC

PCU value of vehicle classes at

Sl. No.	**Vehicle classes**	**Urban roads, mid-block sections**	**Signalized intersections**	**Kerb parking(parallel and angle)**
1.	Car	1.00	1.00	1.00
2.	Bus and truck	2.20	2.80	3.40
3.	Auto-rickshaw	0.50	0.40	0.40
4.	Two wheeler	0.40	0.30	0.20
5.	Pedle cycle	0.70	0.40	0.10
6.	Bullock cart	4.60	3.20	1.20

1.9 WEEKDAY- THURSDAY 23/05/2017 7.30AM - 10.30AM

SL No.	Type of vehicle	No. of vehicles/day	Equivalency factor	PCU/3-hr	Remarks
1	**Bikes/2W**	1050	0.5	525	
2	**Auto/3W**	142	0.5	71	
3	**Cars/3W**	266	1	266	
4	**Bus**	14	3	42	
5	**Trucks**	125	3	375	
6	**Tractors**	7	3	21	
			Total =	1300	PCU/3-Hr


1000
900
800
700
600
500
400
300
200
100
0
pcu
values
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
day and time
Series1
PCU/3-hours

2.0 Overall Observations :

SL No.	Day and Time	PCU/3-hr
1	Tuesday Morning 7.30-10.30	770.1
2	Tuesday Evening 4.00-7.00	763.3
3	Wednesday Morning 7.30-10.30	829.4
4	Wednesday Evening 4.00-7.00	796.7
5	Thursday Morning 7.30-10.30	914.7
6	Thursday Evening 4.00-7.00	858.4
7	Friday morning 7.30-10.30	850
8	Friday Evening 4.00-7.00	792.5
9	Saturday Morning 7.30-10.30	809.8
10	Saturday Evening 4.00-7.00	789.9
11	Sunday Morning7.30-10.30	769.5
12	Sunday Evening 4.00-7.00	723.7
13	Monday Morning 7.30-10.30	664.8
14	Monday Evening 4.00-7.00	745.2
15	Tuesday Morning 7.30-10.30	612.1
16	Tuesday Evening 4.30-6.30	617.8

RESULTS

- **The maximum flow of vehicles observed during Weekday is 224 Vehicles/15 minutes.**
- **The Peak Time of Traffic Flow during Weekday is 8.30 AM - 8.45 AM.**
- **The maximum flow of vehicles observed during Weekend is 189 Vehicles/15 minutes.**
- **The Peak Time of Traffic Flow during Weekend is 5.45 PM - 6.00 PM**
- **The Highest PCU Value is 914.7/3 Hr and is obtained on Thursday morning 25/05/2017.**
- **The Lowest PCU Value is 612.1/3 Hr and is obtained on Tuesday morning 30/05/2017.**

Further Scope:

- The study was carried out for only 2 Hours in the Morning and Evening, so, further we can carry out a Volume Count Survey for 24 Hours
- The study was limited to Thursday and Sunday and further study can be done for other weekdays.
- Since the intersection under study is unsignalized one, signal design can be done the same.

CONCLUSION AND RECOMMENDATIONS

- **The numbers of bikes travelling are more when compared to autos and cars.**
- **The number of autos and cars are more when compared to buses**
- **So, if numbers of buses are increased, then the dependency on Public transports increase.**
- **This will make decrease in number of personal vehicles.**
- **Hence the congestion gets reduced and free Flow of Traffic will be possible.**
- **It adds to comfortness of a road user.**
- **We are settled on a suggestion that if the No. of buses could be increased then the traffic system would become efficient. So huge modification is recommended in the public transportation.**

2.1 Limitations

1. The major limitation of this volume study was the survey was conducted for 15 minutes only, whereas for proper results the survey should be conducted for at least 3 hours

2. Number of enumerators was 5 to 6 persons per group where for complete and precise collection of data at least 15 to 20 persons were required for each group.

3. We collected data for representative portion of traffic stream. However if it was possible to collect data for each and every type of vehicle then a better scenario could have been presented.

2.2 Recommendations

1. Optimum vehicle composition of a traffic flow consists of 40% public transport or BUS while there was only 27% public transport in our study road.

2. The buses we observed on the road were too much old that they could not maneuver easily although the maneuverability of buses is originally low. So replacing these old buses with new ones is highly recommended.

3. Bicycle should have specific lanes of their own which typically is placed beside the footpath/shoulder. But there was not any specific lane in the road we studied. So it is recommended that a lane system should be introduced to increase efficiency of the road at the same time there should be a bicycle specific lane.

2.3 Recommendations for future work

The present study is focused mainly on traffic volume only. Speed-flow studies are useful to evaluate the more parameters. There is a scope on speed flow studies on urban road links for future work.

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