Traffic Volume Study of Signalized Intersection at Delhi Gate Circle

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Abstract - *India is a developing country proper traffic volume study need to proper planning, design and maintaining roadway and intersection facilities. Traffic volume studies are conducted for the counting number of vehicles passing through particular section line in the selected location. Data were obtained from selected section at Delhi gate circle by video graphic survey and collected data were analyzed by different graphs. The Udaipur city is located in Rajasthan state of India. As per provisional reports of census India, population of Udaipur in 2011 is 4, 51,000 of which male and female are 2, 33,959 and 2, 17,141 respectively.*

Key Words: **Traffic Volume, PCU-(Passenger car unit), Mixed traffic flow, Average daily traffic, Equivalent passenger cars (EPC).**

1. INTRODUCTION

Traffic engineering is the branch of engineering deals with planning, design and operation of transportation system the most important requirement is volume expressing the volume in terms of PCU (passenger car unit). Traffic volume is the number of vehicle passing a given section of road or traffic lane per unit time. The number of vehicles in a day will change from time to time. Heterogeneous traffic volume convert the different types of vehicles into equivalent passenger cars (EPC) and volume expressed in terms of (PCU) - Passenger car unit per hour. Intersection counts are taken for determine vehicle classifications, through movements, and turning movements at signalized intersections. These data are used mainly in determining cycle times and phase lengths for signalized intersections.

2. LITERATURE REVIEW

V.T Hamizh Arasan and Krishnamurthy (2008) provided an insight into the complexity of the vehicular interaction in heterogeneous traffic. The PCU estimates, made through microscopic of simulation, for the different types of vehicles of heterogeneous traffic, for a wide range traffic volume and roadway conditions indicate that the PCU value of a vehicle significantly changes with change in traffic volume and width of roadway.

3. STUDY LOCATION

Data collection has been carried out in Udaipur city of Rajasthan. It is also known as city of lakes. The study area for this research work in Udaipur city is governed by Municipal Corporation which comes under Udaipur metropolitan region. Traffic volume survey at signalize intersection select at Delhi gate circle which located between Surajpol and Chetak circle.

The study location chosen for the present study satisfy the following criteria:-

•Mixed traffic flow

•Continuous traffic flow

•Sufficient space for video recording of the pedestrian flow

(Source: - Google Earth)

Figure: 1 Study Location: Delhi Gate Circle

4. METHODOLOGY:

4.1 Volume count:

Traffic volume are conducted to determine the number of vehicles and there movement according to class of vehicles at a selected locations. Two methods are used for conduction traffic volume count.

a)Manual

b) Video graphic survey method

(a) Manual:

Manual counts are used when automated equipment is not available. Interval used for manual counting is 5, 10 & 15 minutes. This method is rarely used.

(b) Indirect or video graphic survey method:

In this method, data is collected using video camera. Video is captured for long time and data is collected later by rewinding. Video graphic survey conducted for 1 hrs peak traffic in morning and evening.

5. DATA COLLECTION

In present study the data collected from Delhi gate circle. The video camera records live traffic at signalized

interaction on selected section. A Video Camera put on side of road from where capturing movement of traffic. The purpose of collection of data is to records the traffic volume and its composition at signalized intersection under mixed traffic condition. The video graphic survey was conducted in a normal working day in morning and evening.

Table- 5.1 Traffic Volume Count

Intersection Name	Cross walk Identity	Date of Survey	Time of Survey	Traffic Volume (Vehicle/hr)				
				Two Wheelers	Three Wheeler	Four Wheeler	Cycle	Tractor
Delhi Gate Circle	L1	13/08/2020	10:00AM–11:00AM	1192	340	544	12	2
			6:15PM– 7:15PM	998	182	768	14	4
		20/08/2020	9:30AM10:30AM	1163	364	524	15	3
			5:00PM–6:00 PM	999	248	634	5	4

Table-5.2 Passenger car unit per hours on 13/08/2020 during 10:00AM-11:00 AM

S. No.	Type of vehicle	No. of vehicles / Hour	Equivalency factor	PCU/Hr.
1	2 Wheeler	1192	0.5	596
2	3 Wheeler	340	1	340
3	4 Wheeler	544	1	544
4	Cycle	12	0.5	6
5	Tractor	02	2.8	5.6
			Total	**1491.6**

Table-5.3 Passenger car unit per hours on 13/08/2020 during 6:15PM-7:15PM

S. No.	Type of vehicle	No. of vehicles / Hour	Equivalency factor	PCU/Hr.
1	2 Wheeler	998	0.5	499
2	3 Wheeler	182	1	182
3	4 Wheeler	768	1	768
4	Cycle	14	0.5	7
5	Tractor	4	2.8	11.2
			Total	**1467.2**

Table-5.4 Passenger car unit per hours on 20/08/2020 during 9:30AM-10:30 AM

S. No.	Type of vehicle	No. of vehicles / Hour	Equivalency factor	PCU/Hr.
1	2 Wheeler	1163	0.5	581.5
2	3 Wheeler	364	1	364

3	4 Wheeler	524	1	524
4	Cycle	15	0.5	7.5
5	Tractor	3	2.8	8.4
			Total	1485.4

Table-5.5 Passenger car unit per hours on 20/08/2020 during 5:00PM-6:00 PM

S.No.	Type of vehicle	No. of vehicles / Hour	Equivalency factor	PCU/Hr.
1	2 Wheeler	999	0.5	499.5
2	3 Wheeler	348	1	348
3	4 Wheeler	634	1	634
4	Cycle	5	0.5	2.5
5	Tractor	4	2.8	11.2
			Total	1495.2

6. DATA ANALYSIS

The field study of traffic volume was conducted on the Delhi gate circle in Udaipur for mixed traffic flow at signalized intersection. Data analysis was done through the recorded video and data were extracted individual parameters like traffic volume and there composition.

6.1 Traffic Volume:-

Traffic volume is a number of vehicles that can pass particular section of road in a unit time duration. This is conducted on intersection area to be selected for pedestrian delay model traffic volume is count for 1:00 hr in morning and evening.

6.2 Traffic Composition:-

Traffic composition play an important role in the traffic operation analyzes. It can be involved vehicle type and the proportions of each vehicle type in the mixed traffic flow.

Vehicles are classified comprising of vehicles: 2 wheelers, 3 wheelers, car, bus, cycle and tractors.
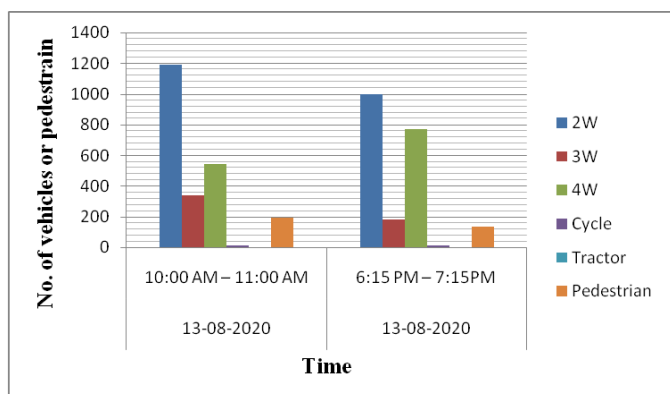

Figure 6.1: Traffic volume

Figure 6.1 shows the traffic volume for the time duration is 10AM-11AM and 6:15PM-7:15PM. This shows the variation of traffic volume and pedestrians in morning and evening. Traffic volume included 2wheelers, 3wheelers, 4wheelers, cycles and tractors.
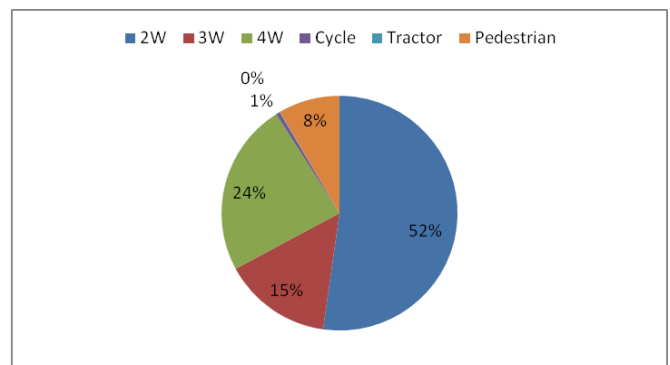

Figure 6.2: Vehicle Compositions during 10AM to 11AM

Figure 6.2 shows the vehicle compositions on Delhi gate circle (Surajpol-Delhi gate road intersection). 2 Wheelers has maximum 52%, 3 Wheelers 15%, 4 Wheelers 24% with 8% pedestrians.
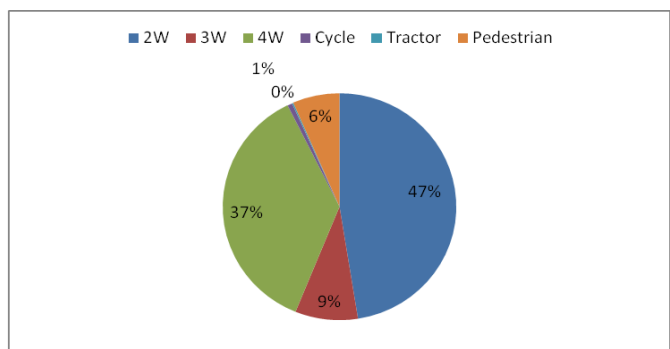

Figure 6.3: Vehicle Compositions during 6:15PM to 7:15PM

Figure 6.3 shows the Vehicle compositions on Delhi gate circle (Surajpol-Delhi gate road intersection). 2 Wheelers has maximum 47%, 3 Wheelers 9%, 4 Wheelers 37% with 6% pedestrians.
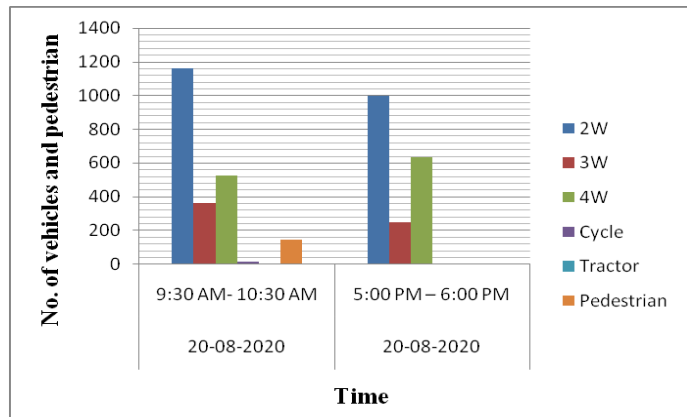

Figure 6.4 Traffic Volume

Figure 6.4 shows the traffic volume for the time duration is 9:30AM-10:30AM and 5:00PM-6:00PM. It shows that traffic volume variation in morning and evening.
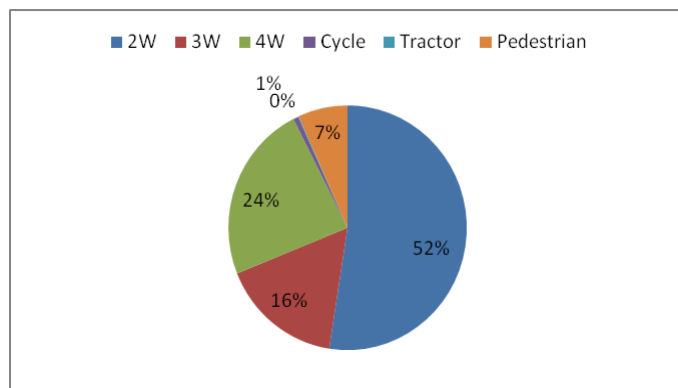

Figure 6.5: Vehicle compositions during 9:30AM to 10:30AM

Figure 6.5 shows the vehicle compositions on Delhi gate circle (Surajpol-Delhi gate road intersection). 2 Wheelers has maximum 52%, 3 Wheelers 16%, 4 Wheelers 24%, 1% tractor with 7% pedestrians.
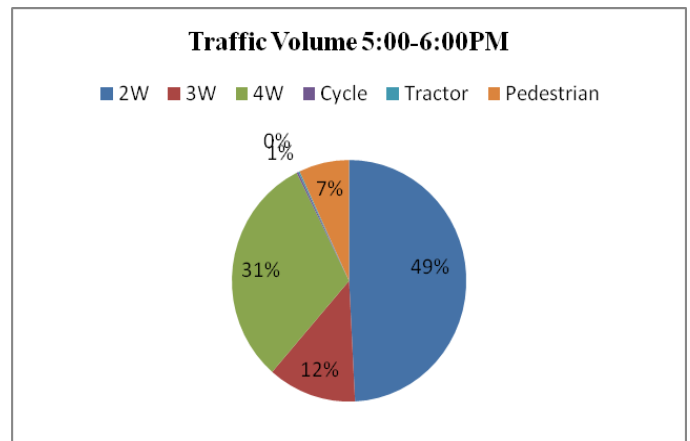

Figure 6.6: Vehicle compositions during 5:00PM to 6:00PM

Figure 6.6 shows the traffic composition on Delhi gate circle (Surajpol-Delhi gate road intersection). 2 Wheelers has maximum 49%, 3 Wheelers 12%, 4 Wheelers 31% with 7% pedestrians.
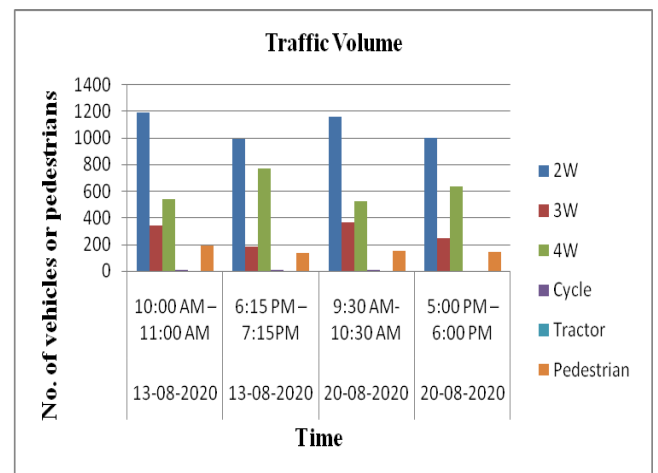

Figure 6.7: Traffic Volume variations with time

Figure 6.7 shows that variation of number of vehicles and pedestrian (2wheelers, 3wheelers,4wheelers, cycles and pedestrians) with time 10:00AM to 11:00AM morning and 6:15PM to 7:15PM evening. Also shows variation with 9:30AM to 10:30AM morning and 5:00PM to 6:00PM evening.
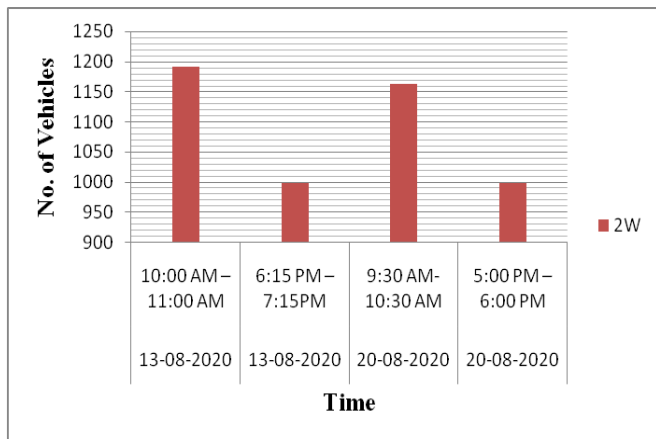
Figure 6.8: Two wheelers vehicles variations with time

Figure 6.8 shows 2 wheelers vehicles variations with time in morning and evening on different days. From this observe that morning 2W traffic more than evening traffic
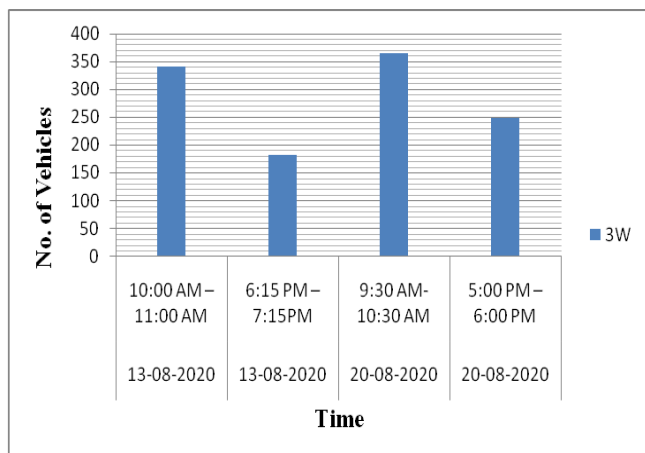

Figure 6.9: Three wheeler traffic variation with time

Figure 6.9 shows 3 wheelers vehicles variation with time in morning and evening on different days. It is observing that morning traffic more than evening traffic.
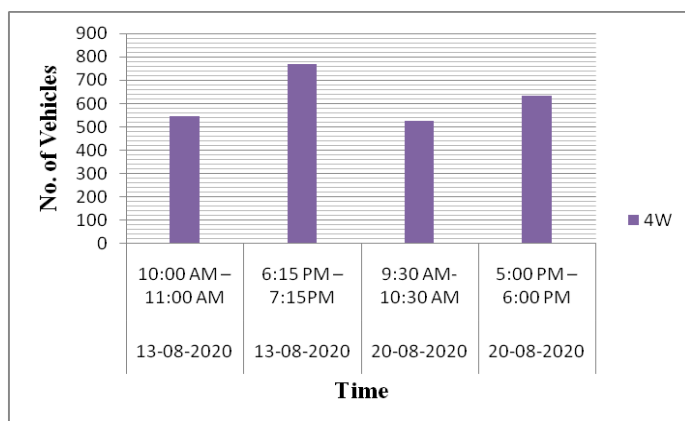

Figure 6.10: Four wheeler vehicles variation with time

Figure 6.10 shows 4 wheelers vehicles variation with time in morning and evening on different days. It is observe that 4W traffic in evening more than morning traffic.

7. RESULTS

a) Traffic volume count on 13 august 2020 during 10:00AM to 11:00AM is 2090 vehicles and during 6:15PM to 7:15PM are 1966 vehicles.

b) Traffic volume count on 20 august 2020 during 9:30AM to 10:30AM is 2069 vehicles and during 5:00PM to 6:00PM are 1890 vehicles.

c) Maximum passenger car unit found to be 1086.9 PCU / Hr. during 5:00 PM- 6:00PM.

8. CONCLUSIONS & RECOMMENDATION:

In this research work the objective is to traffic volume study at signalized intersection under mixed traffic condition at Delhi gate circle. Field data were collected through video graphic survey conducted on selected section on Delhi gate circle. Traffic volume was analyzed by plotting different graphs. Vehicles were classified as 2-wheelers, 3-wheelers, 4-wheelers (car, bus and pickup), Cycles and tractors.

Following are the conclusion summarized below:

a) Two wheelers traffic volume in morning is greater than evening.

b) Number of 2W vehicle is more compare to other class of vehicles.

c) From the study maximum traffic volume found to be 2090 vehicles per hour during 10:00AM to 11:00AM on 13 august 2020.

d) Minimum traffic volume found to be 1890 vehicles per hour during 5:00PM to 6:00 PM on 20 August 2020.

e) The traffic composition of vehicles at Delhi gate circle 54% 2-wheelers, 14% 3-wheelers, 31% 4-wheelers and only 1% cycles.

The present study is focused on traffic volume only; further speed flow studies are useful to evaluate different parameters.

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