Traffic Volume Survey on Helmet Crossing in Ahmedabad City

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***Abstract*:-** Traffic engineering is useful for engineering methods and techniques to achieve the safe, low cost and time efficient movement of road users and goods on roadways. The safe and time 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. Pedestrian and vehicle volumes have increased significantly in the last decade due to the change of income in the middle-class families. The current work studies traffic characteristics in the city of Ahmedabad at one selected Intersection. In this work emphasis was given on traffic volume and the analysis was carried out through primary traffic flow surveys at Helmet Crossing. Traffic flow is studied by manual methods. For better understanding of the present status of traffic flow at the crossing, traffic survey is conducted. Calculation of Passenger Car Units (PCU's) for different vehicle types was calculated as per Indian standard code. With the help of the data collection, an attempt had been made to understand the traffic patterns during different time periods and also determine peak hour, Traffic control at that crossing is also dependent on the traffic flow characteristics. Hence the results from the present study are helpful in controlling the traffic at the intersection.

***IndexTerms:-* Traffic Volume survey, Passenger car unit, Intersection, Ahmedabad city, Vehicle classification**

I.INDRODUCTION

Transport Planning or Transportation system is a fundamental element for functioning of any society, region or country. It demonstrates a very close relationship with the study of transportation time, transport facilities, location of productive and activities and the goods and services, which will be available for rod users. New technologies of transportation have been very closely correlated with the development of modern society but vehicle number increase rapidly. Under this field traffic volume survey plays a vital role to determine the existing condition, to forecast the future condition of traffic volume and also give details about vehicle classification and number of it. Traffic Volume is the number of vehicles crossing a section of road per unit time at any selected period. Traffic volume is used as a quantity measure of flow and the commonly used units are vehicles per day and vehicles per hour so determination of peak hour is quite easy.

Traffic capacity of any road is an important part of the planning and management of traffic. It influences the traffic flow in a city or that proper location. Traffic capacity is expressed as the maximum number of vehicles a lane that can pass a specified point in unit time usually an hour.

The volume of traffic repeats not only the numbers of people requiring to be moved but also their affluences. The volume of transport between two urban centers depends upon the quality of highway and availability of various transportation modes between these urban centers. The volume also depends upon the interaction between these urban centers (to connect CBD).

OBJECTIVES

The present study is undertaken with the following objectives

- To measure traffic volumes and note other related traffic characteristics (e.g. flow composition, flow fluctuations etc.).
- To determine hourly volume in terms passenger car unit (PCU)
- To determine peak hour and classified vehicle.

II Study Area

The study area for the present study is Ahmedabad city of India as shown in Figure 1.

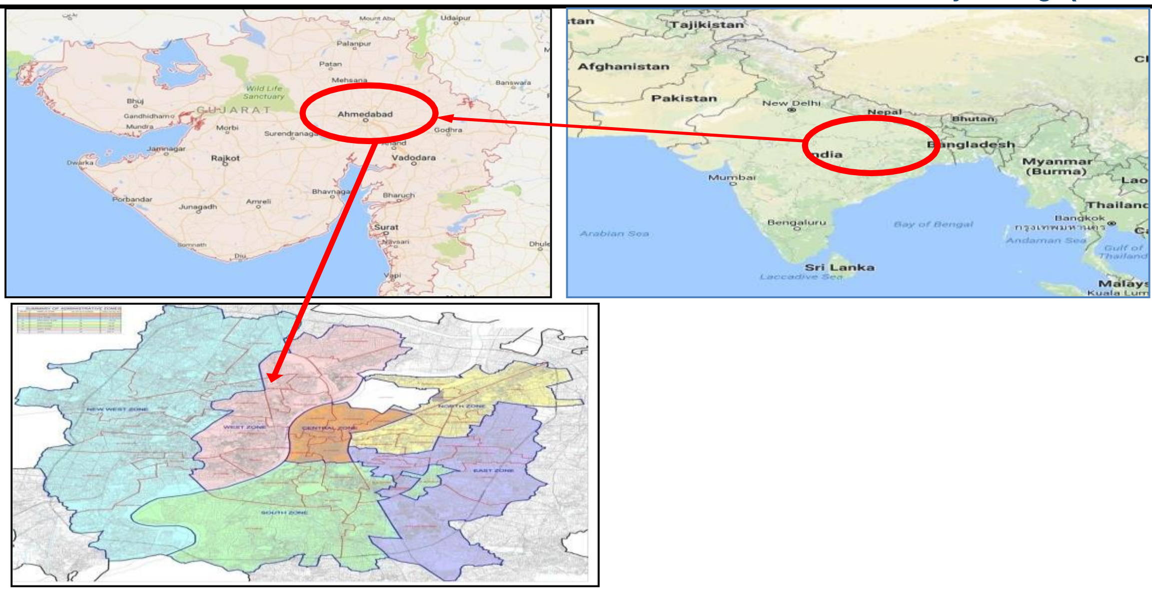

Figure: 1 Ahmedabad (Study area)

Ahmedabad is the fifth largest city and the former capital of Indian state Gujarat with a population of more than 7.3million (2017). Ahmedabad situated on 23.03°N, 72.58°E according to geographic–coordination system. It is situated on the western part of India near Sabarmati river passes near the Ahmedabad. It spreads in area of 464 km².

Table 1Total vehicle registered and annual vehicular growth in Nation, State and Ahmedabad City

Year	INDIA		GUJARAT		AHMEDABAD	
	TOTAL		TOTAL		TOTAL	
Year 1961	665000		43230			
Year 1971	1865000	180%	147967	242%	62922	
Year 1981	539100	189%	522451	253%	165620	163%
Year 1991	21474000	298%	2052391	292%	538182	225%
Year 2001	54991000	156%	5576040	172%	1210278	125%
Year 2010	127743600	158%	11873000	150%	1684565	133%
Year 2016	230456800	245%	19721000	160%	3665643	143%

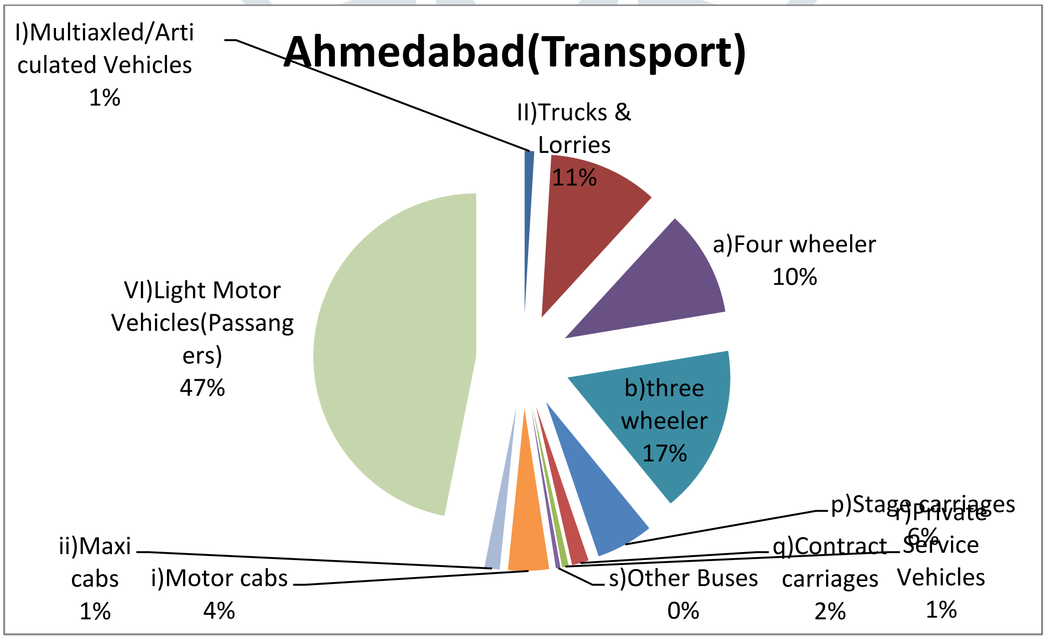

Figure:2 Detailed Category-wise Total Registered Motor Vehicles in Ahmedabad City(Transport) on 31st March 2016

As per morth 2016 data vehicles in Ahmedabad city increase rapidly and analization of vehicle on road is important to increase road facility.

Here, we take helmet crossing as study area because it has more residential area and income of families are higher and conjunction problem is normal for that crossing.

Figure:3 Helmet cross road image from satellite

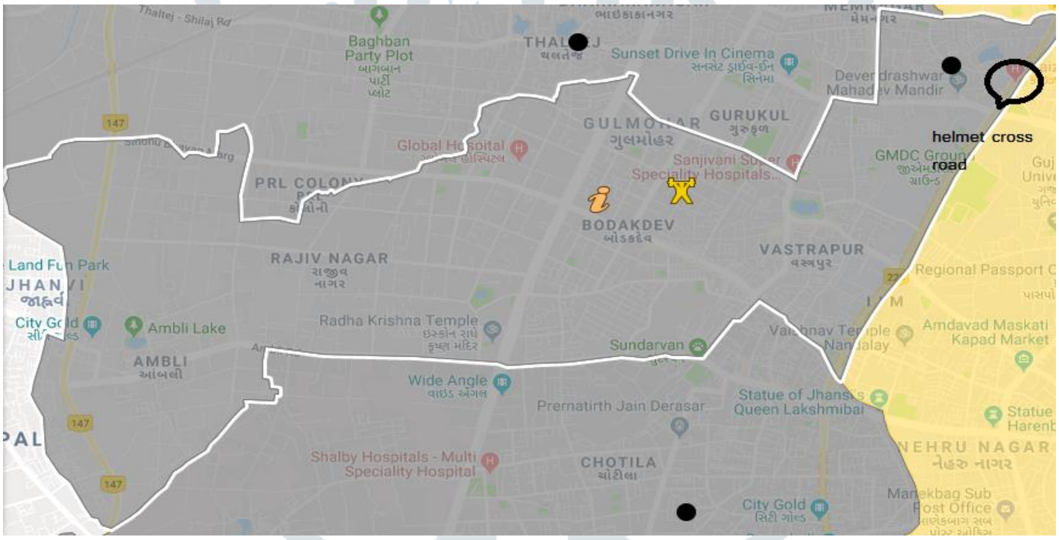

Figure:4 Helmet cross road word wise map Ahmedabad

III Methodology

Our survey topics are Traffic volume survey of Traffic intersection of Ahmedabad city and our study area is Helmet Crossing. This study maintains a systematically well-arranged methodology for the achievement and successful accomplishment. The methodology divided into some segments as,

Conceptualization: Concepts about the study are developed from the previous relevant studies and papers like report, thesis, books etc. From those previous works, effects and causes of traffic congestion and also undertaken measures to reduce traffic congestion have been known. Those concepts are very essential to conduct this report. For the survey we prepared a survey form to measure the traffic volume.

Tally Sheets: Recording data onto tally sheets is the simplest means of conducting manual counts. The data can be recorded with the tally mark on a pre-prepared survey form.

Field procedure: Related information like traffic volume, the inbound and outbound traffic of the intersection. Transportation type of the area is collected by means of objective observation. The main objective of the survey is to observe the vehicular traffic flow, to identify the traffic characteristics, to explore the present traffic condition. We surveyed the study area both weekend and weekday to find out and measure the traffic volume with the survey form. In the survey time we the group members are placed each station. Then we start our survey together in time. In the weekend survey, we spent 1hr continuously. But, in the weekday we surveyed 15 min cycle in 4 orders. Thus, we have finished our traffic volume survey.

IV METHODS FOR COUNTING TRAFFIC VOLUME

(1) Mechanical counters

(2) Manual counts

(1) Mechanical counters:-The automatic devices essentially consist of equipment for detecting the passage or presence of a vehicle (called detector or sensor) and another for recording the count. The sensor usually transmits some form of electric impulse which activates the accumulating register or recording chart.

(2) Manual counts:-The number of observers needed to count the vehicles depends upon the number of lanes in the highway on which the count is to be taken and the type of information desired.

It is perhaps more desirable to record traffic in each direction of travel separately and post separate observers for each direction. In fact, the Indian road congress standard deems this necessary. Enumerators should be literate persons with preferably middle or matriculation level qualifications and can be trained suitably for the purpose.

The field sheet data can be modified to suit the particular requirements of any intersection. By this method it is possible to obtain data which is not be collected by mechanical counters, such as vehicle classification, turning movements and counts where the loading condition or number of occupants are required. But it is not practicable to have manual count for all the 24 hours of the day. Hence it is necessary to resort to statically sampling techniques in order to cut down the manual hours involved in talking complete counts, First the fluctuation of traffic volume during the hours of day and the daily variations are observed. Then by selecting typical short count period, the traffic volume study is made by manual counting. Then by statistical analysis the peak hourly traffic volumes as well as the average daily traffic volumes are calculated. This method is very commonly adopted due to the specific advantages over other methods.

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VI Data collection

In our traffic volume survey we are assigned to survey the traffic volume of Helmet crossing. From the following method we follow the manual count method. Under this method we arrange our working process into some steps.

Table 2 Towards Helmet crossing

Towards the Helmet							
Time Duration	**Two Wheeler**	**Three Wheeler**	**Four Wheeler**	**Bus**	**Truck**	**Tractor**	**Cycle**
6:00 to 6:05	223	45	54	13	4	0	11
6:05 to 6:10	245	56	51	10	3	0	13
6:10 to 6:15	241	60	48	10	4	1	10
6:15 to 6:20	266	54	49	11	3	1	9
6:20 to 6:25	267	70	42	11	7	0	14
6:25 to 6:30	236	65	39	14	4	1	16
6:30 to 6:35	261	55	51	9	2	0	17
6:35 to 6:40	259	57	45	12	2	0	12
6:40 to 6:45	251	58	40	14	3	1	13
6:45 to 6:50	238	61	52	11	2	1	11
6:50 to 6:55	258	56	49	13	3	2	11
6:55 to 7:00	258	51	48	10	2	0	9
Sub Total	3003	688	568	138	39	7	146
PCU value	**0.5**	**1.0**	**1.0**	**3**	**3**	**4.5**	**0.5**
PCU	1501.5	688	568	414	117	31.5	73
Total PCU	**3393**						

Table: - 3 Out from Helmet crossing

Out from Helmet							
Time Duration	**Two Wheeler**	**Three Wheeler**	**Four Wheeler**	**Bus**	**Truck**	**Tractor**	**Cycle**
6:00 to 6:05	239	42	36	12	1	2	2
6:05 to 6:10	254	38	35	11	1	0	1
6:10 to 6:15	457	47	48	11	2	2	5
6:15 to 6:20	245	46	47	14	2	2	4
6:20 to 6:25	259	52	45	9	2	0	8
6:25 to 6:30	268	53	43	12	3	2	5
6:30 to 6:35	257	54	54	11	3	1	4
6:35 to 6:40	276	47	48	8	5	1	2
6:40 to 6:45	259	48	45	7	2	1	4
6:45 to 6:50	251	44	35	11	0	1	2
6:50 to 6:55	264	42	39	12	1	1	3
6:55 to 7:00	269	54	28	9	6	0	3
Sub Total	3298	567	503	127	28	13	43
PCU Value	**0.5**	**1.0**	**1.0**	**3**	**3**	**4.5**	**0.5**
PCU	1649	567	503	381	84	58.5	21.5
Total PCU	**3264**						

Table:- 4 Toward the Gurukul

Towards the Gurukul							
Time Duration	**Two Wheeler**	**Three Wheeler**	**Four Wheeler**	**Bus**	**Truck**	**Tractor**	**Cycle**
6:00 to 6:05	140	53	32	0	2	1	4
6:05 to 6:10	111	56	23	2	1	1	7
6:10 to 6:15	120	58	24	0	2	0	11
6:15 to 6:20	125	51	26	1	2	1	14
6:20 to 6:25	90	49	28	4	3	2	13
6:25 to 6:30	103	47	23	2	3	0	14
6:30 to 6:35	105	44	35	1	0	1	11
6:35 to 6:40	90	41	37	1	1	0	6
6:40 to 6:45	112	43	32	0	2	0	5
6:45 to 6:50	145	46	32	1	1	1	8
6:50 to 6:55	121	38	30	3	1	0	9
6:55 to 7:00	113	40	20	0	2	0	6
Sub Total	1375	566	342	15	20	7	108
PCU value	**0.5**	**1.0**	**1.0**	**3**	**3**	**4.5**	**0.5**
PCU	687.5	566	342	45	60	31.5	54
Total PCU	**1786**						

Table:- 5 Toward Expo Ground

Towards the Expo Ground							
Time Duration	**Two Wheeler**	**Three Wheeler**	**Four Wheeler**	**Bus**	**Truck**	**Tractor**	**Cycle**
6:00 to 6:05	90	51	30	0	2	1	5
6:05 to 6:10	91	34	20	1	1	0	8
6:10 to 6:15	101	51	32	2	3	1	10
6:15 to 6:20	110	53	26	2	3	1	9
6:20 to 6:25	90	49	24	2	2	2	9
6:25 to 6:30	112	45	20	0	1	1	6
6:30 to 6:35	134	53	27	1	3	0	8
6:35 to 6:40	93	57	21	1	2	0	7
6:40 to 6:45	107	74	21	2	1	1	4
6:45 to 6:50	91	59	20	1	1	1	3
6:50 to 6:55	89	51	24	2	0	1	2
6:55 to 7:00	85	53	29	1	1	0	3
Sub Total	1193	630	294	15	20	9	74
PCU Value	**0.5**	**1.0**	**1.0**	**3**	**3**	**4.5**	**0.5**
PCU	596.5	630	294	45	60	40.5	37
Total PCU	**1703**						

V Result and Discussion:-

As per calculation of IRC we found PCU of peak hour and also analyze traffic volume count with vehicle group classification which is given here as graphical presentation.

1)Towards the University to memnagar road give pcu calculation as per IRC :-

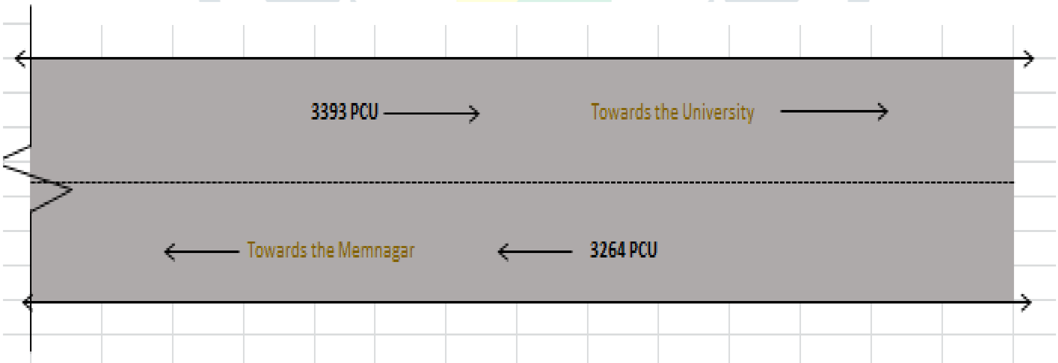

Figure:5 Towards the University to memnagar road

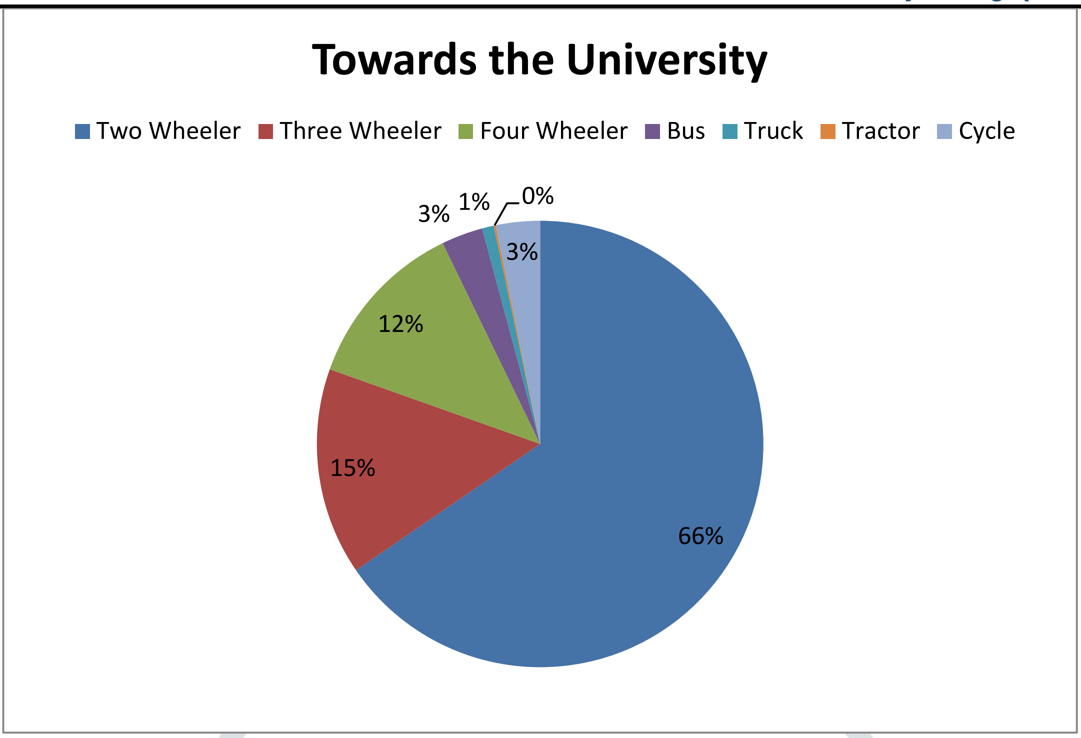

Figure:6 Towards University

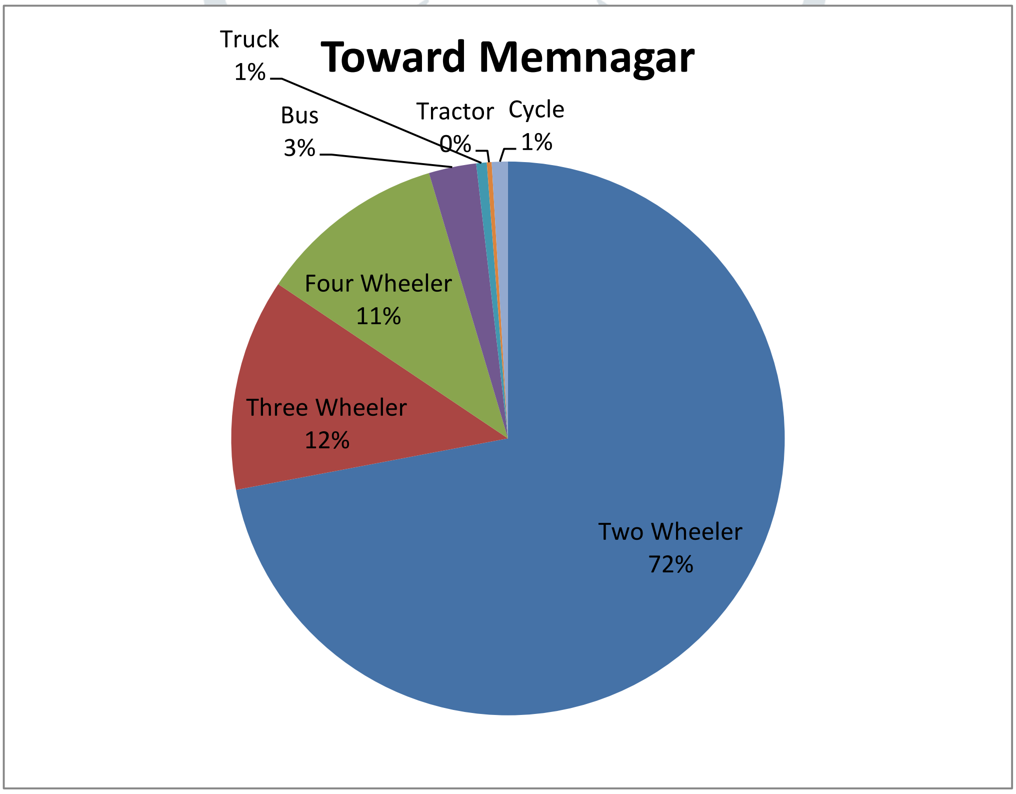

Figure:7 Towards Memnagar

2)Towards the Gurukul to Expo ground give pcu calculation as per IRC :-

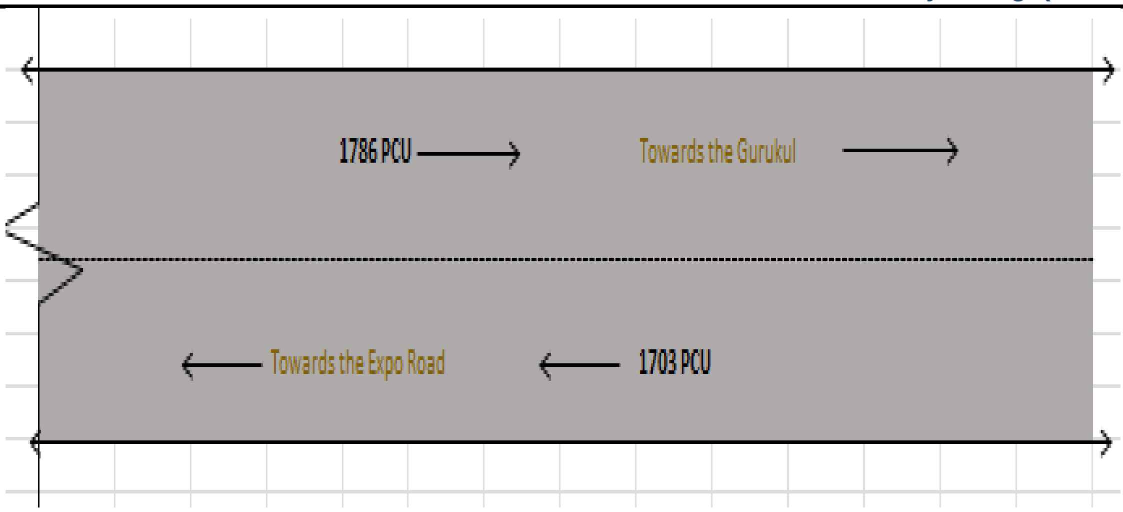

Figure:8 Towards the Gurukul to Expo ground

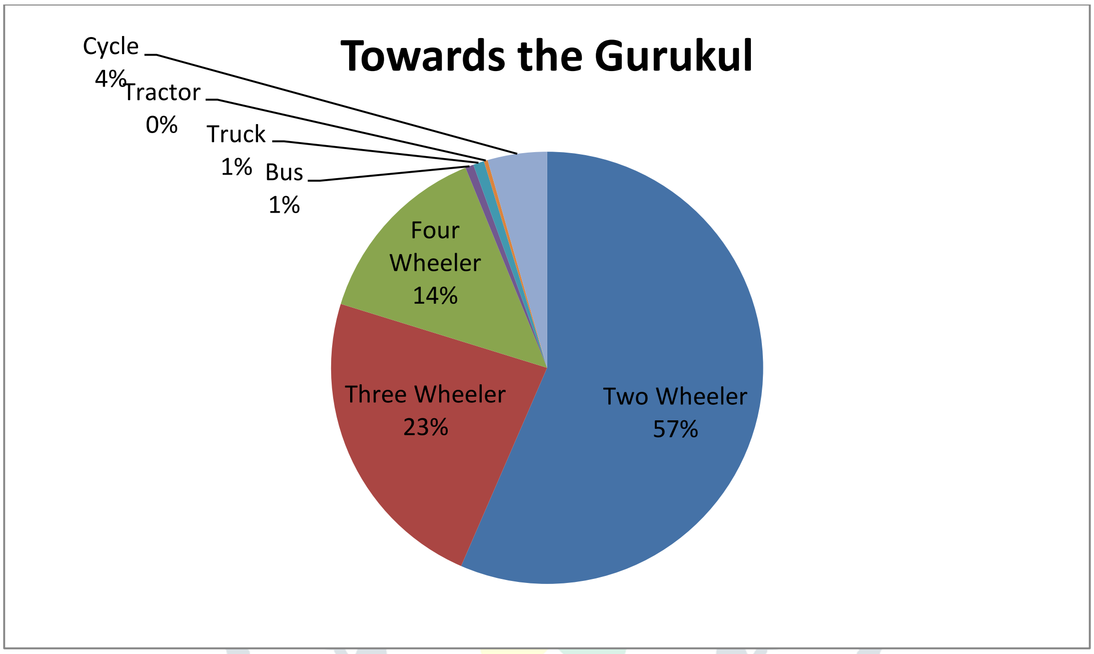

Figure:7 Towards the Gurukul

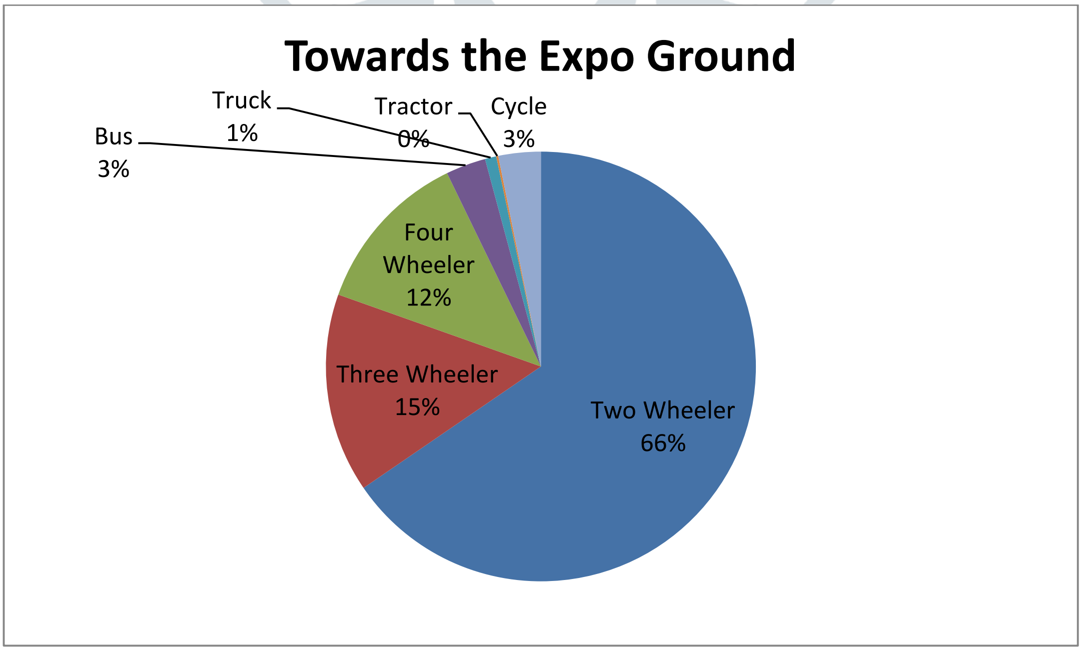

Figure:8 Towards expo ground

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