

# DESIGN AND STRATEDIES TO REDUCE THE TRAFFIC CONGESTION AT SCIENCE CITY INTERSECTION ON S.P.RING ROAD

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**Abstract:** This research paper presents data collection and traffic analysis of science city area, Ahmedabad, India. Inventory surveys including traffic volume studies like classified volume count survey and spot speed study survey were conducted and data was collected. Data analysis yield that road is overloaded and traffic jams are because of poor management. It includes but not limited to pedestrians, slow moving vehicles (SMV), on road parked vehicles, improper traffic management. Because of traffic congestion the accident chances are more.

**Index Terms-** Traffic congestion, Analysis, Volume, Capacity, traffic safety.

## I. INTRODUCTION

### 1.1 General

Most of us at some point in our lives have had the misfortune of experiencing the effect of a congested roadway. For a majority of commuters, traffic congestion has become something that they endure on a regular basis during their morning and evening commutes. However, aside from the frustration aggravation of creeping through slow moving traffic, congested roadways exert both private costs in wasted time and fuel and social costs in the form of increased travel time for all commuters as well as the release of pollutants and greenhouse gas emissions into the air.

The private cost of traffic congestion has risen exponentially over the last several decades, increasing nearly fivefold since 1982 to a total of \$101 billion in 2017. And these costs will continue to climb \$175 billion by end of this decade. With these costs in mind politicians, planners and other decision makers have tried different ways to alleviate the problem of traffic congestion from expanding roadway capacity and transit systems to encouraging higher density development with an emphasis on alternate modes of travel to implementing intelligent traffic system such as road metering and stoplight synchronization.

## II. LITERATURE REVIEW

**2.1 Ankush Kumar, Dr. R.R Singh. et. al. 2017** In this publication to rapidly growing cities of country like India, the increasing private transport and high movement of the population toward urban cities leads to problem of congestion, which further leads to complications and hazard on the cities roads. Indian cities are already suffering with huge deficiencies in term of infrastructures as well as in operational efficiencies. Considering the policy gaps on country roads this paper first describes the factor causing the congestion and after that presents some recommended measures to reduce the congestion on the city roads.

**2.2 Robaka Shamsher, Mohammad Nayeem Abdullah. et. al. 2015** In this study a One of the most challenging and complicated issues in city management in the present decade for Bangladesh are the traffic problem. It is a very common phenomenon in almost all the cities of Bangladesh. Presently, traffic congestion problem in Bangladesh are increasing at an alarming rate. The traffic problem has become to a very dangerous arena and has already implicit agonizing extent in the cities of Bangladesh. This type of study has been conducted in Dhaka but not in Chittagong city. Traffic management in Chittagong is not well organized as Dhaka so that the problem is becoming more complicated as the number of people in Chittagong is increasing and it is getting the priority after Dhaka. This article is dedicated to determine the current condition of traffic management in Chittagong City. This article explore the causes involved in traffic congestion including heavy concentration of vehicles, absence of adequate public transport, inadequate road infrastructure, faulty signaling equipment and poor enforcement of traffic rules. At the end of the paper the researchers tried to identify the solution of traffic jam in Chittagong Metropolitan City.

**2.3 Shekhar K Rahane, Pro U R Sahakar. et. al. 2014** In this paper the Cities and traffic have developed hand-in-hand since the earliest large human settlements. The same forces that draw inhabitants to congregate in large urban areas also lead to sometimes intolerable levels of traffic congestion on urban streets and thoroughfares. Effective urban governance requires a careful balancing between the benefits of agglomeration and the disadvantages of excessive congestion. Road traffic congestion poses a challenge for all large and growing urban areas. The full report on which this summary is based aims to provide policymakers and technical

staff with the strategic vision, conceptual frameworks and guidance on some of the practical tools necessary to manage congestion in such a ways to reduce its overall impact on individuals, families, communities and societies. Urban traffic congestion is a significant and growing problem in many parts of the world.

**2.4 P. J. Muhammad Ali, R. H. Faraj. et. al. 2013** In this study one of the big problems facing city municipalities is the traffic congestion. It makes life in cities uncomfortable for people. Every year governments spend huge budgets to solve this problem. Koya is suffering from this problem especially at rush traffic hours. In this paper, the traffic congestion problem is studied for the road connecting Sawz Square and Shahidan Square in Koya city. The congestion is measured by determining the level of service of the street (LOS) through calculating the traffic flow rate of the street and free flow rate; the LOS level was D. For determining peak hour traffic volume the calculation is made through the manual counting of vehicles and multiplying by passenger car equivalent (PCE) where the speed is reduced to (10 km/hr). In addition, the topography, elevations and alignments of the road are studied. This paper determined the real causes of the traffic congestion in this specific street in Koya city and proposed solutions for solving the problem.

STUDY AREA

3.1 Briefing of the Location

Ahmedabad city is the administrative centre of Gujarat, India. Located at latitude 23.0300° North and longitude 72.5800° East, the city is the centre for social, educational, commercial, residential, cultural, political and economic activities of Ahmedabad district. The total population of Ahmedabad is 85, 00,000+ as per Gujarat census, 2018. Ahmedabad has seen rapid economic growth during last decade. The city is facing problems of traffic, parking, and pedestrian safety on certain stretches of road in the city. Ahmedabad is seventh largest metropolis city in India and largest city in Gujarat. Ahmedabad is the commercial capital of the state and is also known as the textile capital of India. Ahmedabad has excellent connectivity through Air, Road, Rail lines with Mumbai and Delhi. Historically Ahmedabad has been one of the most important centers of trade and commerce in western India. The city has a great architecture tradition reflected in many exquisite monuments temples and modern buildings.

Science city is a very fast developing area in Ahmedabad city. Science city area is famous for their beautiful invention of science which is “Science city”. The location of the science city round about is on the sardar patel ring road. Simultaneously at the other hand it is connected the science city area and bhadaj area. There is plenty of traffic problems face on that reason. If we scrutinized the bottom then we can see that it is one of the high risk accidents point in Ahmedabad.



Spot Speed Study					
Project: Design and strategies to reduce the traffic congestion in Ahmedabad City: A case study of Science City round about.					
Name of Road: S.P. Ring Road			Date : 03 Nov. 2018		
Curve Length: 22 meters			Time : 03:00 pm		
Morning			Evening		
Vehicle no.(asc)	Time (Sec)	Speed (km/ph)	Vehicle no.(asc)	Time (Sec)	Speed (km/ph)
1	2.59	30.58	1	2.45	32.33
2	2.16	36.67	2	2.21	35.84
3	2.61	30.34	3	2.34	33.85
4	2.06	38.45	4	2.14	37.01

5	2.01	39.40	5	2.17	36.50
6	1.69	46.86	6	2.16	36.67
7	1.68	47.14	7	2.46	32.20
8	1.98	40	8	2.64	30
9	1.89	41.90	9	2.07	38.26
10	2.08	38.08	10	1.89	41.90
11	2.16	36.67	11	1.69	40.41
12	2.24	35.36	12	1.99	39.80
13	2.36	33.56	13	2.07	38.26
14	2.45	32.33	14	2.11	37.54
15	2.65	29.88	15	2.27	34.89
16	2.55	31.06	16	2.35	33.70
17	2.32	34.14	17	2.14	37.01
18	2.04	38.82	18	2.17	36.50
19	1.98	40	19	2.16	36.67
20	1.98	40	20	2.45	32.33
21	1.96	40.41	21	2.21	35.84
22	1.78	44.49	22	2.34	33.85
23	1.87	42.35	23	2.14	37.01
24	2.09	37.89	24	2.17	36.50
25	2.18	36.33	25	2.16	36.57
26	2.26	35.04	26	2.46	32.20
27	2.45	32.33	27	2.07	38.26
28	2.59	30.58	28	1.89	41.90
29	2.16	36.67	29	2.45	32.33
30	2.61	30.34	30	2.21	35.84
31	2.06	38.45	31	2.34	33.85
32	2.01	39.40	32	2.14	37.01
33	1.69	46.86	33	2.64	30.00
<b>Average Speed</b>		<b>37.33</b>	<b>Average Speed</b>		<b>31.63</b>
<b>85th percentile Speed</b>		<b>36.67</b>	<b>85th percentile Speed</b>		<b>32.33</b>
<b>95th percentile Speed</b>		<b>38.45</b>	<b>95th percentile Speed</b>		<b>33.85</b>
<b>Median (50th perc. Speed)</b>		<b>34.14</b>	<b>Median (50th perc. Speed)</b>		<b>37.01</b>

### Spot speed study

Speed is an important transportation consideration because it relates to safety, time, comfort, convenience and economics. Spot speed studies are used to determine the speed distribution of a traffic stream at a specific location. The data gathered in spot speed studies are used to determine vehicle speed percentiles, which are useful in making many speed-related decisions. Spot speed data have number of safety applications, for a spot speed study at a selected location, a sample size of at least 30 and preferably more vehicles. Traffic counts during the peak period may show exceptionally high volumes and are not normally used in the analysis; therefore, counts are usually conducted on the other times. Spot speed data are gathered using one of three methods: (1) Stopwatch method, (2) Radar meter method, (3) Pneumatic road tube method. The stopwatch method is the least expensive method. Therefore here stopwatch method is used for surveying.

## III. DATA COLLECTION

### 3.1 Classified Volume Count - CVC

Traffic data collection is basic requirements for transport planning. Traffic data forms an integral part of national economics and such knowledge is essential in drawing up a rational transport policy for movement of passengers and goods by both government and the private sectors. One of the fundamental measures of traffic on a road system is the volume of traffic using the road in a given interval of time. It is also termed as a flow and expressed in vehicle per hour or vehicle per day. Volume is important for understanding the efficiency at which the system works at present and the general quality of service offered to the road users. Method used for vehicle count here is named as video photography method.

Traffic flow condition at the study area in the morning peak hour was vast and varied on the science city intersection. Another crucial factor which is unavoidable at the intersection, the turning vehicles or changing the direction of the flow through an opening provided at the curve area. Although number of direction changing vehicles is less, it creates very unpleasant environment for the other road users and affects the moving traffic flow resulting in conflicts between vehicles and road users at

the section. Due to classified volume count we can find out the no of vehicles which are going in that particular area at how much rate and also we can see how side friction affects it.

Table 4.1 Classified Volume Count

Towards the shilaj - vaishnodevi				Towards the bhadaaj – science city			
Time Duration	Two Wheeler	Three Wheeler	Four Wheeler	Time Duration	Two Wheeler	Three Wheeler	Four Wheeler
10:30 to 10:35	198	35	38	10:30 to 10:35	136	42	34
10:35 to 10:40	207	33	39	10:35 to 10:40	126	44	26
10:40 to 10:45	201	32	42	10:40 to 10:45	116	43	25
10:45 to 10:50	197	24	37	10:45 to 10:50	122	43	33
10:50 to 10:55	192	28	40	10:50 to 10:55	116	38	31
10:55 to 11:00	188	29	33	10:55 to 11:00	117	39	32
11:00 to 11:05	202	28	34	11:00 to 11:05	128	40	33
11:05 to 11:10	178	27	38	11:05 to 11:10	139	44	28
11:10 to 11:15	179	33	37	11:10 to 11:15	117	42	29
11:15 to 11:20	186	32	39	11:15 to 11:20	118	43	37
11:20 to 11:25	198	29	41	11:20 to 11:25	135	37	38
11:25 to 11:30	207	28	31	11:25 to 11:30	124	39	32
<b>Sub Total</b>	23.33	358	449	<b>Sub Total</b>	1494	494	378
<b>PCU value</b>	0.5	1.0	1.0	<b>PCU value</b>	0.5	1.0	1.0
<b>PCU</b>	1166.5	358	449	<b>PCU</b>	747	494	378
<b>Total PCU</b>	<b>2654</b>			<b>Total PCU</b>	<b>1966</b>		

## • RESULTS

The results of the CVC counts show that maximum number of vehicles passing through the mid block at peak hours. Maximum numbers of vehicles passing out at that And when vehicles capacity is passed out the speed gets slow due to side friction on that area. Traffic volume data is directly linked with the speed of the vehicles and time delay problems.

### 3.2 Travel Time Delay

Moving car observer method is a procedure commonly used to estimate the average flow and journey time of traffic on a road link through collected data of moving vehicle.

Table 4.3 Travel Time Delay of Morning Period

Morning Peak Hour ( 10 am To 11 am )				
Sr No	Time Delay		No Of Vehicles	
Laps	Fixed Delay (min)	Operational Delay (min)	Over Taking	Over Taken
1	14	17	12	25
2	12	15	6	26

The method was first described in a paper by Wardrop and Charlesworth (1954) and developed by the road research laboratory in U.K.

Table 4.4 Travel Time Delay of Evening Period

Evening Peak Hour ( 5 pm To 6 pm )				
Sr No	Time Delay		No Of Vehicles	
Laps	Fixed Delay (min)	Operational Delay (min)	Over Taking	Over Taken
1	20	27	28	29
2	23	31	18	36

#### IV. CONCLUSION

The Rapid urbanization is a serious issue faced by most of the metropolitan cities in India. Many people are migrating from rural to urban areas and this urbanization results in the increase a vehicle capacity on the road. So the vehicular growth follows an exponential trend, the infrastructure expansion does not commensurate at the same level, thus results in traffic congestion on city roads. Less usage of public transport also a one side of congestion situation. Hence in the present study, analysis of traffic capacity at the science city intersection, Ahmedabad, India. Traffic volumes coming from different approach roads were collected using videographic techniques and analyzed for peak hour traffic volume. And also found out the Travel Time Delay data using Moving Car Observer Method. So there are the two solution to reduce the traffic congestion. First one is fly over and second one is under bridge. This two are the one of the two best possible solutions.

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