International Journal of Advance Engineering and Research Development
Scientific Journal of Impact Factor (SJIF): 4.72
Special Issue SIEICON-2017,April -2017
e-ISSN : 2348-4470 p-ISSN : 2348-6406

Feasibility of flyover at Sussen Circle, Vadodara

Amit Sharma[1], Abhishek Patel[2], Harshal Katargamwala[3], Ripal Patel[4], Yuvrajsinh Sisodiya[5], Darshak Chauhan[6]

[1, 2, 3, 4,5]*Department of Civil Engineering, Sigma institute of Engineering*
[6]*Assistant professor, Department of Civil Engineering, Sigma institute of Engineering*

Abstract —*Development of any Nation is mainly dependent on the effective delivery of transportation services. Similarly development of the any urban or suburban area depends on the well effective delivery of urban services. In Present the main cities of our country are experiencing rapid population growth and consequently the traffic demands on each city's. Transportation infrastructure also increases with the increased traffic demands, comes decreased Mobility. The study focuses on the area of the towns where the traffic congestion occurs at circle/rotary and other alternative to minimize its problems. Sussen circle is a rotary which connects GIDC Makarpura & other Business District of Vadodara to NH8. At this intersection Traffic flow is nearly about 10,000 PCU during peak hours which usually result in very inefficient and hazardous traffic conditions, so many people have faced problem due to traffic congestion, pollution, delay, fuel consumption etc. At this junction number of accident occur due to heavy loaded vehicles, and pedestrian life risks, high speed of vehicle, lack of proper facility like symbols, signals, road channelization and marking. So it needs an improvement. For this research we would like to carry out the survey likewise Road inventory survey, traffic volume count, accident survey, Turning movement count survey etc. so that will be done for mitigate present scenario of the condition and to find other alternative. The goal of a traffic study is for development or re-development and to identify the road way improvements required to ensure that the road network will operate safely and efficiently upon completion of the development. At the junction all types of vehicles likewise two-wheeler, three-wheeler, four-wheeler, loaded-unloaded vehicle, trucks, buses etc. are travelling day & night time so there is congestion of the traffic. Peoples are used to public & private vehicles to connect with different areas of the cities and to the National highway. The improvement of the intersection can be done by the different possible alternatives like provide modification in rotary, signal or by removal the road side violation, road channelization and marking, construction of the overpass or underpass, divert the traffic at the intersection as per Indian standards code & minimizes traffic delay by the Road Safety Audit and by using rapid construction method for the benefits of people.*

Keywords- Sussen Circle, Passenger Car unit (PCU), Traffic volume count (TVC), Transportation, Infrastructure, Road Safety Audit

I. INTRODUCTION

Road traffic has been growing a very rapid rate in India during the past three decade the number of motor vehicle has been growing at the rate around 10% per annum. Table gives the actual statistics about growth rate of various vehicle classes as follows:

Table 1. Class wise growth rate in Motor vehicle per annum

Vehicle Class	Growth rate per annum%
Cars	7-10 %
Buses	5-10 %
Trucks	6-15%
Two wheeler	15-17%

(Reference from: L.R Kadiyali)

The production of motor vehicle has been governing with the rapid rate; India has crossed the figure of two million cars per annum in 2015.As the result of steep growth of motor vehicle production of traffic on road has been increasing both in terms of volume and intensity. With increase in number of vehicles the overall speed due to increase in accident rate is usually high. Developing countries transportation planning has given more importance to utility than to accessibility. Utility has been improved through construction of overpass, underpass, channelization of road network & widening of roads, etc. Such provisions along with improper planning of access to transportation systems have pollute the environment; increased in the overall cost, which involves health, accident and congestion costs cost of operation; and increased the economic burdens. Rapid growth, low incomes, and extreme inequality are among the main underlying causes of transport problems in developing countries. Although the nature and extent of transport problems obviously vary from one country to another, virtually all developing countries suffer from the following:

- Unplanned, haphazard development at the suburban fringe without adequate infrastructure, transport, and other public services.
- Extremely congested roads with an incompatible mix of both motorized and nonmotorized vehicles traveling at widely different speeds.
- Rapidly increase in ownership and uses of private cars and motor-vehicles.
- Inadequate roadway accommodations for buses and non-motorized transport.
- Extremely high and rapidly rising traffic fatalities, especially among pedestrians and motorcyclists.

Infrastructure is an important role player for the development of a country and transportation involving around 80% in the total infrastructure. India's infrastructure is relatively poor with respect to other developed countries. Some of the major issues which create the traffic problems are improper planning, violation of the rules & regulation, poor construction and management.
Now in Indian cities, all the work activity of human that motivate people travel different places destination in the city like a shopping, working, educational, social all trips are motivated for travel. The calculation is depends upon the time, money, comfort, discomfort, generalized cost, and fare.
Present study is on Sussen rotary intersection, at these intersection accidents occurs due to high operating speed vehicle, traffic congestion and intensity of traffic flow in all four directions. The reason for this traffic congestion is overcrowding at junctions due to the increasing density of traffic from all directions. Present study includes four alternatives with a Flyover, or modification in Rotary intersection by removing road side violation; signalize intersection, Divert Traffic on other Road which may partially solve the problem of congestion and accidents, Traffic delay, risk of pedestrian life, lack of proper facility like channelization of road symbols, signals, and road marking are major problem at this in rotary intersection. Out of this four alternatives construction of flyover is advantageous at this rotary intersection. Increase in population growth about (15.5%) per decade. Average increase is 10% of motor vehicles per decades, so that rapid construction of suitable alternative solution required at this rotary intersection that can make a Sussen circle congestion and crowd free, ecofriendly, appropriate & suitable for the public.

II. STUDY AREA

Vadodara is the 3rd largest city in Gujarat and one of the fastest developing cities in India. With increasing growth in population of the city, the road traffic problems are also increasing at an alarming rate. The development of a city or town leads to the growth of the number of vehicles i.e. directly linked to increased traffic congestion and a growing number of accidents and fatalities. Road traffic problems like congestion, unpredictable delay in journey & travel-time and road accidents are taking a serious shape in the city.
The study area "Sussen Circle" situated at Makarpura location of Vadodara which is one of the major rotary intersection having traffic congestion during the peak hours because the residency is situated near the area having high number of population density. Due to rapidly growth in population over the past decade have results in decrease of its road transport services which is no longer able to answer to the travel necessity of its public. Increasing demand has not been matched by enough funds in transport infrastructure facilities, services and management.
Traffic and public transport conditions of Sussen circle have seriously been increasing day by day, characterized by daily traffic jams, traffic congestion, and long delays. Sussen circle is in its developing stages and & the main road that connect to National Highway 8 and other main locations of the nearby areas like Manjalpur, Tarsali, & GIDC area of Vadodara that having rapid growth in number of shopping centre, hospitals facility, educational institutes, industrial companies, business parks & townships, etc. and because of this rapidly increase in traffic volume has been increased which causes traffic issues such as congestion & overcrowding. This area have good infrastructure facility like Banking system, Residential area, Hospital and education centre, etc. provided but traffic issues is the vital problem, the parking facility below average and not having any infrastructure development for transportation planning and management.
Sussen circle connects people to the other main business district centre of around all City so the all localities are coming to for some work in to the Makarpura GIDC that connected by Sussen circle to NH8 that causes problems like traffic congestion, delays, overall operating cost, fuel consumption and also pavement condition that will make direct effect on vehicle maintenance and operation cost.

III. NEED FOR STUDY

- Infrastructures based facilities line congestion and operating speed on the road network plays an important role in transport policies related to accessibility
- To suggest best alternative like the underpass, flyover modifications of rotary
- To study the accident that taken place at the rotary and suggests ways to minimize them
- To suggest the ways to reduce the traffic congestion during the peak hours
- To enumerate the turning moment, so that it becomes clear that on which side of the road maximum traffic is diverted for their destination.

IV. OBJECTIVES OF STUDY

- To study and analyses of accident scenario of the study area.
- To carry out Classified Volume Count.
- To carry out Road Inventory Survey.
- To evaluate & mitigate traffic congestion, traffic intensity and give predictive measures for future traffic conditions and their major controls.
- To analyze the best public & private transport system.
- To analyzed measure for success and failure of the transportation infrastructure of Sussen circle Vadodara.
- To carrying out Turning Movement survey.
- To suggest the possible solutions with their dimensions, capacity & other construction aspect with good aesthetic view.

V. METHODOLOGY

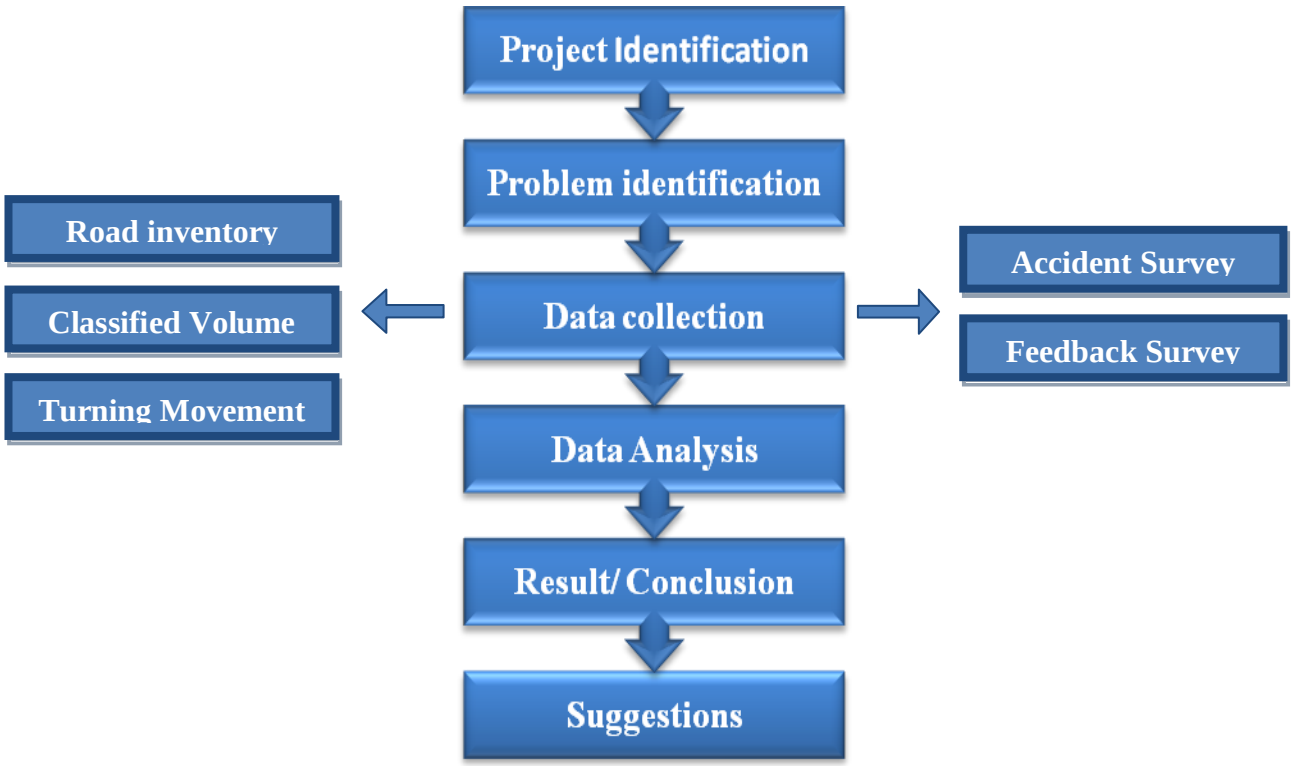

Figure 1. Layout Design of Methadology

VI. DATA COLLECTION & ANALYSIS

It is becomes necessary to study, in detail, the present and expected future characteristics of traffic at Sussen Rotary. The following surveys are required to be carried out for making these studies:

1. Road Inventory Survey
2. Classified Traffic Volume Survey
3. Turning Movement Count Survey
4. Accident Survey Data
5. Feedback Survey

6.1. Road Inventory Survey

Road Inventory Survey provides the details of road and street network. Enumerators collect the information on the field sheets which are maps drawn in a large suitable scale. A typical survey party consists of a party leader, observer and recorder and tape holders. The typical information's collected from road inventory survey are,

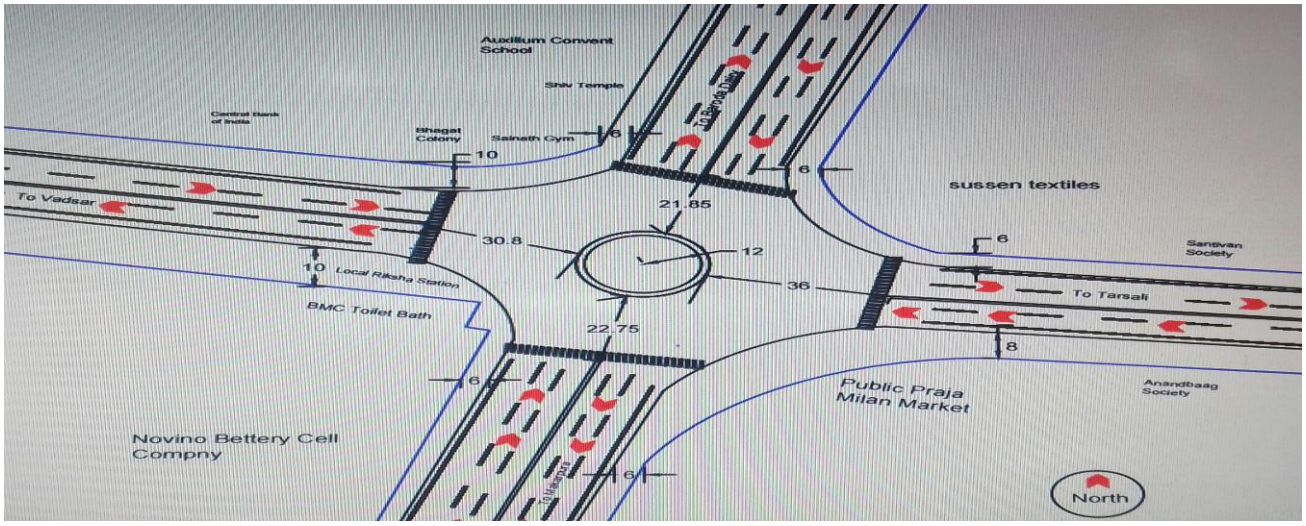

Figure 2. Plan of Sussen circle (Road inventory survey)

Table 2. Inventory Data

Component	Tarsali		Maneja		Vadsar		Pratap Nagar	
	Towards Circle	Outwards Circle	Towards Circle	Outwards Circle	Towards Circle	Outwards Circle	Towards Circle	Outwards Circle
Carriage way	11.10 m	11.70 m	12.30 m	12.30 m	10 m	9.70 m	13 m	12.50 m
Shoulder	1 m		1 m		1m		1 m	
Foot-Path	Not provided		6 m	6 m	Not provided		N.P	6 m
Pedestrian Crossing	28 m		38.8 m		30.15 m		38.2 m	
Lane Width	2 Lane (3.5m)		3 Lane(3.5m)		2 Lane(3.7m)		3 Lane (3.7m)	
Road Sign	Provided		Provided		Provided		Provided	
Informatory-Board	Provided		Provided		Provided		Provided	
Signal	Not-Provided		Not-Provided		Not-Provided		Not-Provided	
Street-Light	Yes		Yes		Yes		Yes	
Bus Stand	Yes		Yes		Yes		Yes	
Rickshaw Stand	No		No		Yes		No	
Police Station	No		No		No		No	
School	No		No		No			
Temple	No		No		Yes		Yes	
Type of Road	Bituminous		Bituminous		Bituminous		Bituminous	

6.2. Classified Traffic Volume Survey

Classified volume survey carried out by Short-term survey method during Peak hours of day. The peak hour time duration is selected by full day traffic count survey and by asking from local residents, venders, and Traffic police officers of selected location.
This survey carried out during Peak hour of day (in morning & evening) of interval 8:30 to 10:00am, 5:30 to 7:30pm only in working days (Monday to Friday) of 4 days except public holidays.
Manual Count of 5-5 minute interval is used to obtain the traffic volume data shown in Table.3

Table 3. Classified volume count data

Date	Types of vehicles	2W	3W	4W	Bus/Truck	Total
06/02/2017	TVC	10920	1586	2148	381	15035
	PCU/HOUR	5460	1586	2148	1143	10337

07/02/2017	TVC	10591	1428	2286	349	14654
	PCU/HOUR	5296	1428	2286	1396	10406
09/02/2017	TVC	10472	1634	2192	359	14657
	PCU/HOUR	5236	1634	2192	1077	10139
10/02/2017	TVC	10692	1557	2175	392	14816
	PCU/HOUR	5346	1557	2175	1568	10646

6.3 Turning Movement count survey

Turning movement counts is important for the design of junction, channelization, capacity analysis, traffic signal timing and phasing, turn lanes, parking and turning restrictions.
Turning movement counts was conducted manually and recorded in 15 minutes interval according to lane movement and by vehicle classification.
This survey was carried out during Peak hour of day

Table 4. Turning Movement Count (Evening)

1)			
Approach Side	**GIDC**	**Pratap Nagar**	**Tarsali**
Maneja	2371	762	724
PCU	1638	523	501
2)			
Approach Side	**Pratap Nagar**	**Tarsali**	**Maneja**
GIDC	608	2513	769
PCU	418	1726	528
3)			
Approach Side	**Tarsali**	**Maneja**	**GIDC**
Pratap Nagar	857	2261	351
PCU	589	1553	241
4)			
Approach Side	**Maneja**	**GIDC**	**Pratap Nagar**
Tarsali	646	1327	557
PCU	443	911	383

Table 5. Turning Movement Count (Morning)

1)			
Approach Side	**GIDC**	**Pratap Nagar**	**Tarsali**
Maneja	782	2185	658
PCU	537	1501	492
2)			
Approach Side	**Pratap Nagar**	**Tarsali**	**Maneja**
GIDC	329	1292	2195
PCU	196	887	1508
3)			
Approach Side	**Tarsali**	**Maneja**	**GIDC**
Pratap Nagar	654	755	854
PCU	449	519	587
4)			
Approach Side	**Maneja**	**GIDC**	**Pratap Nagar**
Tarsali	751	2249	759
PCU	516	1545	525

6.4 Accident data Survey

The usefulness of an accurate and comprehensive system of collection and recording accident data cannot be overemphasized such data serve to identify the basic causes of accident and to suggest means for overcoming the

deficiencies that lead to such accidents. Data carried out from Manjalpur Police Station (Police Constable: - Samir Sitaram)

Table 6. Accident Data

Year	Accident	Type of Accident	
		Fatal	Non-Fatal
2012	5	2	3
2013	4	3	1
2014	4	4	0
2015	9	7	2
2016	4	3	1
Total	**26**	**19**	**7**

6.5 Feedback survey

- We had taken feedback survey of around more than 100 people to know from the people opinion & there soft review for solves the traffic problem at crossing.
- We had taken the feedback from different people; they were Employer, Businessmen, Workers, Students, Venders, shopkeepers or the public vehicle drivers.
- In survey we given them four options out of which are beneficial to solve the traffic problem at crossing. Flyover, Underpass, Diversion of the traffic & Signalizing System. Out of the four they had given me suggestion of the best alternative to solve the traffic problem at crossing as per them knowledge.
- After carried out Feedback survey we analyzed what is the best to solve the traffic problem at crossing as per the feedback survey that show the data in the below table.

Table 7. Feedback Survey Public review

Type of Alternative	Flyover	Underpass	Diversion	Channelized Signal
Public Review (%)	36 %	14 %	27%	23%

VII. CONCLUSION

This study has led to the following conclusions:
At Rotary intersection the traffic flow of the vehicles is controlled by traffic police and traffic signals. When the flow of vehicles increases at the junctions, it causes traffic jams and increase in journey time.
After caring out survey like Traffic Volume Count, Turning movement count, during a peak hour it was observed that major problem was due to improper management of traffic or by lack of proper infrastructure. It is important that transport infrastructure and other facilities to be developed. So, growth and connectivity of the town is quick.

- By analysis of collected data or as per as IRC: SP 90-2010 Intersection traffic volumes nearing 10,000 PCU usually result in very inefficient and hazardous traffic conditions and it is at this level of traffic that provision of flyovers generally becomes necessary.
- On construction of flyover the business of local shopkeeper, showroom, & local venders will be affected.
- From feedback survey we got public opinion on flyover and make any kind of diversion that will play role for reducing traffic during peak hour.
- Scattered parking on the sides of roads can be reduced legally with the help of law enforcement authorities and public awareness programs. Suggestion can be made for construction of a flyover if the problem is not solved by changes in rotary.
- By analysis of collected data suggestions of fly-over bridge will be on the route; Pratapnagar to Maneja which will carry traffic safely in future.
- Jupiter circle which is about 650 meters from Sussen circle, Construction of flyover is not feasible on Tarsali/GIDC ring road although having high traffic flow.
- To minimize the accident by construction of flyover this will smoothen the traffic flow in all direction.
- The application of flyover can increase the aesthetic view of city.

REFERENCES

[1] John Puchera, Nisha Korattyswaropama, Neha Mittala, Neenu Ittyerahb, "Urban transport crisis in India", Transport Policy 12 (2005) 185–198, 186, 2005
[2] Navanita Das, Yudhajit Dey, Imtaj Haque Choudhury," "Study of road traffic problems with reference to guwahati city" 2nd international confrance on science, technology and management, 27/9, 1392-1337,2015

[3] Ronak N. Modi, Ms. Pooja Podar "pre-feasibility study of transportation in infrastructure: a case study of chhapi railway crossing" Journal of information, knowledge and research in Civil engineering, ISSN: 0975 – 6744| NOV 14 TO OCT 15 | Volume 3, Issue 2_
[4] Kuldip.B.Patel , Anand D. Sapariya, Pradeep P. Lodha "Feasibility study for planning a fly- over bridge over railway crossing at vijalpore road, Navsari International Journal of Advance Engineering and Research Development Volume 2, Issue 1, January-2015"
[5] Tarun Patel, Krupa Dave "Feasibility Study and Rapid Construction of Flyover at Sahakari Zin Intersection on NH-8, Himmatnagar" International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181 IJERTV4IS041315 Vol. 4 Issue 04, April-2015
[6] Shyam Prakash.K, Sai Sravan.S, Ganesh.G, Sarat Chandra.R, "Traffic Impact Study at 3 Legged Intersection" International Journal of Engineering Research & Technology (IJERT) ISSN: 2278-0181 Vol. 1 Issue 6, August – 2012.

