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IMPROVEMENT OF T-JUNCTION ON MODASA-SHAMALAJI HIGHWAY (SH-59)

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Abstract— Goods transportation facility is important for the development of any region or country road transportation is playing key role for door to door delivery of the passengers as well as of the goods. Well planned and efficient road network is necessary for safe, economic and timely transportation road links and junction shall be well designed for smooth and safe traffic operation. Particularly T-junction on rural highway shall be provide with proper channelization, islands making and signs to avoid accidents generally during the light over turning incidents happen frequently if proper reflective sign boards and making are not provide on T-junction. when number of incidents increased, grade separated junction (fly over bridge) shall be recommended as a safe infrastructure.

*Considering these, a T-junction located on Modasa-Shamalaji highway (SH-59) and modasa by-pass road is selected for improvement in this study. A heavy traffic of multi axel loaded trucks is continuously crossing this junction (Average **855** number of trucks per day). **350** number of incidents have been recorded in last year. Hence, existing T-junction requires improvement to minimize this type of incidents, a fly over is suggested on this junction. Modasa by-pass to shamalaji direction is very severe (right turning movement) on which maximum over turning incidents recorded. There for .geometric design and architectural design of the fly over bridge for this direction is incident in this study necessary classified traffic volume counts, geometrics details and accident data will be collected and accordingly design of fly over bridge will be carried out.*

Keywords—*Traffic volume count, Spot speed study, Delay survey, Highway geometry, Accident data .*

I. INTRODUCTION

A junction, when discussed in the context of transport, is a location where traffic can change between different routes, directions, or sometimes modes, of travel. Junctions can range from very simple to very complex, depending on the number of approach to be joined, the direction the vehicles are to travel and the number of vehicles expected to use the junction at any one time.

Modasa and shamlaji connected by state highway no.59. In this highway near modasa city one T-junction to connected modasa by-pass or godhara and shamlaji. On this junction many accident occur. Because of the no island circe, no signalize and no fly over and under pass to reduce the traffic and accident. And in this junction horizontal geometry and vertical geometry also not complete for smooth traffic flow. Main reason for accident occur is the super elevation problem for the modasa by-pass to shamalaji sharp turn. Main traffic flow is the 2-axle trucks,3-axle trucks, multi-axle trucks in this junction. So that HCV(heavy commercial vehicle) turned for more space and smooth horizontal curve required. But here turning radius is not access the smooth traffic and also space is not required. So that the HCV are fallen one side or the accident to the divider and any vehicle for that fatal, major and minor accident occur. And this junction near to government engineering college, modasa and also near to the tatva institute of technological study, modasa.

REVIEW OF LITERATURE

Road safety audits and review

- In the last decade, some countries have introduced the practice of auditing new or existing roadways to assist in building safety into the road network. This practice is known as the road safety audit. A road safety audit is a formal and proactive process to complete a comprehensive traffic safety study. The Austroads guidelines define a road safety audit as a "formal examination of a future road or traffic project, an existing road, or any project which interacts with road users, in which an independent, qualified team assesses the crash potential and safety performance" (Austroads, 2002).
- The main objective of a road safety audit is to address the safe operation of a roadway and to ensure a high level of safety for all users. Road safety audits foment safer roads by promoting elimination or mitigation of safety hazards (such as inappropriate intersection layouts) and by encouraging incorporation of suitable crash-reducing features (such as guard fencing, traffic control devices and delineation). A road safety audit should enclose two complementary approaches, crash reduction and crash prevention.

Following objectives are considered from the study:

- To collect existing geometric features, classified traffic volume counts on the selected T-junction.
- To collect the accident data for the past years.
- To analyze the data and carrying out geometric design of fly over bridge.
- To design necessary infrastructural facilities with good architectural look of the fly over bridge.

METHODOLOGY

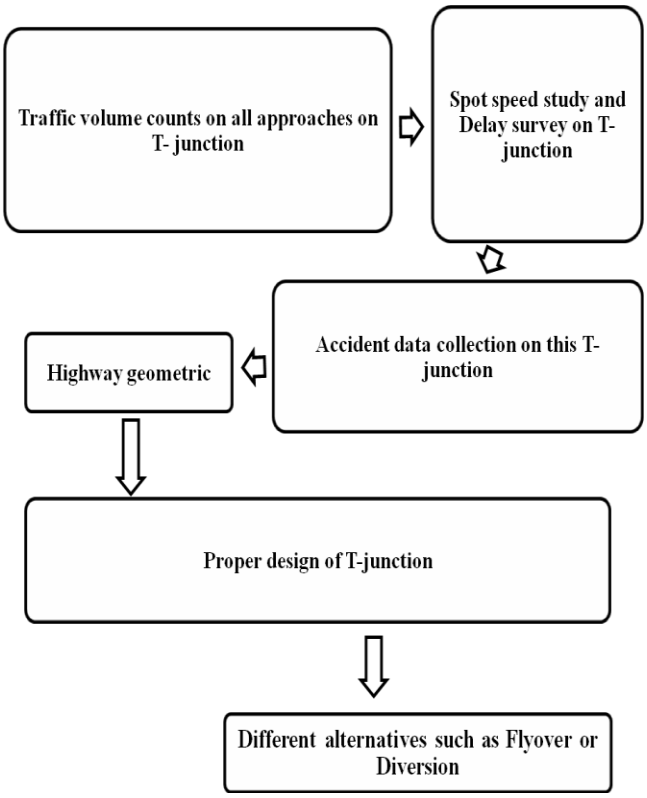


Fig. 1: Methodology flow chart

General

Improvement of T-junction on Modasa-Shamalaji highway (SH-59) shall be require data such as traffic volume counts, spot speed study, delay time study, accident data and analyze the all data after improve it in any feasible alternatives. So that improvement of t- junction all step by step methods are briefly explained.

Traffic volume counts on all approaches on T- junction

Traffic volume studies are conducted to determine the number, movements, and classifications of roadway vehicles at a given location. These data can help identify critical flow time periods, determine the influence of large vehicles or pedestrians on vehicular traffic flow, or document traffic volume trends. The length of the sampling period depends on the type of count being taken and the intended use of the data recorded.

Spot speed and Delay survey on T-junction

For geometric design of roads , analyzing the causes of accidents and identifying any relation between speed and accidents, spot speed data are needed. Delay studies at T-junction provide data for the design and installation of the appropriate traffic control devices.

Accident data collection on this T-junction

In determining and planning pedestrian safety, speed zoning and speed control, this accident data are needed. For designing channelized island, central verges, and refuge island and also redesigning intersection and t-junction accident data on this location are needed.

Highway geometric

The safe, efficient and economic operation of a highway is governed to large extent by the care with which the geometric design has been worked out. Geometric design is an aspect of highway design dealing with the visible dimensions of roadway. Include the horizontal and vertical alignment, sight-distance, cross-section, lateral and vertical clearance and control of access, etc.

Proper design of T-junction

Particularly T-junction on rural highway shall be provide with proper channelization, islands making and signs to avoid accidents generally during the light over turning incidents happen frequently if proper reflective sign boards and making are not provide on T-junction. when number of incidents increased, grade separated junction (fly over bridge) shall be recommended as a safe infrastructure. Hence, existing T-junction requires improvement to minimize this type of incidents, a fly over is suggested on this junction.

STUDY AREA

Fig. 2: Satellite view of T-junction

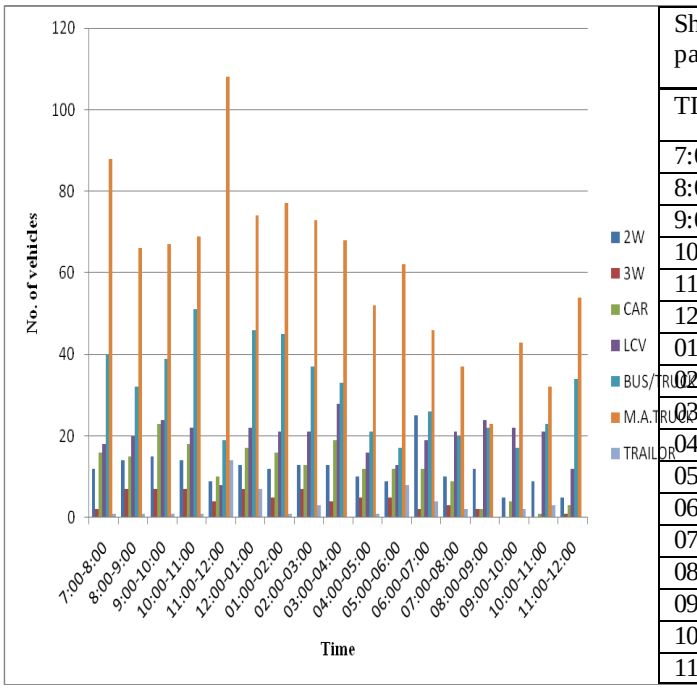
Fig. 3: Present scenario of T-junction

DATA COLLECTION

1-TRAFFIC VOLUME COUNTS

Table-1. [By-pass to Shamalaji full day counting]

Bypass to Shamalaji							
TIME\VEHICLE	2W	3W	CAR	LCV	BUS/TRUCK	M.A.TRUCK	TRAILOR
7:00-8:00	12	2	16	18	40	88	1
8:00-9:00	14	7	15	20	32	66	1
9:00-10:00	15	7	23	24	39	67	1
10:00-11:00	14	7	18	22	51	69	1
11:00-12:00	9	4	10	8	19	108	14
12:00-01:00	13	7	17	22	46	74	7
01:00-02:00	12	5	16	21	45	77	1
02:00-03:00	13	7	13	21	37	73	3
03:00-04:00	13	4	19	28	33	68	
04:00-05:00	10	5	12	16	21	52	1
05:00-06:00	9	5	12	13	17	62	8
06:00-07:00	25	2	12	19	26	46	4
07:00-08:00	10	3	9	21	20	37	2
08:00-09:00	12	2	2	24	22	23	
09:00-10:00	5		4	22	17	43	2
10:00-11:00	9		1	21	23	32	3
11:00-12:00	5	1	3	12	34	54	



Shamalaji to By pass						
TIME\VEHICLE	2W	3W	CAR	LCV	BUS/TRUCK	M.A.TI
7:00-8:00	26	7	33	21	24	
8:00-9:00	28	6	38	22	34	
9:00-10:00	25	7	32	25	22	
10:00-11:00	26	7	47	20	20	
11:00-12:00	24	2	23	4	20	
12:00-01:00	25	6	38	21	23	
01:00-02:00	27	5	31	23	26	
02:00-03:00	29	4	32	21	27	
03:00-04:00	27	7	35	20	23	
04:00-05:00	24	5	36	21	30	
05:00-06:00	26	7	47	26	25	
06:00-07:00	24	5	41	22	25	
07:00-08:00	11	2	22	12	11	
08:00-09:00	5		24	34	35	
09:00-10:00	7		55	32	43	
10:00-11:00	16	1	34	25	54	
11:00-12:00	7		33	23	44	

Chart-1. [By-pass to Shamalaji No. of vehicles versus Time graph]

Table-2. [Shamalaji to By-pass full day counting]

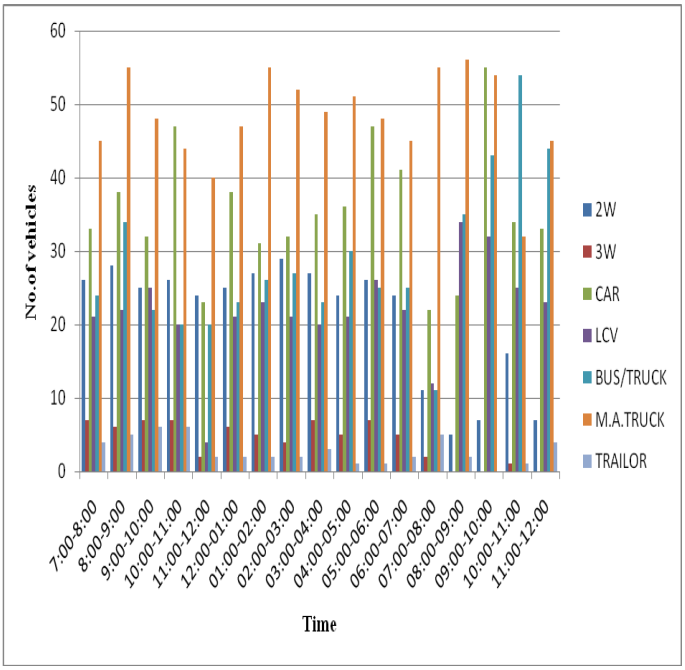


Chart-2. [Shamalaji to By-pass No. of vehicles versus Time graph]

TABLE OF BY-PASS TO SHAMALAJI ONE HOUR COUNTING

Table-3. [By-pass to Shamalaji one hour counting]

Byepass to Shamalaji				Time:11to12			
Type of vehicle	2W	3W	CAR	LCV	BUS/TRUCK	M.A.TRUCK	TRILOR
No. of vehicles	9	4	10	8	19	108	14

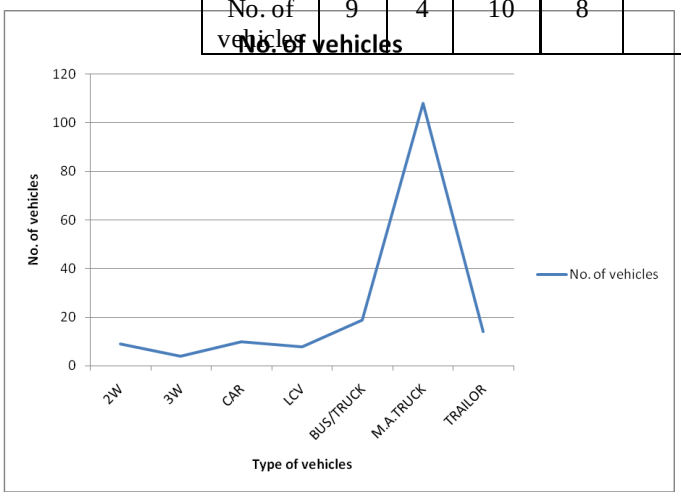


Chart-3. [By-pass to Shamalaji Number versus Type of vehicles Line graph]

TABLE OF SHAMALAJI TO BY-PASS ONE HOUR COUNTING

Shamalaji to Byepass						Time-11 to12	
Type of vehicle	2W	3W	CAR	LCV	BUS/TRUCK	M.A.TRUCK	TRAILOR

No. of vehicles	24	2	23	4	20	40	2

Table-4.[Shamalaji to By-pass one hour counting]

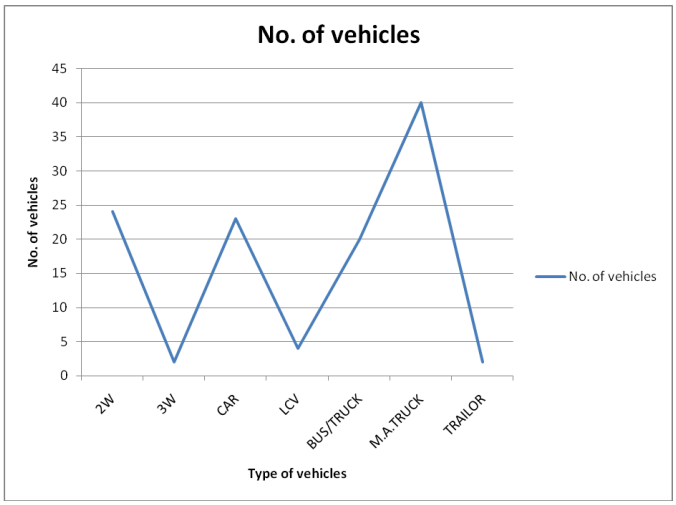


Chart-4. [Shamalaji to By-pass Number versus Type of vehicles Line graph]

HIGHWAY GEOMETRY

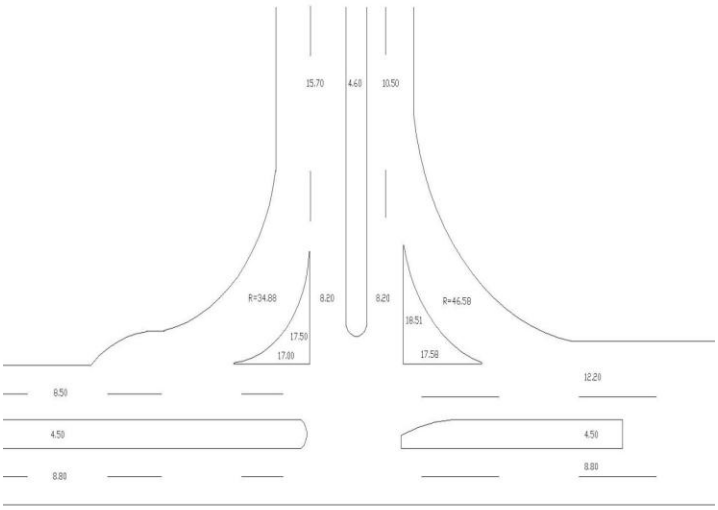


Figure 4.-[Existing T-junction geometry]

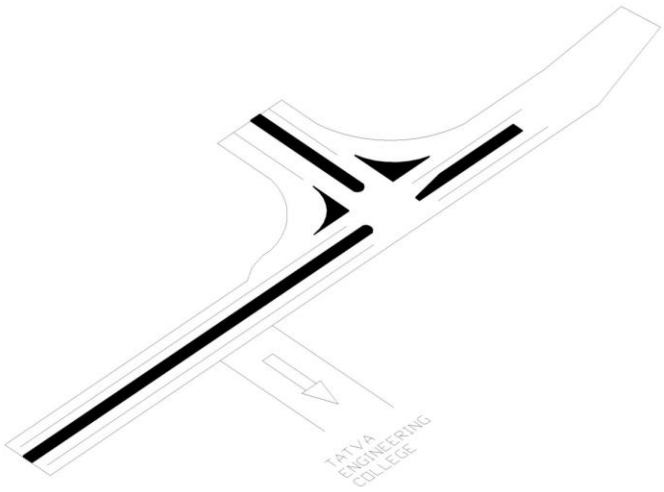


Figure 5.[3-Dimension plan of T-junction]

ACCIDENT DATA

Table-5. [Accident data on by-pass to shamalaji highway]

YEAR	2010-2014
No. of incidents	98
Fatal	45
Injured	199

CONCLUSION

The view of the junctions should be very clear to the drivers likewise the road should be designed. The speed of the vehicle will be reducing by various techniques like speed prediction models, speed separators, speed dividers are to be use in the junction areas

- Many people are affected from major accidents are reported and recorded for improving the good road safety improvement in India.
- By analysis the collection of data, We have been suggest the fly over one way two lane bridge on by-pass to shamalaji.
- We have been suggest the fly over bridge. So, Incidents will be minimized.
- And Traffic operation will be safe and smooth.
- The suggested fly over bridge will also carry the future traffic safely up to 20 years.

- We also suggest to design necessary infrastructural facilities with good architectural look of the fly over bridge.
- And another way shamalaji to by-pass on this T-junction super elevation and horizontal curve is good and proper required.
- And also on this T-junction another alternatives such as under-pass or widening of roads and separator is required to solve this incidents problem.

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