ROAD SAFETY AUDIT –IMPROVEMENT OF SH-10 IN GULBARGA DISTRICT OF STRETCH 135.85KM

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Abstract - *The traffic accidents in India are the biggest concerns as the number of registered vehicles are increasing every year at an abnormal distribution rate. The aim of this study is to reduce the number of traffic accidents for the considered arterial road which connects with almost every sub arterial roads in the city and this corridor serves as the only path to connect with neighboring states at a very short distance and time. The data was collected from Gulbarga Police Station with the permission from Assistant Commissioner of Police, Gulbarga District for a period of three years (2015, 2016, 2017). The data was stored in the form of writings in a data book called First Information Report (FIR). Each data was extracted manually from FIR. There were totally 670 cases during this study period. The risk of accidents likely to occur on the SH-10 from Maharashtra Border to Andhra Boarder via Aland, Gulbarga, Mulkhed, Sedam, in Gulbarga District for a length of 135.85 Km. The Accident black spot is a spot where accidents are repeatedly occur or a large number of occurred during a period of time . Black spot are identified and Develop the accident modeling by using partial Babkov safety coefficient factor in accident black spot locations. Design and preliminary counter measures in terms of redesign of junctions, safety measures at mid block section, street lighting, provision of rumble strips along the project corridor ,truck lay bay and bus bay designs were imported into auto cad software.*

Key Words: **ROAD SAFETY AUDIT(RSA), ROAD SAFETY SIGN BOARDS, VEHICLE TRAFFIC, ROAD ACCIDENTS, BLACK SPOTS, ROAD GEOMETRICS,BABKOV ANALYSIS etc...**

1. INTRODUCTION

The death toll of road accidents globally recorded in World Health Organization (WHO) 2014 statistics was 1.25 million. In 2013, middle and lower income countries suffered accidents of about 24.1 and 18.4 fatality per 100,000 population. Most of the victims of accidents belonged to vulnerable group such as motorcyclists, cyclists and pedestrians. In India, during the year 2013, over 137,000 were killed in road accidents. According to several statistics released by media, there is one death every four minutes in India and totally 1,214 crashes occur each and every day.

According to that study, deaths were underestimated by 5% and the number injured who needed treatment in hospitals was underestimated by more than a factor of two. In that study, the ratio of injured people reporting to hospitals versus those killed was 8% .An estimated 1,650,000 people were victimized in traffic crashes were hospitalized in 2006.

1.1 Purpose of Road Safety Audit

The purpose of this road safety audit is to assess the highway study section for any existing safety issues which could adversely affect the design, implementation and successful operation. The road safety audit provides an independent assessment of the existing roads, traffic operational situation, as well as assessment of any specific design or planning and concept changes, and urban development that will impact on the safety for all road users and institutional value for achieving an international highway standard; establish and maintaining a safety culture within the enforcement and health agencies; and draft awareness campaigns and education programs for local school curriculum, as well as local industry, and driver license training.

2. OBJECTIVES

The main aim of road safety audit is to upgrade SH-10 from Maharashtra Border to Andhra Boarder via Aland, Gulbarga, Mulkhed, Sedum, in Gulbarga District for a length of 135.85 Km such as install road furniture and road facility to desire level for road users. This means that accidental black spot should be minimized throughout the stretch and provides safety for the whole life cycle of road.

2. 1 Scope of the study

The following process will be adopted for road safety audit
- To conduct reconnaissance survey of the study area –SH10 Maharashtra to Andhra Pradesh border via Aland, Gulbarga, Mulkhed, Sedam in Gulbarga district.
- To conduct the topography survey to know existing land use of the study area.
- To conduct the road inventory survey only at accident black spot identified location.
- To conduct traffic volume count only at accident black spot location.
- Road safety audit finding to identify the issues during field visit.

- The collect secondary data-accident data has been collected from Gulbarga police for the past 3 years 2015,2016,2017 is has the combined data of all the state highways that come under Gulbarga district
- The accident black spot details were obtained for the study stretch from the police and road safety audit was carried at all this location.
- To conduct the accident analysis based on month ,year, time, collision type , vehicle patterns by using Microsoft excel .
- To determine the accident modelling by using babkov coefficient method.
- To redesign all the required drawings on the study stretch by using auto cad software.

3. METHODOLOGY

The process being adopted will involve

- Assessment of any design plans or specifications
- Draft a report on safety problems and risks
- Suggest design countermeasure alternatives for specific road sections or ultimate system solution measures, if feasible
- Report finalization, taking into consideration any comments and feedback.

Fig -1: Steps Involved In Road Safety Audit Road Safety Audit

3.1 Project Corridor

The Project Corridor State Highway-10(SH-10) connects from Maharashtra Border to Andhra Pradesh Border i.e., from Whagdhari to Ripponpalli. The SH-10 has been constructed on **BOT-VGF (Toll)** Basis for a length of 135.85 KM. The project corridor has been built by **M/s. GVRMP WHAGDHARI – RIPPONPALLY TOLLWAY PVT. LTD**. The project corridor has a Concession Period of **30 years with 2 years of construction Period and 28 Years of Operation & Maintenance period**.

The existing project corridor is a two lane carriageway has been designed for a designed speed of **80 Kmph** and has a Right Of Way (ROW) of about 15m from the center line of carriageway on either side of highway. The project corridor

has two sections, Section 1 stretch starts from Chainage 0 KM at Wagdari to Chainage 60.6 KM at Aland Check post and Section 2 stretch starts from Chainage 65.8 KM at Kharge Petrol Pump to Chainage 141.84 Km at Ripponpalli. Gulbarga City is located in between these two sections and has a municipal corporation road of length 5.2 KM from Aland Check post to Kharge Petrol Pump.

Fig -2: Study Area

3.2 Accident Black Spot Identification Location on SH-10

Black Spot is a stretch of round of about 500m in length in which either (a) five road accidents took place during the last three consecutive calendar years involving fatalities/grievous injuries or (b) Ten fatalities took place during the last three consecutive calendar years.

There are totally 16 Accident black spot have been identified on the study stretch, based on past three years of accident data i.e., from 2015 to 2017.Safety audit was carried at all these locations and the findings are detailed out in the table below section. All 16 locations are mapped for reference in and represented in the figure.

Fig -3: Accident Black Spot Key Map

4. DATA COLLECTION

Data has been collected for road safety audit –improvement of SH-10 from Maharashtra border to Andhra Pradesh border taking into consideration of primary and secondary data sources. Data which are based on field studies is Primary Data . Data which are collected for secondary sources like police station ,hospitals and some agencies.

4.1.1 Field Review

Following are the things to consider in field review

1. Geometric Attributes And Condition Of Road Way

2. Signs, Pavement Markings, Lighting

3. Road Users-All Possible Users and Their Needs

4.1.2 Accident Data Collection

Major of the accidents occurring in Gulbarga district are on State Highway-10 between Whagdhari and Ripponpalli. To improve the safety along these roads appropriate traffic control measures, safety devices and their strict enforcement is a prerequisite.

The First Information Report (FIR) data has been collected from the police stations which are coming under SH-10 project corridor for the last three year i.e., 2015, 2016 and 2017 to analyse the accident statistics and to find the black spot location.

4.1.2.1 Accidents by The Month

Accident occurrence could vary from month to month owing to seasonal variations etc. In the context of the present study, an analysis of the distribution of accidents over the 12 months has been done as in the following tables and figures.

Table -1: Accident Statistics of SH-10 Project Corridor Over The Month wise For Last Three Years (2015 to 2017).

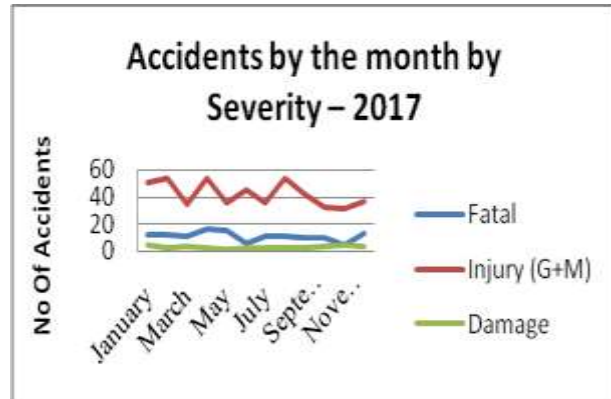| Accidents by the month by Severity – 2015,16,17			
Month	Fatal	Injury	Damage
January	12	51	84
February	12	54	73
March	11	34	94
April	16	54	72
May	15	35	74
June	5	45	84
July	11	35	64
August	11	54	68
September	10	42	69
October	9	32	88
November	4	31	60
December	13	36	66
Total	129	503	38

Chart-1: Comparison of accidents on month wise last 3 years

4.1.2.2 Accidents Severity on Sundays and other days

Traditionally, road crashes are seen to be proportionately related to traffic volumes. It is well noted that traffic volumes are less on Sundays when compared to working days.

Table -2: Accident comparison on Sundays and other days

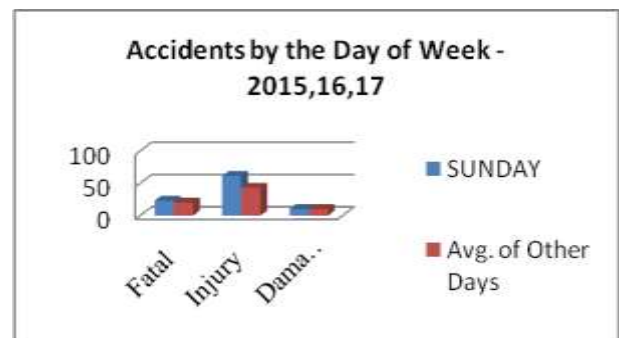| Accidents by the Day of Week – 2015,16,17		
	Sunday	Avg. of Other Days
Fatal	14	19.1
Injury	86	69.5
Damaged	5	5.5
Total	105	94.1

Chart-2: Comparison of accidents on Sundays and other days.

Fig -3: Accident Black Spot Key

4.1.2.3 Number of Vehicles Involved In The Accidents

Table -3: Number Of Vehicles Involved In The Accidents Along SH-10 Corridor.

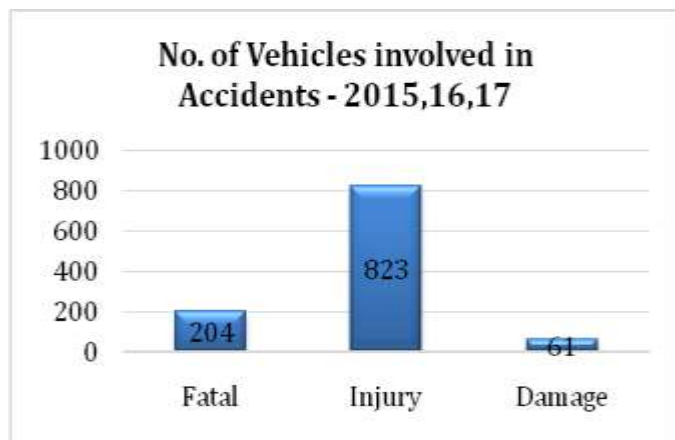| Vehicles involved in Accidents – 2015,16,17	
Accident Severity	No. of Vehicles involved
Fatal	204
Injury	823
Damage	61

Chart-3: Number of Vehicles Involved In The Accidents.

The total number of vehicles involved in accidents is about 1088. The proportion of vehicles involved in fatal and non-fatal accidents is 19 % and 81 % respectively.

4.1.2.4 Accident Casualties And Injuries

Table -4: Accident Casualty Injury By Casualty Class On SH-10 Corridor.

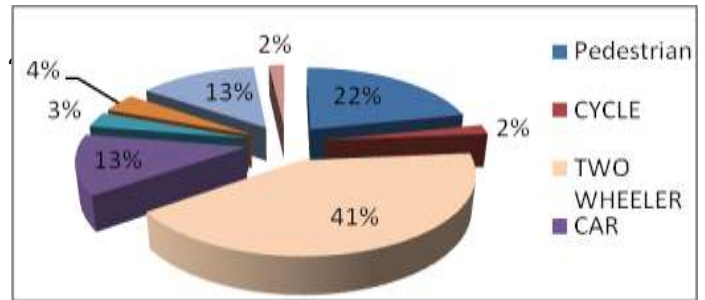| Casualty Class	Fatal	Non-Fatal
Pedestrian	33	54
Cycle	2	4
Two-wheeler	61	9
Car	9	21
Auto	7	8
Bus	0	2
Heavy Vehicles	1	13
Other	1	3

Chart-4: Graph Showing Casualty Injury By Casualty Class On SH-10 Corridor.

4.1.3 Accident Modelling

Safety co-efficients are obtained for different geometrical conditions, traffic conditions and pavement surface condition and the continuous product of partial safety co-efficients will give a Summary Accident co-efficient, according to *W.F Babkov*, a Russian researcher, who has done considerable work in the Soviet Union in areas such as design of streets, roads (urban/rural) and highways.
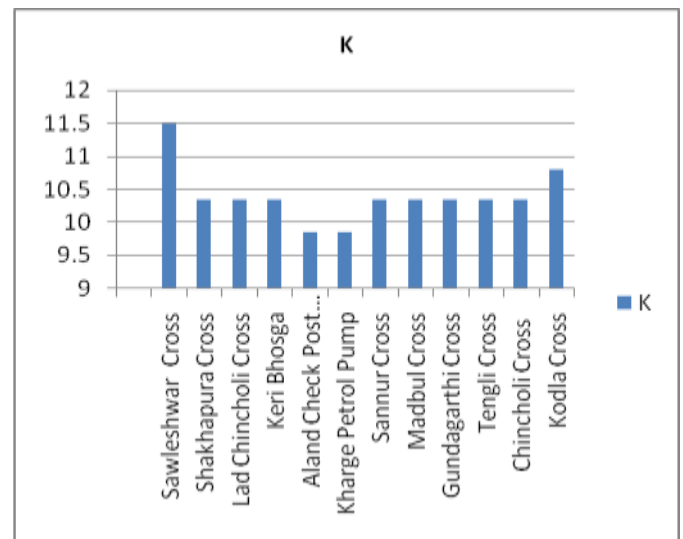

Chart-5: Graph Showing Accident histograms on Babkov coefficient K and road names of SH-10 corridor.

According to calculated Babkov, in a section if the total accident coefficient is less than 25-40 in road reconstruction. The safety co-efficients proposed by Babkov are categorized based on traffic volume i.e.vehicles per day.

5. CONCLUSION

- The audit has observed many hazardous locations on the stretch
- The countermeasures identified are based on the road safety audit findings
- Remedial measures have been suggested that would meet the objective of minimizing accident on the stretch
- The countermeasures identified need to be implemented in total, so that corridor to be in safe and also we are very sure that black spots identified is treated properly accident numbers will drastically reduce.
- The interventions suggested would also need continuous monitoring of progress and police enforcement by responsible agencies.
- The other aspect of education/awareness based intervention need to be combined with these engineering measures to attain a level of complete safety improvement specifically focused at the local level.
- Accident modelling by babkov coefficient method gives less than 25-40 in road reconstruction .
- The preliminary countermeasures identified in this report need to be detailed out in specific designs, including additional road safety auditing assessments.

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