

Study and Analysis of Accident Black Spots on SH-3, Madhugiri-Pavagada Road: A Case Study

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Abstract— Accident blackspot can be defined as it is a place where road accidents had historically concentrated due to variety of reasons include sharp drops, sudden curve in the straight road, hidden junction on the fast road, poor warning signs and poor visibility of lane markings on the cross road. The statistical analysis of the accident spots is carried out periodically at critical locations which help to take some suitable counter measures to efficiently decrease the rate of accidents. Statistical analysis is one of the mathematical approach for deciding severity level of the black spots from the accident data collected. These analysis reports have been maintained zone wise and have to be updated regularly. Present study is carried out in two phases in which Phase-I deals with collection of primary and secondary input data such as traffic volume count, accident records from police file, road users and local residents feedback etc. required for identifying black spots and to analyze accident severity level. Accident records along SH3 were collected from madhugiri, midigeshi and pavagada jurisdiction, traffic volume count and turning movement counts were carried out at Junctions Hosakere and S.S.K. from the accident records and road users feedback collected at various locations on SH3 six black spots were identified namely a) S.S.K Junction b) Kanive Narasimha Swamy temple c) Rajvanthi d)Bidarekere e) Chinnenahalli f) Hosakere junction. Second phase of this study focuses on carrying out statistical analysis as per accident rates, accident frequency and accident severity method to validate accident severity level at identified six black spot locations. In the present method of statistical analysis black spot identification is validated through three criteria i.e. accident rate, accident frequency and accident severity and the severity level at each black spot location is identified as low severity, medium severity and high severity based on number of criteria achieved at each black spot location. Present study is concluded with reasonable and workable remedial measures recommendation to reduce number of accidents and its severity for the identified black spot locations of SH3 study stretch.

Key words: Blackspot Identification, Accident Black Spots

I. INTRODUCTION

A. Back Ground

Accident black spot has been originated from the country U.K before computer generation by the local cops. They identified black spot by mounting the map of those particular locations on the wall and marked the points on the place where the accidents were repeatedly arrived. Hence they concluded when the marked points have been enlarged by repeated accidents and became blackest point on the map. They finally decided these spots as an accident black spot. The accident black spot can be derived as the places of

fatal or serious injury accidents are marked on the points of clustering are identified.

B. General

Accident black spot can be defined as it is a place where road accidents had historically concentrated due to variety of reasons include sharp drops, sudden curve in the straight road, hidden junction on the fast road, and poor warning signs poor visibility of lane markings on the cross road.

The statistical analysis of the accident spot is carried out periodically at critical locations which help to take some suitable counter measures to efficiently decrease the rate of accidents. Statistical analysis is a measure of number of accidents and severity of accidents. These reports have been maintained zone wise.

II. METHODOLOGY

Initially the accident black spots are identified from the accident data and report collected from local police stations of Pavagada, Midigeshi and Madhugiri jurisdiction.

Various traffic investigations were carried out on selected stretch to ascertain the present plying traffic along with the spot inspection of black spots to identify common causes of accidents and to inspect the geometric features at those black spot locations. The details at each black spot are collected in the prescribed format along with Photographs of each spot. In addition to traffic studies and spot inspection, an enquiry with local residents was also carried out to get the inputs for the analysis.

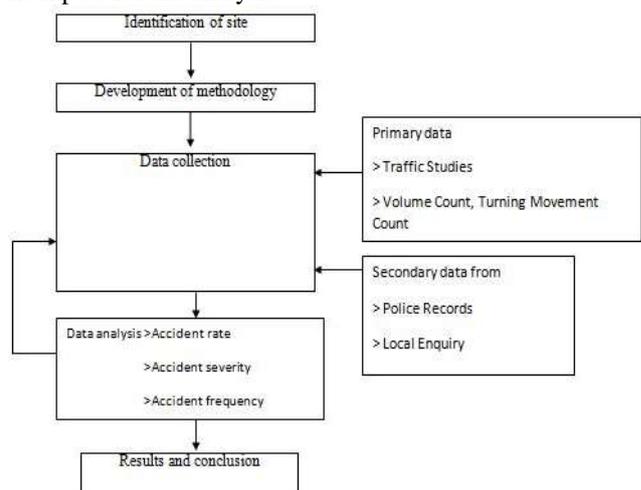


Fig. 1: Analysis

III. RESULTS AND DISCUSSION

A. Statistical Analysis of Blackspot Identification

The above details show the identification of black spot and severity by taking accidental rate, accidental frequency, and accidental severity of the black spot locations in to

consideration hence it represents the minimum, intermediate and maximum severity. If two methods satisfies the condition it shows the medium severity and three methods satisfies indicates maximum severity. From the table it shows all the spots in intermediate severity since it needs proper precaution measures.

Sl no	Blackspot	Accidental Rate		Accidental Frequency		Accidental severity		Severity level
		R_k	R_c	A_k	A_c	Q_k	Q_c	
1	SSK pavagada	0.75	0.730	9	3.02	9.67	8.723	Intermediate
2	Kanive Pavagada	0.8	0.756	8	2.76	8.285	8.016	Intermediate
3	Rajavanthi	0.777	0.766	7	2.41	6.625	9.080	Intermediate
4	Bidarekere	0.8	0.756	8	2.76	6.1	9.417	Intermediate
5	Chinnenahalli	0.777	0.766	7	2.41	6.42	9.212	Intermediate
6	Hoskere	0.5625	0.526	9	3.02	7.1111	8.768	Intermediate

Table 1: Identification of Black Spot by Various Methods

B. Traffic Volume Counts

Traffic volume counts are conducted to identify the total number of vehicles, vehicle movement, and classification of road way vehicles at a selected location, these data can help to identify flow time period, determine influence of large vehicles or pedestrian, on vehicular traffic flow. To identify the key issues associated with the decision making for accessibility on SH3 it is necessary to understand the nature of traffic before arriving at such decisions. Therefore classified volume counts for selecting the locations were conducted to understand the compositions and volume of traffic on SH 3. the traffic volume counts are carried between Madhugiri and Pavagada and it was carried out for 10 hours in a day from 8AM to 6PM on 14/5/2015 to 19/5/2015 to understand the traffic trends and a destination at both ends of state Highway is a historic place which attracts the many tourists.

The survey was carried by manual vehicle counts and classification for the vehicle passing through the survey point. The detail data of volume count is tabulated as given below

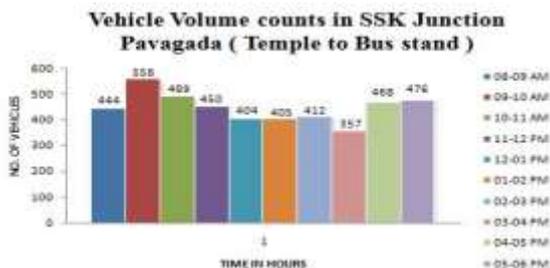


Fig. 3: Vehicle Volume counts in SSK Junction, Pavagada (temple to Bus stand)

C. Phase Diagram of Junctions

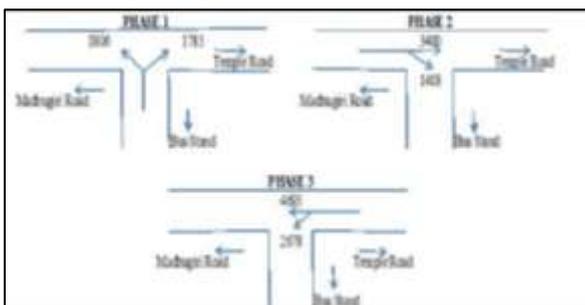


Fig. 2: Phase diagram of SSK Junction

The phase diagram represents the direction of moving vehicles at junctions, where we can find number of total vehicles in different directions. In this project there are two junction that is SSK and Hoskere, the below figure shows the complete details of movement of vehicles

IV. CONCLUSIONS

- 1) Data collected for the black spot analysis in the form of traffic investigations and accident records collected from the police stations are subjected to statistical analysis to identify severity level and following conclusions are drawn based on the analysis:
- 2) At each location morning peak hour traffic is observed between 8 am to 10 am and evening between 4pm to 6pm. It is evident from the traffic investigation and accident data that two wheelers constitutes the highest road user type on SH-3 and in this particular stretch the highest number of vehicle involved in the accidents are two wheelers, Busses and cars.
- 3) From the statistical analysis it was found that
 - Hoskere Junction experiences Intermediate Accident severity level
 - chinnenahalli village experiences Intermediate Accident severity level
 - Bidarekere experiences Intermediate Accident severity level
 - Rajavanthi curve experiences Intermediate Accident severity level
 - Kanive narasimha swamy location experiences Intermediate Accident severity level
 - S.S.K Junction experiences Intermediate Accident severity level
- 4) It also learnt from the study that the main causes for accidents are due to lack of direction signs to guide the drivers/riders on the path, islands for deviating the vehicle in a systematic way, absence of median, lane marking, guide posts in the curves, warning signs, speed restriction signs, speed breakers, proper gateway.

V. RECOMMENDED MEASURES

A. Blackspot: S.S.K Junction, Pavagada



Fig. 4: View of S.S.K junction.

This is a T intersection located in the town of Pavagada. This intersection is not scientifically designed there are no direction signs to direct drivers/riders on the path and there is no control system to ensure systematic movement of traffic.

B. Safety Issues:

The Highway passes through this town has no divided road this leads to a large "unmanaged" area at the intersection that permits drivers/riders to cut the corner and to drive on the wrong side of the Highway. Such "wrong way" movements coupled with a wide range of movements of the movements by pedestrians and slow moving small vehicles creates many conflicts points. When coupled with occasional fast moving, large through vehicles there is a high risk of collisions. There is a need for line marking, and for conspicuous advanced direction signs on each approach.

C. Recommended Countermeasures

- Reduce the opportunity for wrong way traffic movements by re-channelizing this intersection.
- Scientific provision of median which gives modified intersection that gives priority to the Highway.
- Proper marking lane lines along the Highway should be provided.
- Install large advanced direction signs on each approach.
- Island should be preferred.
- Speed restriction signs are recommended.
- Provision of speed breakers.

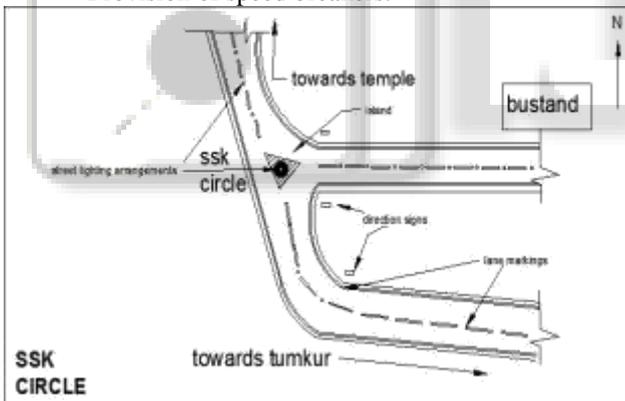


Fig. 5: Typical Junction Improvements Drawing at S.S.K

REFERENCES

- [1] Mr. Phillip Jordan, 2013, investigation of black spot on state Highway 23 between Raichur and Bagalkot road.
- [2] Mr. Phillip Jordan, 2013, investigation of black spot on state Highway 25 between Hosapet to Shimoga in central Karnataka Region.
- [3] Snehal u nobade jalindar r patil, raviraj rsorate.april, 2002, identification of accidental black spots on National Highway and expressways.
- [4] Santosh jalihal T.S. reddy B. srinivas rao E. Madhu, 2005 investigated on Accident study on National Highway - 5 between Anakapalli to Visakhapatnam.
- [5] Parikh Vaidehi Ashokbhai and Dr. A.M.Jain, 2014 they made study on Road safety audit to Development of an accidental model for urban area.

- [6] Hauer, 2002, observation before-after study in road safety.
- [7] S.K Khanna, C.E.G justo and A Veeraragavan, 10th revised edition 2014.
- [8] Suchitra, 2014, Black spot investigation.