

Black Spot Analysis in Davangere City

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Abstract— To identify the reason that leads a particular stretch of Davangere Road, an accidental prone area and to provide the helpful information. To find out the black spot on Davangere to Hadadi Road. The high accident rate is largely considered to the inadequacy of the highways and other main roads to meet the traffic demands, road user behaviour, vehicular defects, poor road geometrics and inadequate visibility. Road accidents result in heavy wealth loss to the country. IRC SP 88: 2010 has been considered for the provision of road safety. The data provided or gathered from the police station is not sufficient because some F.I.Rs has been missing and some of them have not been registered because of the compromise between the two parties.

Key words: Black Spot

I. INTRODUCTION

Black spot is a place on a road that is considered to be dangerous because several accidents have happened there. Accidents happened their because of variety of reasons, such as a sharp curves in a straight road, so oncoming traffic is concealed, if design of junction are not proper on a fast road, poor or concealed warning signs at a cross-roads. Accident black spots can be improve by improving the signage, speed restrictions, improving sightlines, straightening bends etc. 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, 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 helps 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. The increase in the number of motor vehicles is due to the growth of population and fastly growth of technology and economics. As the mobility increases, the probability of accidents also increases. The basic elements in traffic accidents are road users, vehicles, road and its condition, road geometry and environmental factors etc. The fatality rate is more in developing countries as compare to developed countries. The main cause of road accidents are drunken driving, careless and rash driving, over speeding, sudden braking, skidding, traffic rule violation, sudden twists and turns while driving etc..Moreover, road accidents can affect 1% of annual gross product resources of the developing countries.

II. OBJECTIVES AND SCOPE

The Aim of the present study is to Analyze the Accident Blackspots in Davangere City. Analyzing the High risk accident spots or Blackspots from Engineering point of view

and developing a low cost effective counter measures for those selected spots is a major objective of this study.

The accident black spot are identified from the accident report collected from local police stations of Davangere city.

The blackspot spot has been identified using data

1) *Hadadi Road Under bridge (4.0 km from the Davangere Railway Station)*

This Black spot is considered for present study.

III. METHODOLOGY

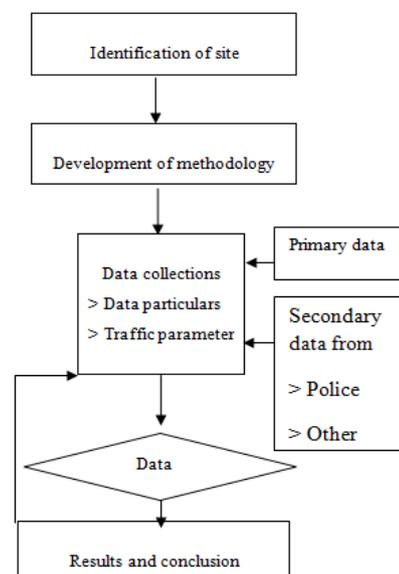
A. Identification of Blackspot

Inspections were made in Davangere City and its surrounding areas from Monday 26th march to 29th April. The Road was driven in both directions. The inspection is conducted on this Roads at designated blackspots and other identified locations. The Photographs of each spot have been taken during the inspection for the further future study. Discussions were made with local residents for further clarification and information of those spots.

B. Data collection

- 1) In the initial stage in order to identify the blackspots, it is very necessary to collect statistical report of that particular stretch. Hence the Two years accidental report is collected from the Southern police station Davangere. From that report we got vehicles involved, fatal, injuries and time of different places.
- 2) In the next step traffic volume survey is conducted by us and the inspections took place during hot dry weather in day light hours from morning 8am to 6pm in all identified blackspots in order to know the flow and density of vehicles in different durations.

C. Flow Chart



IV. RESULTS & DISCUSSIONS

As explained in the methodology this is the fourth step in this present work, to collect the data required. The different procedures required for data collection is based on the objectives, this detailed study explained in the following data.

A. Accidental Blackspot



Fig. 1: Accidental Blackspot Hadadi under Bridge, Davangere

Above shown Figure is one of the accident location in Hadadi Under Bridge, Davangere. As it is shown, it is a T-junction three legged road where there is no proper signal, lane markings which often confuses for road users and creating obstructions for the easy flow of traffic.

B. Google Map Locations of the Identified Blackspot

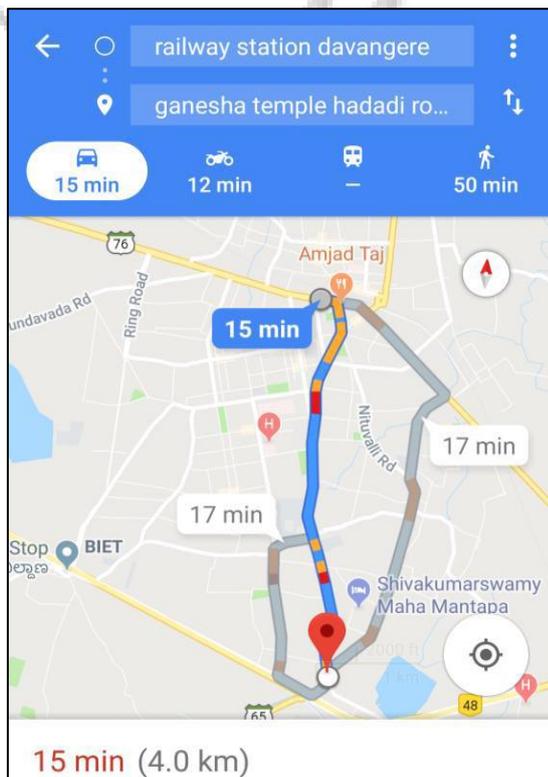


Fig. 2: Hadadi Road Under Bridge

C. Traffic Data Collection

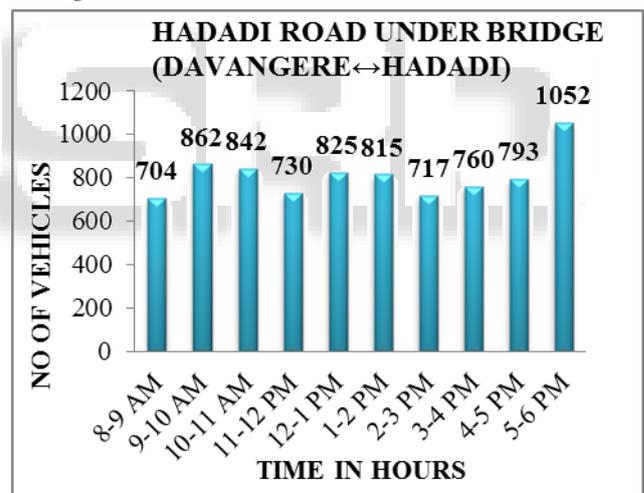
It was necessary to gather traffic data on different parameters in order to understand the nature, type and composition of traffic for analyzing the accident black spot for a given traffic. Therefore survey has been conducted to gathering the data. The traffic survey were conducted at junction and curves for detailed study. Hence the traffic volume count survey has been conducted.

D. Traffic Volume Counts

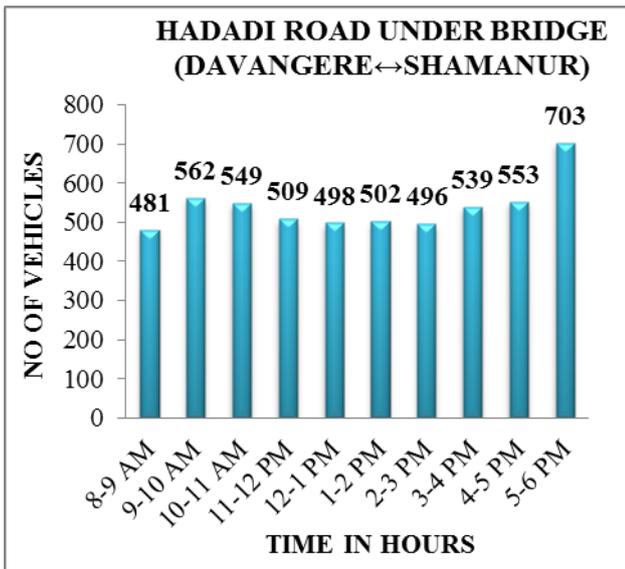
Traffic volume counts are conducted to identify the total number of vehicles, vehicle movement, and classification of road way vehicles at a selected location, these data can help to identify flow time period, determine influence of large vehicles or pedestrian, on vehicular traffic flow. To identify the key issues associated with the decision making for accessibility on Davangere City 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 in Davangere City.

The traffic volume counts are carried in Davangere City and it was carried out for 10 hours in a day from 8 AM to 6 PM on 26th March to understand the traffic trends and a destination.

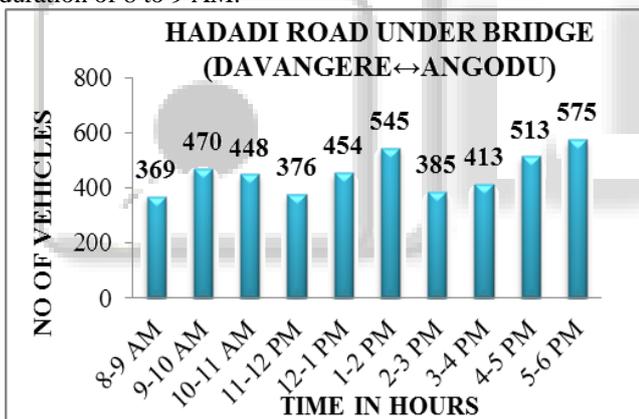
E. Charts: Vehicle Volume counts in Hadadi under Bridge, Davangere



The above Chart gives a clear picture of volume composition of vehicles which moves in the direction of Davangere Railway Station to Shamanur, during volume count survey. From the above chart We found that the maximum no. of vehicle traveled in the time duration from 5 PM to 6 PM and the volume of vehicles got reduced in the afternoon sessions, at the end of the day again it got increased. Hence 9 to 10 AM and 5 to 6 PM are the peak hours and the minimum no. of vehicles traveled in the time duration of 8 to 9 AM.



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F. Collection of Accident Data

The objective of the study to improve the ideal access control is necessary to road accidental detail collection of the study site, to know the nature of accidents which would indirectly explained the problems which were making the road unsafe to travel. With regards to this, road accident particulars were collected from local police station Davangere City, which are responsible for recording the accident data for the current study site.

The police reported accident data was collected from the police stations for Two years from 2016 and 2017 which includes the study area. The accident data collected from Davangere about 5 Km of distance which was needed to select the detailed study area of short distances.

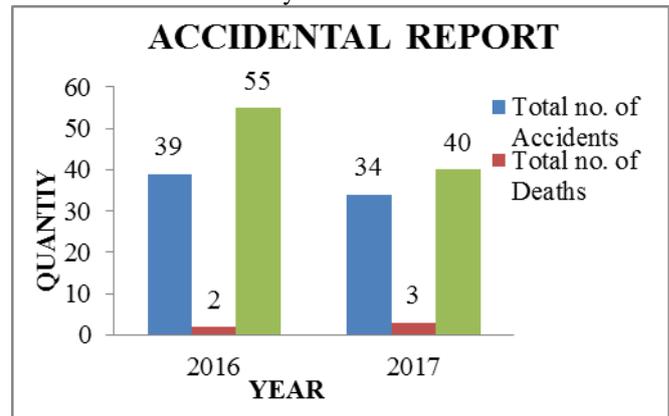


Chart Accident trend on Davangere city

The summary accident detailed been shown in Figure. Total no. of accidents to be stable after the initial increase in the year 2016. While the total no of death rate in the year 2016 was slightly high but has reduced in the year 2017 and the injury rate appears as to have decreased and is stable over the 2 years.

There was no clear indication of the causes for the accident in the data collected in the police station but after the gradual conversation with respective police whose jurisdiction covers the area, it was clear that Lack of signals, Islands, lane markings, unscientific road humps, over speed of the vehicles, sign boards, reflective signs were the main causes for the accidents. peoples who are from the local acquires the property of the road, parking vehicles with in the section and improper crossing by the pedestrians results in overall accidents found on the particular section.

Year	Accidental Block Spot	No. of Accidents	Total no. of Injured
2016	Hadadi Under Bridge	22	29
2017	Hadadi Under Bridge	12	15

Table 1: Summary of accidents in Davangere

G. Identification of Accidental Black Spot by Considering Rate of Accidents

Hadadi Under Bridge

A. Based on Accident rate point of view

$A_j = \text{Total no of Accidents} = 12$

$M_j = \text{Total no of vehicles involved} = 14$

$R_j = A_j / M_j = 12/14 = 0.857$

Block spot are considered on Based on Accident rate point of view

if value of $R_j > R_c$

where, $R_c = \lambda + k_\alpha \sqrt{(\lambda/M_j)} - 0.5/M_j$

$k_\alpha = 1.282$ is a constant

$\lambda = \sum_{i=0}^n A_i / \sum_{i=0}^n M_i = 34/55 = 0.618$

$R_c = 0.618 + 1.282 \sqrt{0.618/14} - 0.5/17 = 0.834$

$R_j > R_c = 0.857 > 0.834$

Hence $R_j > R_c$, Hadidi Under bridge is consider to be black spot

B. Based On Accident Frequency Point Of View

According to this theory the value of $A_j > A_c$
 where $A_c = F_{avg} + k_{\alpha} \sqrt{F_{avg}/L_j - 0.5/L_j}$
 where, A_c = critical value for accident frequency
 L_j = length of road section assumed to be 0.5 km
 F_{avg} = Average accident frequency for all road section
 F_{avg} = no of accidents / no of years = $34/2 = 17$
 $A_c = 17 + 1.282\sqrt{17/1 - 0.5/0.5} = 21.28$
 $T.A_j > A_c = 34 > 21.28$
 Hence $T.A_j > A_c$, Hadidi Under bridge considered to be a Black spot

C. Based on Accidental Severity Point of View
 According to this theory the severity value of road section can be calculated as below

condition= $Q_j > Q_c$
 Where Q_c is the critical value
 The severity $S_j = (f \times 9) + (i \times 3) + (d \times 1)$
 Where, f = no of fatal= 1
 i = no if injury= 15
 d = no of damaged vehicles= 19

$S_j = (1 \times 9) + (15 \times 3) + (19 \times 1) = 73$
 $A_j = 12$
 $Q_j = S_j / A_j, 73/12 = 6.08$
 $Q_{avg} = \sum_{i=1}^n S_i / \sum_{i=1}^n A_i$
 $2016 S_i = (0 \times 9) + (29 \times 3) + (37 \times 1) = 124$
 $2017 S_i = (1 \times 9) + (15 \times 3) + (19 \times 1) = 93$

Total $\sum S_i = 217, \sum A_j = 34$
 $Q_{avg} = \sum S_i / \sum A_j = 217/34 = 6.38$
 $Q_c = Q_{avg} + k_{\alpha} \sqrt{\phi^2 - 0.5}$
 $\phi^2 = 1/n - 1 \sum_{j=1}^n (Q_j - Q_{avg})^2$
 $\phi^2 = (1/2 - 1) \times (6.08 - 6.38)^2 = 0.09$
 where , Q_i = no of Accidents
 Q_{avg} = the average rate of accidents for 2 years
 $Q_c = 6.38 + 1.282 \sqrt{0.09 - 0.5} = 6.26$
 $Q_j > Q_c, 6.26 > 6.08$

Hence, Hadidi Under Bridge Consider to be black spot.

H. Safety issues

The Roadway passes through this town as 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 Roadway. Such "wrong way" movements coupled with a wide range of 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.
 View of Hadadi Road Underbridge, Davangere



Fig. 2: View of Hadadi under Bridge

I. 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 Roadway.
- Proper marking lane lines along the Roadway should be provided.
- Install large advanced direction signs on each approach.
- Island should be preferred.
- Speed restriction signs are recommended.
- Non availability of speed breakers.
- Direction signs are recommended.

V. CONCLUSIONS

- Present study focused on the accident blackspot in Davanagere stretch having 5 km chainage. the present work was analyzed by statistical method which includes vehicle volume count survey.
- From the present study it can be concluded that it is very necessary to provide lot of scientific precautions should be followed on the respective blackspots.
- As a Highway engineer student I recommended some scientific precautionary measures on respective blackspot based on nature of path.

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