Black Spot Analysis on NH-21A

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Abstract

Objectives: To identify the reason that leads a particular stretch of National Highway an accidental prone area and to provide the helpful information. To find out the black spot on NH-21A from BADDI to NALAGARH. **Methods:** Data taken from PWD and FIR's have been analyzed and places were identified where maximum accidents occurred. IRC 53:1982 has been adopted for drawing the condition and collision diagram of the particular accident location. Peak hour traffic volume data has been collected. IRC SP 88: 2010 has been considered for the provision of road safety. A1 and A4 forms have been filled. **Findings:** 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. A1 form was not filled by the police and on the basis of that A4 form has to be filled which was also not filled. If all of this information made available in the police station, then the accident rate should have been reduced. After doing this study and gathering the data, it will be helpful in reducing the accident rate on that particular stretch. PWD do their work in more consolidated manner. Police are aware of the area prone for accident and they should keep check on it to reduce the accident rate. Proper sign board and lighting system should be installed at T junction and intersection points as it will also reduce accident rate. **Improvements:** Collecting such data in consolidated manner will help police department to take necessary steps in reducing accident rate. It will also help PWD while maintaining the road.

Keywords: Accident Rate, Case Studies, Collision Diagrams, Condition Diagrams, F.I.R Data

1. Introduction

Our objective of doing this research was to identify the reason that leads a particular stretch of National Highway an accidental prone area and to provide the helpful information which will further help to control the rate of accident on that particular stretch. For this, data was collected by studying 700 F.I.R's of 5 years from 2009-2014 to find out the black spot locations on NH-21A. After compiling the data, 5 black spots were noticed from which three were T-junctions and two were intersections where maximum accidents took place. In road safety management, an accident black spot is a place where road traffic accidents have historically been concentrated. It may have occurred for a variety of reasons, such as a sharp drop or corner in a straight road, so oncoming traffic is concealed, a hidden junction on a fast road, poor or concealed warning signs at a cross-road. Black spot is that particular place at which maximum accidents takes place. We have selected National Highway 21Afrom Baddi to Nalagarh for our black spot analysis research, as the traffic volume at this particular stretch is too high due to the existence of industrial area. Till now no research had been done for the analysis of black spot at this particular stretch.

According to[1], for the development and improvement of highway nets, the road safety should be considered and improved at the same time. Otherwise, road safety situation will get to be worse and accident rate will increase. Analysis on accident causes and characteristics of black spots indicated that unreasonable highway features and traffic devices are certainly the factors affecting road safety. Typical blackspots were found for Chinese highway, which are that with poor highway alignment or with insufficient sight distance, intersections and interchanges, Access/exit, ramps, bridge and tunnel constructions, pass-by section.

According to[2], the road accidents are considered as one of the top three public health problems in Thailand. Despite the Government's best efforts in recent years, unfortunately, there are still over 12,000 deaths and more than one million injuries each year as the result of road accidents, with several hundred thousand people disabled. This article discussed two main approaches to identify black spot location currently practiced in Thailand. The first one is a classical approach which relies on the historical accident occurrence. Several methods such as accident number, accident rate, quality control approach, and severity index are addressed. The second approach is proposed as an alternative approach to identify black spot when accident data are limited or not available at the site. For this method, the public participation tactics is utilized to gather public input locations to identify the potential black spot locations.

2. Methodology and Analysis

2.1 Collection of Data[3]

The F.I.R records for the past 5 years were collected from the Baddi Police Station. As the project emphasised on the black spots located on N.H-21A, the FIR's were shunted accordingly. Accident data was also collected from P.W.D. Nalagarh. The data provided by them did not specified chainage of the location so the black spots were identified by compiling the F.I.R's and the accident data. The locations with maximum number of accidents with respect to severity of accidents (i.e., fatal, major and minor) were shortlisted. The shortlisted places were analysed and various causes for accidents were noted. The following data is based on the F.I.R records of the year 2014.

2.2 Traffic Data Collection

Traffic volume data is studied to collect the information about various aspects of traffic that includes type of vehicles, direction of flow of traffic, and intensity of traffic at a given point etc[4]. The traffic volume data was collected at the peak hours of the day, on the black spots that were identified by manual count method[5].

2.3 Collision Diagrams

The main objective of making the crash diagram is to know that what kind or type of accidents is occurring at the black spot[6]. Crash points were identified on the road

stretch by studying the FIRs collected from police station and then crash diagrams were made by analyzing the information given in the FIRs[7]. These collision diagrams are shown in results.

2.4 Attributes

Here each data is obtained from the police station through R.T.I of different F.I.R lodge, geometrical, construction details from P.W.D[8] and the data that has been collected from F.I.R's has been given in Figure 5 and are listed below.

- User identification number.
- Police station limit.
- Month and date of occurrence.
- Time of occurrence.
- Exact area of occurrence.
- Type of accident.
- Type of injury.
- Type of vehicle involved.

3. Results

On the basis of FIR records and PWD data, the following black spot locations were finalised given in Table 3. These points had been finalised after studying the F.I.R data[9]. Maximum accident has been occurred at these particular points.

3.1 Collision Diagram

Crash points were identified on the road stretch by studying the FIRs collected from police station and then crash diagrams were made by analyzing the information given in the FIRs[10,11]. The different type of incidents occurred on this stretch has been shown in Figure 1 and the location of accidents are described in Table 1.
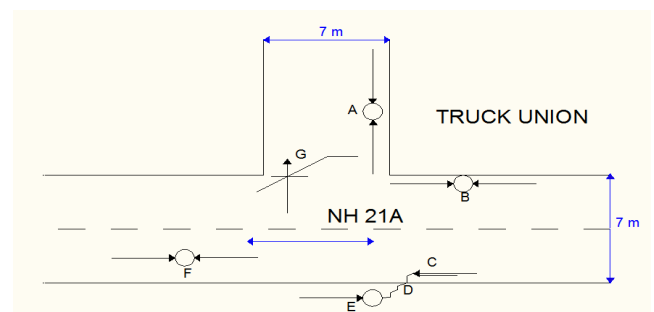

Figure 1. Accident collision diagram at truck union.

Table 1. Accident collision location at truck union

Locations	Category of accident
A	Fatal accidents
B	Person injury
C	Side swipe
D	Out of control
E	Personal injury
F	Fatal accident
G	Rear and collision

According to Figure 1, point A shows the spot where maximum fatal accident took place, point B shows the spot where maximum single person injuries occurred, point C shows the spot which leads to various side swipes, point D shows the spot where maximum vehicles lost their control, point E shows the spot where maximum personal injuries occurred, point F shows the spot which leads to various rear end collisions.

According to Figure 2, point A shows the spot where maximum personal injuries took place, point B shows the spot where maximum rear end collisions occurred with parked vehicles and out of control vehicles, point C shows spot where maximum fatal accident occurred. The Figure 2 shows that different type of incident occur on the specified location and location of accidents are described in Table 2.
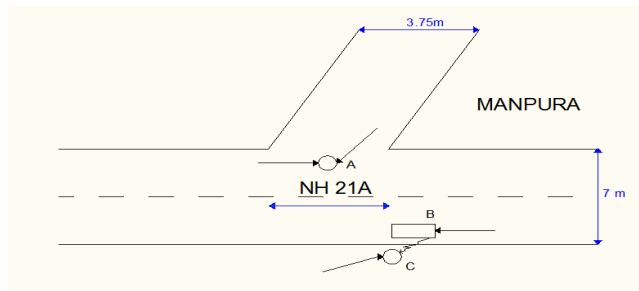

Figure 2. Accident collision diagram at Manpura.

Table 2. Accident collision location at Manpura

Locations	Category of accident
A	Personal injury
B	Rear end collision with Parked vehicle and out Of control
C	Fatal accident

Figure 3 shows the analysis on categories of accidents. Three categories have been discussed in which maxi-

mum fatal and minor accidents occurred at truck union Sandholi and major accidents occurred at Kishanpura-Manpura. The number of accidents observed at the specified location was shown in Figure 3. Table 3 provides the identification of black spots.
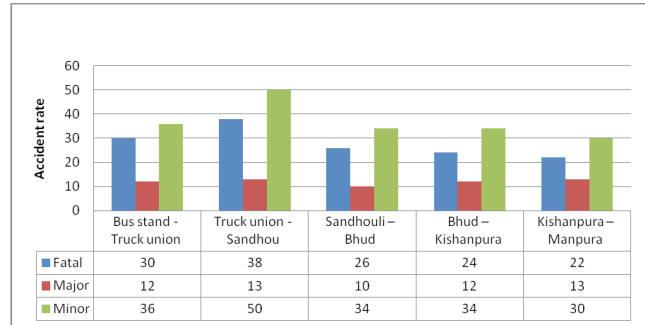

	Bus stand - Truck union	Truck union - Sandhou	Sandhouli – Bhud	Bhud – Kishanpura	Kishanpura – Manpura
Fatal	30	38	26	24	22
Major	12	13	10	12	13
Minor	36	50	34	34	30

Figure 3. Location of accident spot.

Table 3. Identification of black spots

Sr. no	Location	Number of Black spots
1	Bus stand - Truck union	1
2	Truck union - Sandhouli	1
3	Sandhouli – Bhud	1
4	Bhud – Kishanpura	1
5	Kishanpura – Manpura	1

Figure 4 shows the numbers of vehicle passes during a 24 hours survey at the specified location. This road is interconnected to three states Himachal, Punjab, Haryana as well as there is a well established industrial area Baddi to Nalagarh along this stretch which leads to maximum movement of trucks.

Figure 5 shows a FIR report registered under IPC act 1860 and motor vehicle act, 1988 which consists a complaint of an accident which took place at T-point, Sairoad Baddiin which one female lost her life.
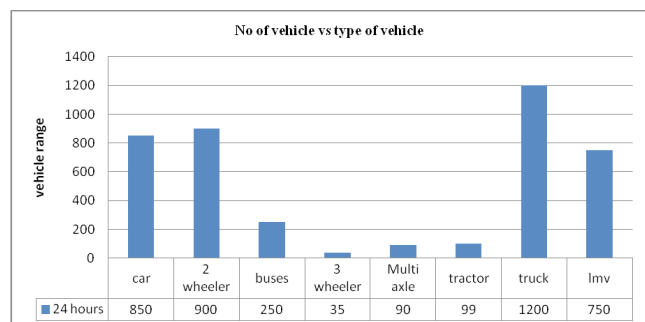

	car	2 wheeler	buses	3 wheeler	Multi axle	tractor	truck	lmv
24 hours	850	900	250	35	90	99	1200	750

Figure 4. Number of vehicle Vs type of vehicle.

Table 4. Remedial measures

| Accidents black spots on NH 21A (from km 0 to 12)	Causes of Accident	Remedial measures according to IRC: SP:88-2010
Km 0 to 12	Traffic volume is high and mixed.	Actually the road policy of Indian road congress is adopted all through the country. The constructional method of road system should be adopted as per the situation and environment all over the country.
	High speed vehicle	Installation of speed breakers on SH and on NH construct bypass.
	Drink and drive	Precautions
	Over taking	Drive according to design speed and installation of road signs as per IRC recommendation.
	High beam	Always prefer to drive on low beam.
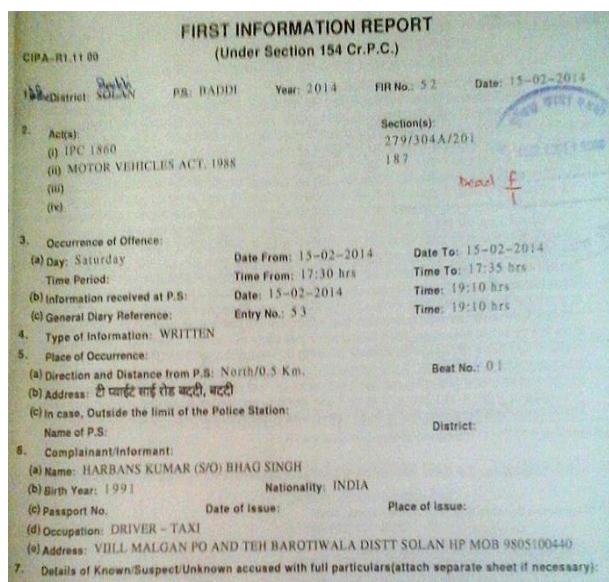
Figure 5. F.I.R report.

Table 4 shows the causes of accident in the survey on NH 21A from km 0 to 12 and their remedial measures according to IRC: SP:88-2010.

4. Conclusion

Most of the road accidents occur due to heavy vehicles and two wheelers. Accidents due to two wheelers are fatal and number of accidents is also more, as compared to other mode of transportation. In our opinion, PWD data needs to be gathered in a more consolidated manner. As all the black spots are identified on the national highway, consider it is observed that the accidents are widely due to the following reasons:-

- Over speeding- Due to design speed limit of NH.
- Narrow bridges- Due to less span of the bridges.
- Absence of railing on the bridges.
- Heavy traffic movement-Volume of vehicle is high as compared design of the road.
- Due the Absence of pedestrian path.

An efficient traffic control system would reduce the number of accidents. Analysis of these black spots and other relevant data will also be shared with the police department for the uplift and betterment of the society.

- PWD data needs to be gathered in a more consolidated manner.
- FIR data taken from police should be in a very detailed and comprehensive manner.
- Every state should have an engineering team with highly qualified engineers who can study the technical aspects of accidents and suggest the appropriate measures.
- The movement and parking of trucks needs to be carefully checked and managed.
- A1 and A4 form given in IRC: 53 1982 has not been filled by police.
- A1 and A4 form give the full detail about the individual and yearly accident occurred in that particular area.

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