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Road Accident Analysis and Identification of Black Spots on Jammu-Akhnoor (J&K) State Highway

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ABSTRACT: The problem of road accidents is very acute in highway transportation due to complex flow pattern of vehicular traffic, presence of mixed traffic along with pedestrians. Traffic accidents lead to loss of life and property. Thus the traffic engineers have to undertake the responsibility for providing safe traffic movements to the road users and ensure their safety. In this paper, an effort is made to identify the black spots on 18 km stretch between Jewel and Akhnoor in Jammu and Kashmir. The reasons for the accidents can be attributed to the lack of signage, raised median cover with trees/bushes making pedestrians not visible to the driver, improper design of pedestrian crossing, frequent median openings, and lack of enforcement to control wrong side movements. Proper investigation of the cause of accidents was carried out and the data was analyzed. Finally new plan for each hotspot was proposed after interpretation of all the shortcomings.

KEYWORDS: Black spot, Average severity Index, Threshold value.

I. INTRODUCTION

Accidents, tragically, are not often due to ignorance, but are due to carelessness, thoughtlessness and over confidence. Human, vehicle and environmental factors play equal roles during, before and after trauma event. Accidents, therefore, can be suited in terms of agent, host and environmental factors and epidemiologically classified into time, place and person distribution. For this reason systematic study of traffic accidents are required to be carried out. Proper investigation of the cause of accidents will help to propose preventive measures in terms of design and control. 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, hidden junction on a fast road, poor or concealed warning signs at a cross roads.

For some decades treatment of accidents black spots e.g. by signage, speed, restrictions improving sight lines, straightening bends or speed cameras was main stay of road safety policy, but current thinking has it that the benefits of these interventions are often overstated. Effects such as regression to the mean, risk compensation and accident migration combine to reduce the overall benefits. Black spots are road locations that have a record of large number of accidents. The section of state highway between Jewel to Akhnoor is unsafe at some spots from safety point of view. The main reason is heavy traffic, which has direct access to it, which results in congestion and accidents. We have found 5 black spots in the stretch of road from jewel to Akhnoor. These are PulliAkhnoor, Paloura, Purkhoo, Mishriwala and BaweTalab.

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II. ROAD ACCIDENT SCENARIO IN INDIA

India has a road network for 3.3 million km consisting of national highway, state highway, major district roads and other district roads. National highways constitute 2% of the total road length and carries more than 40% of passenger traffic and 85% of goods traffic has registered more accidents accounting for 20% as compared to other roads. Analysis of previous data indicates that 66% of the accidents occur due to human error and 33% due to road parameters such as road and vehicle interaction, other road user and environmental factors.

The spectacular growth in the road transportation sector in India has been a key element in the economic development. In the country, more than 70,000 people die and nearly 4 lakh persons are injured in about 3 lakh and more road accidents every year. India's motor vehicle population is just 1% of the world's but its share of world road traffic accidents is 6%. Even though it can be observed that the accident rate has been steadily decreasing over the past 25 years, the accident rate is still very high as compared to the developed nations.

III. ACCIDENT STUDY IN JAMMU & KASHMIR

This paper lays emphasis on accident studies on the 18km long state road between Jewel and Akhnoor, in the state of J&K, India. We have undertaken a study on the road between Jewel to Akhnoor during the year 2014-2015 and it runs through urban, semi-urban and rural areas. The accident data for the last one year was collected from the concerned police stations and analyzed thereafter. The data revealed that 9 deaths and 163 injuries were recorded between January to December 2014. The analysis of the data from safety point of view indicated that the vehicle drivers are the single major factor responsible for the accidents as they fail to perceive the situation ahead because of poor reflexes, fatigue, inexperience or being under the influence of toxicants. The accident data for the section indicated that two wheelers are the ones who mainly suffer the fatalities and major injuries, which is around 35% followed by trucks 23% involved in accidents. Representation of various vehicles responsible for accident, shown in figure 1.

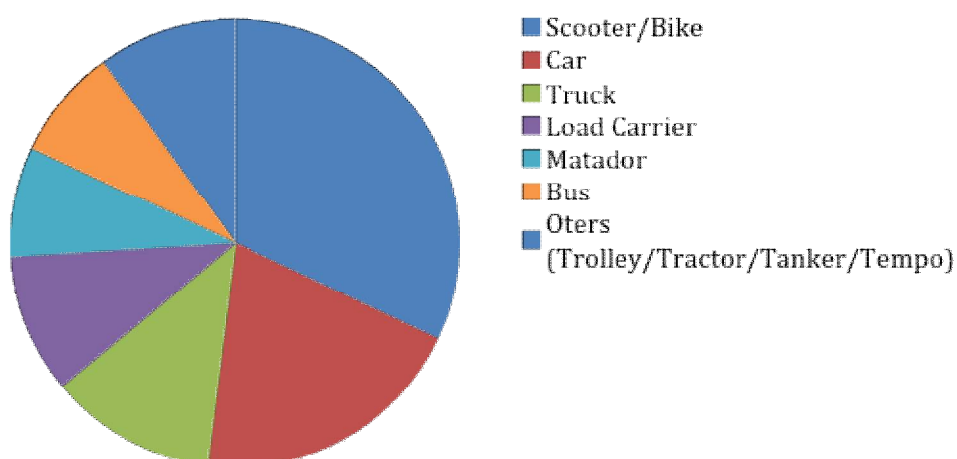


Figure 1: Representation of different vehicles responsible for accident

The reasons for the accident can be attributed to the lack of signage, raised median cover with trees/bushes, making pedestrians not visible to driver, improper design of pedestrian crossing, frequent median openings and lack of enforcement to control wrong side movements. There are however, other factors, which contribute directly or indirectly to the accidents include road, vehicle, road user and environmental factors.

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IV. EXPERIMENTAL INVESTIGATIONS

ANALYSIS OF TRAFFIC DATA: The section of State Highway caters to various type of traffic such as urban, sub-urban and regional traffic. The development along the highway indicates that land use on both sides of the highway is mixed with urban and rural and mainly consist of commercial, residential and industrial establishments (such as brick kilns, FCI godown, BSF camp, colleges etc.)

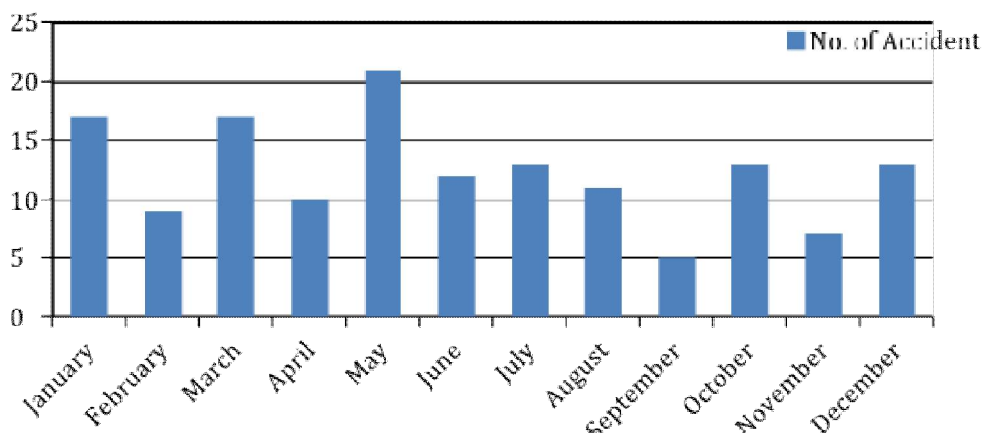


Figure 2: Monthly representation of accidents

NOMENCLATURE:

A (Accident Location)	Urban/Rural and detail of surrounding land use
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Code	B (Nature of accident)	C (Classification of accident)	D (Causes)	E (Road Feature)	F (Road Condition)	G (Intersection type & control)	H (Weather Condition)
1	Over Turning	Fatal	Drunken	Single lane	Straight road	T-junction	Fine
2	Head on collision	Grievous Injury	Over speeding	Two lane	Slight curve	Y-junction	Fog
3	Rear end coll.	Minor injury	Vehicle out of control	Three lane without divider	Sharpe curve	Four arm junction	Cloud
4	Collision side wipe	Non-injury	Fault of driver	Four lane without divider	Flat road	Staggered junction	Light rain
5	Turn collision	-	Defect in vehicle/ road	-	Gentle incline	Junction with more than four arms	Heavy rain

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6	Skidding	-		-	Steep incline	Round about junction	Hail
7	-	-	-	-	Hump	Manned rail crossing	Snow
8	-	-	-	-	Dip	Unmanned rail crossing	Storm
9	-		-	-	-	-	Dust storm
10		-	-	-	-	-	Very hot
11	-	-	-	-	-	-	Very cold
12	-	-	-	-	-	-	Other Weather condition

JANUARY

ROAD ACCIDENT REPORT											
B	C	D	E	F	G	H	Vehicle Responsible	No. of Affected Person			
								Fatal	Grievous	Minor	
6	2	2	1	1	-	2	Bike	0	1	0	
3	3	3	1	3	-	2	Car	0	0	1	
2	2	4	1	1	-	2	Load carrier	0	1	0	
2	2	2	1	1	-	2	Bike	0	1	0	
4	2		1	1	1	2	Bike	0	1	0	
6	2	4	1	1	1	2	Bike	0	1	0	
6	2	2	1	1	-	1	Scooter	0	1	0	
4	2	4	1	1	-	1	Bike	0	0	0	
2	2	4	1	3	1	2	Bus	0	2	0	
1	1	3	1	1	-	2	Car	1	0	0	
2	2	3	1	1	1	2	Truck	0	0	0	
3	3	4	1	2	1	1	Car	0	0	1	
6	2	2	1	1	1	2	Bike	0	2	0	
5	2	2	1	1	1	1	Bike	0	2	0	
5	2	2	1	3	-	2	Bike	0	3	0	
5	2		1	1	1	1	Bike	0	2	0	
4	3	3	1	1	0	1	Matador	0	0	1	

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S. No	Date	Name of Police Station	A
1	1-1-2014	Nowabad	Canal Road
2	1-1-2014	Kanachak	Purkhoo
3	4-1-2014	Domana	Muthi
4	8-1-2014	Domana	Muthi
5	8-1-2014	Kanachak	Bawe Talab
6	9-1-2014	Nowabad	M. A. Stadium
7	9-1-2014	Domana	Pounichak
8	12-1-2014	Domana	Muthi
9	19-1-2014	Kanachak	Deharan
10	20-1-2014	Domana	Purkhoo
11	22-1-2014	Domana	Domana
12	25-1-2014	kanachak	Deharan
13	25-1-2014	Kanachak	Mishriwala
14	26-1-2014	Domana	Paloura
15	29-1-2014	kanachak	Purkhoo
16	30-1-2014	Domana	Paloura
17	31-1-2014	Domana	Barnai

V. BLACK SPOTS

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 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 roads.

LOCATION OF BLACK SPOTS: Average severity index gives us the average of all fatal, grievous and minor injuries. It is given as:-

Where: A = Fatal injuries
B = Grievous injuries
C = Minor injuries

- Threshold value is the maximum no. of injuries permitted at the location.
- When the ASI value is greater than the threshold value, the location is considered black spot.

VI. IDENTIFICATION OF BLACK SPOTS

Location	Chainage (km)	Fatal (a)	Grievous (b)	Minor (c)	A.S.I	Threshold Value
M. A Stadium	00.00	0	2	0	170.4	399
Jewel Chowk	00.20	0	5	0	426.0	471

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Science college	00.50	0	1	0	85.20	375
Canal Road	01.00	0	4	7	413.6	468
Pulli Akhnoor	01.60	0	6	2	532.0	477
HazuriBagh	03.20	0	1	0	85.2	375
Paloura	04.20	0	8	0	681.6	435
K.C Public	05.20	0	2	0	170.4	399
Roop Nagar	06.00	0	0	2	20.8	356
PouniChack	06.20	1	2	0	247.2	420
Durga Nagar	06.30	0	0	1	10.40	353
Muthi	06.80	0	4	2	361.6	453
Rajouri Lines	07.30	1	2	0	247.2	420
Barnai	07.40	0	4	3	372.0	456
Unique Resort	07.50	0	1	0	85.20	375
Bantalab Road	07.60	0	2	0	170.4	399
NardaniMorh	07.70	0	1	0	85.2	375
KeranMorh	07.90	0	4	0	340.8	447
Patoli	08.40	0	4	0	340.8	447
Karan Palace	09.10	1	3	0	332.4	445
Nagbani School	10.20	0	3	0	255.6	423
Machine Domana	10.40	0	3	0	255.6	425
Naka Domana	10.60	0	0	4	41.6	362
Main Domana	11.00	0	5	2	446.8	477
Purkhoo	12.00	1	19	4	1737.2	136
Mishriwalla Petrol Pump	13.70	0	0	1	10.4	353
Mishriwalla	14.20	1	26	2	2312.8	-27
Deharan	15.60	1	3	1	342.8	448
Bawetalab	18.00	2	7	0	750	415

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BLACK SPOT -1 (PULLI AKHNOOR at Chainage 01.60 km)

HISTORY: The black spot lies at a chainage of 01.60 km from the initial point. At this black spot, the stretch of road from Jewel to Akhnoor has one link approaching towards Bakshi Nagar via bridge. It is of great public importance as it connects Jammu-Akhnoor stretch with Govt Medical College & Hospital. It helps in diverging the heavy traffic of highway road towards the main city. The famous Pawan ice-cream parlour and Bikano's restaurant lie on either side of the black spot. Figure 3 & 4 shows the existing and proposed plan of road with suggested modifications.

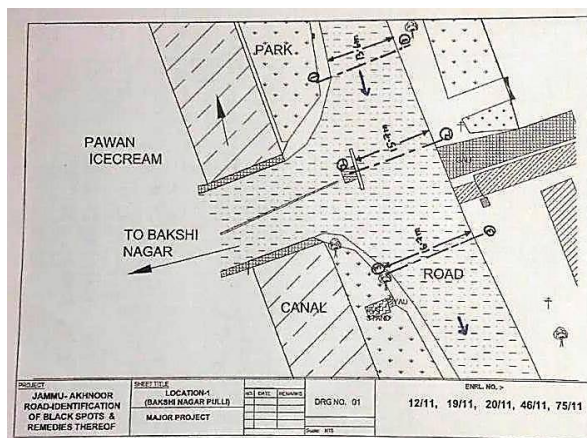


Figure3: Existing Plan

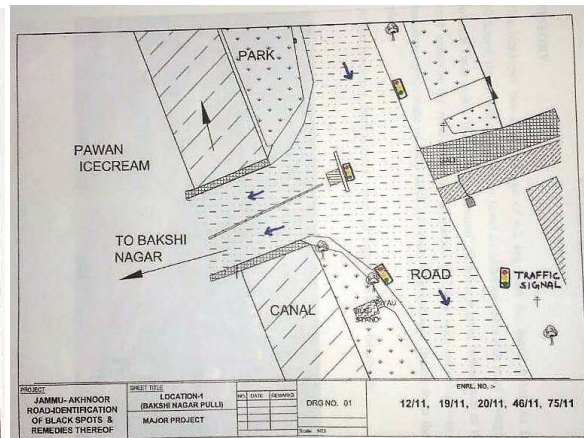


Figure4: Proposed Plan

SHORT COMINGS:

1. No traffic signals
2. No shoulders
3. No kerbs
4. No side drainage system

PROPOSAL: At this black spot it is proposed to, provide traffic signals at suitable locations as it will help in providing the orderly movement of traffic and increase the traffic handling capacity of this black spot thereby reducing certain types of accident, notably right angled collisions.

BLACK SPOT -2 (BaweTalaab at Chainage 18.00 km)

HISTORY: The black spot is at chainage of 18.00 km from the initial point. This junction become more important as during Jhirimela (regional festival), there is a heavy rush of devotees from and outside the state. The black spot has a T-Junction and a link road is heading towards Bawetalaab village. Figure 5 & 6 shows the existing and proposed plan of road with suggested modifications.

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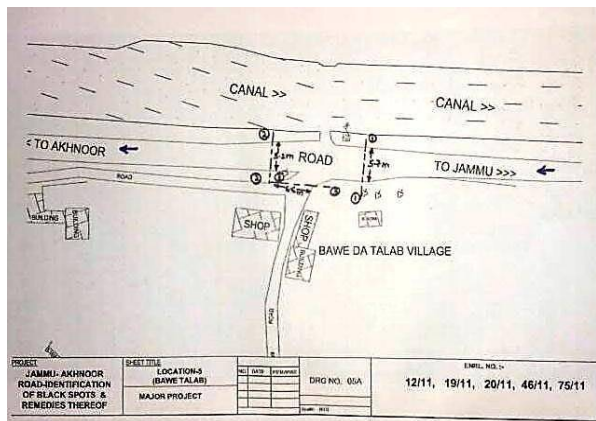


Figure 5: Existing Plan

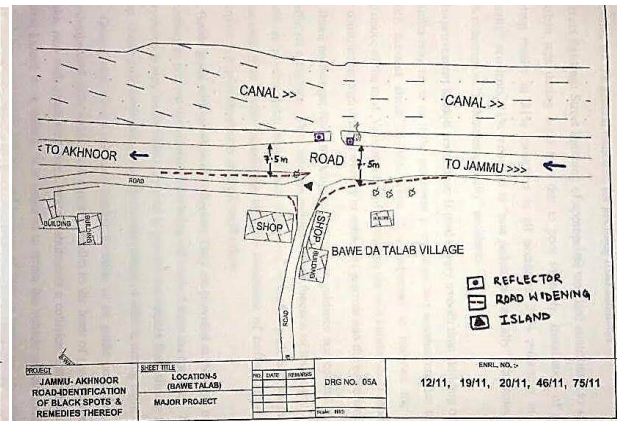


Figure 6: Proposed Plan

SHORT COMINGS:

1. Road width is insufficient
2. Turn on link road
3. Less reaction time as view of traffic from link road is obstructed due to presence of shops.

PROPOSAL: As the width of the road is insufficient and the view is obstructed so it is proposed to:-

1. Increase the width of road.
2. Provide reflectors at suitable locations so that drivers on the link road able to see the traffic at the highway.

VII. GENERAL REMEDIES

Following are the general remedies for avoiding road accidents:

- a. Street lighting:** Installation of good lighting results 21% reduction in all accidents, 29% reduction in "all casualty" accidents. 21% reduction in "non-pedestrian casualty" accidents and 57% reduction in "pedestrian casualty".
- b. Improvement in skid resistance:** If road is very smooth then skidding of the vehicles may occur or if the pavement is wet then wet weather crashes occur which account about 20 to 30%. Thus it is important to improve the skid resistance of the road.
- c. Road marking:** Road marking ensures a proper guidance and control to the traffic on a highway. They serve as psychological barrier and delineation of traffic path and its lateral clearance from traffic hazards for the safe movement of traffic.
- d. Driver reviver stop:** Driver reviver stop are generally in use in countries like U.S.A. where driver can stop and refresh himself with food, recreation and rest. They play a very important role in traffic safety as they relieve the driver from the mental tension of constant driving. These stops are required to be provided after every 2 hour travel time.
- e. Constructing flyover & bypass:** In areas where local traffic is high bypasses are required to separate through traffic from local traffic to decrease the accident rate. To minimize conflicts at major intersections flyovers are required for better safety and less accident rate.

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- f. Regular accident studies:** Based on previous records of accidents the preventive measures are taken and after that the data related to accidents are again collected to check the efficiency of measures and for future implementation of further preventive measures.

VIII. CONCLUSION

The paper presents new proposed plans for all the black spots that were identified. After analysis of the results, it can be concluded that this state highway section needs improvement from the safety point of view. A large number of accidents have been occurring over such a small section of 18 km length. Proper accident guidance and control system to guide road users ensuring safe movement of vehicles has been recommended and some of the facilities such as pedestrian crossings and median openings acceleration and deceleration lanes were redesigned in order to improve the safety of the road and minimize the accidents. The widening of junctions and providing traffic signals will help in orderly flow of traffic and increase the traffic handling capacity of these black spot thereby reducing certain types of accidents, notable right-angled collision.

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