

Road Accident Analysis and Identify the black spot location On State Highway-5 (Halol-Godhra Section)

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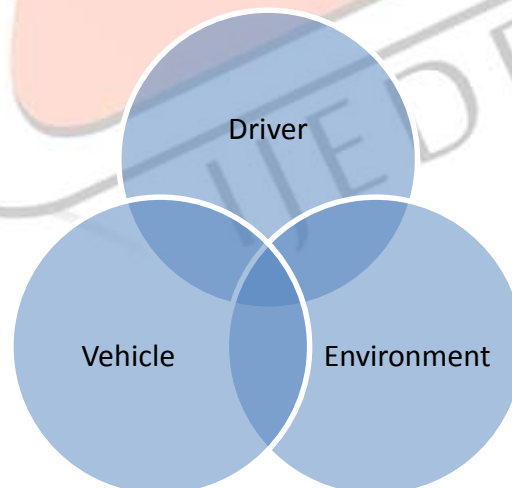
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Abstract - According to MORTH-2014 India has the highest no of accidents in the World. Accident Severity has been increasing year by year. A road accident is an unplanned and uncontrolled occasion, which happened on a road open to an open activity bringing about individual harm, harms to the property and death toll in which no less than one moving vehicle was included. Rapid growth of population coupled with increased economic activities has favored in tremendous growth of motor vehicles. This is one of the primary factors responsible for road accidents. It is observed that few works have been carried out on statistical analysis of accidents particularly on Four-lane State Highway. The essential objective of this paper is to gather the road accident data of chosen stretch from Halol CH 335.800 km (SH-5) to Godhra CH 380.00 km (SH-5) from the L&T Toll Plaza and GSRDC office Gandhinagar and to workout purposeful examination of road accident of it and propose remedial measures too. Total 548 road crash recorded in last 24 months, 2013-2014. The collected data were analyzed to evaluate the effect of influencing parameters on accident rate.

I. INTRODUCTION

Road safety is one of the most important problems in our society. Every year 1.2 million of people are killed and between 20 and 50 million people are injured in road accidents. If current trends continue road traffic accidents are predicted to be third leading contributor to the global burden of Disease and injury by 2020 (Torregrosa et al.,2012)India had earned the dubious distinction of having more number of fatalities due to road accidents in the world. Road safety is emerging as a major social concern around the world especially in India. India had earned the dubious distinction of having more number of fatalities due to road accidents in the world. Road safety is emerging as a major social concern around the world especially in India (Shiv kumar and Krishnaraj,2012). The various causes of accidents may be due to three factors shown in fig 1.

- (i) Driver
- (ii) Vehicle
- (iii) Road Environment



II. Objective of the Study

The primary objectives of the study are:

- (i) to identify the engineering factors that may contribute to the cause of accident,
- (ii) to identify the black spot and give preventions
- (iii) to propose improvements at the location, and

III. STUDY STRETCH AND DATA COLLECTION

The study stretch was selected from Chainage Km 335.170 to Km 380.00 on SH-5 which connects Halol to Shamlaji in Gujarat state. The accidents data were collected from L&T, IDPL Toll Plaza with prior permission. The Study Stretch is shown in Fig.

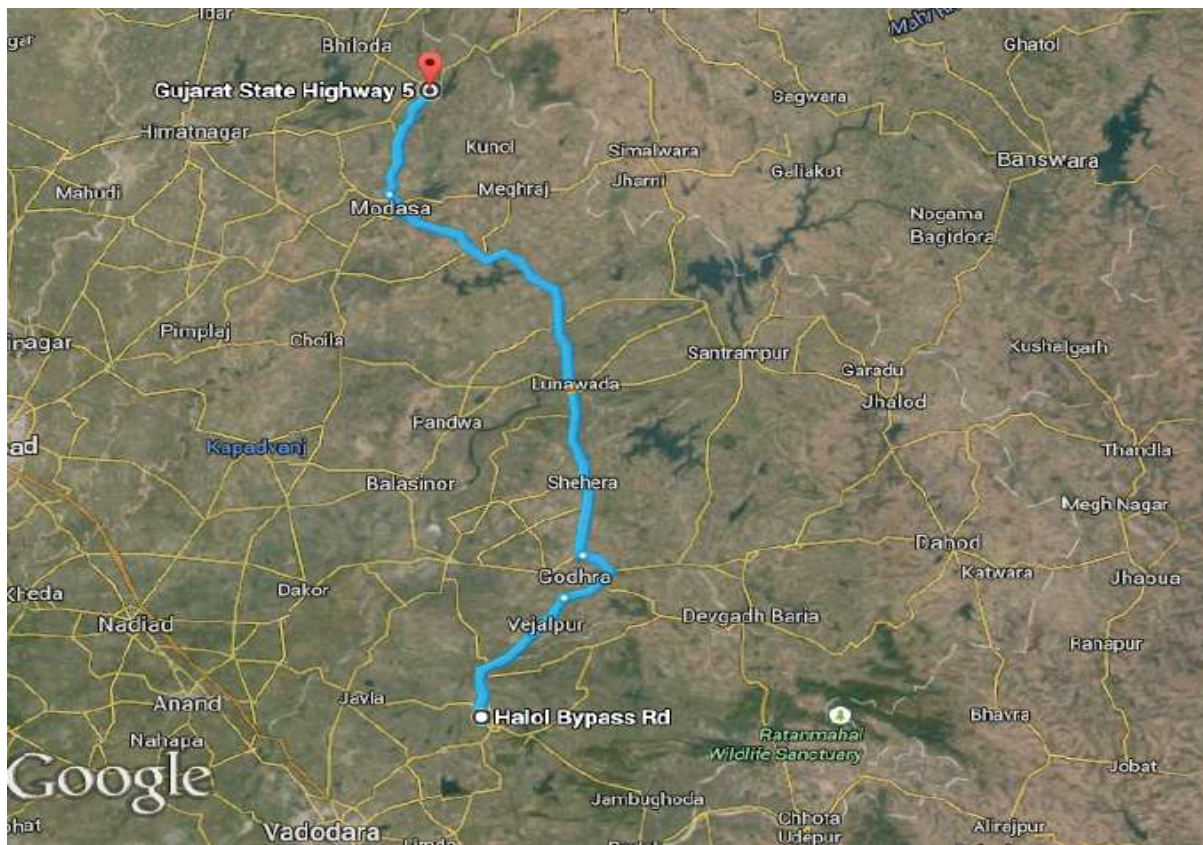


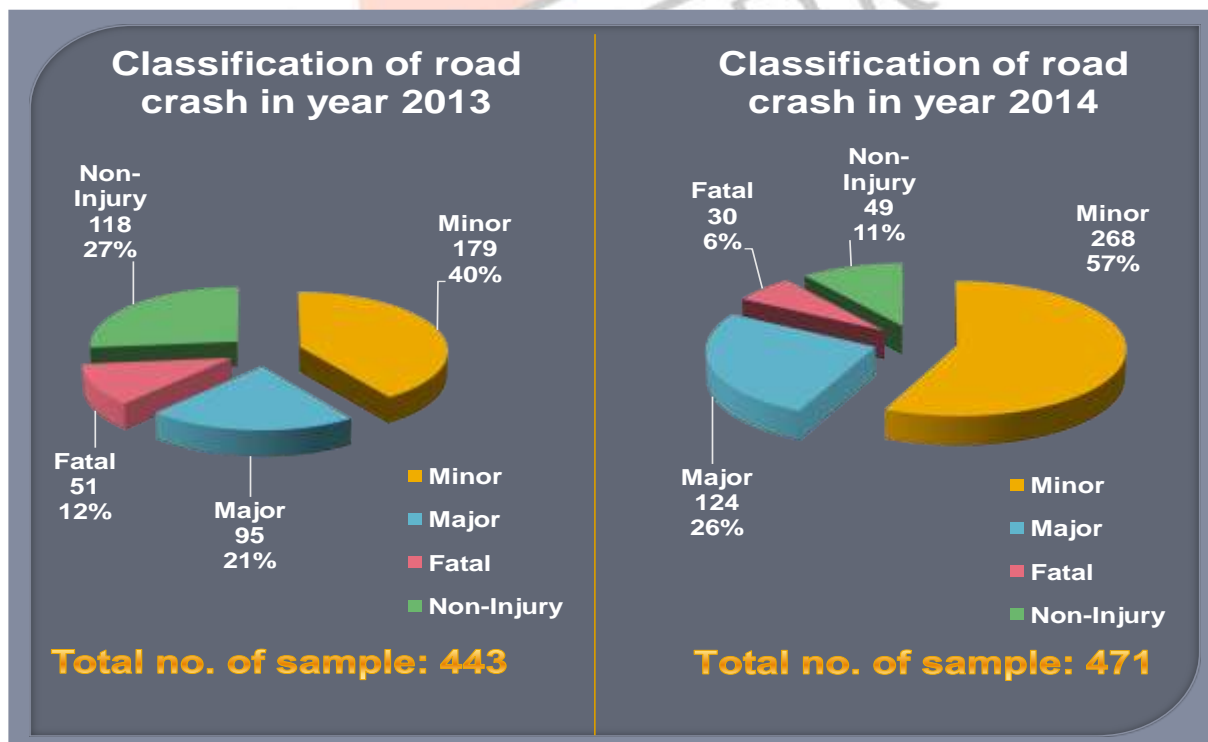
Fig. Study Stretch (Source: Google Map)

IV. ACCIDENT DATA

The accident data collected during last 2 years were plotted with MS excel. Total no of accidents, fatalities; injuries are shown in Table 1.

Table no. 1

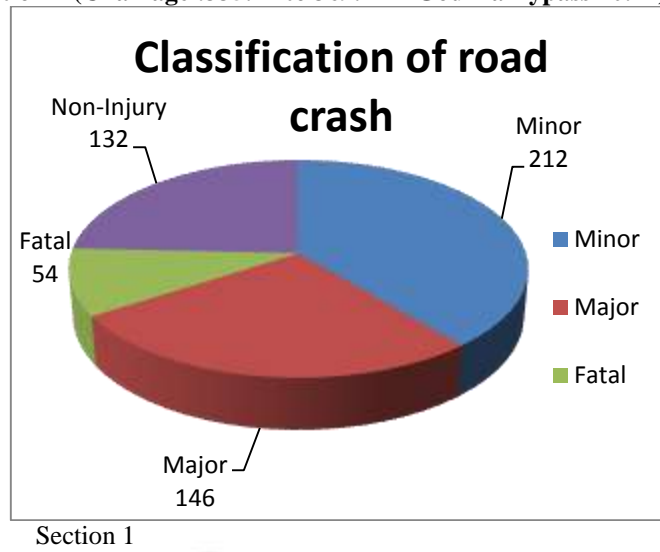
Year	2013	2014
Total no. Of accidents	443	471
Person killed	51	30
Person injured	274	392
Non-Injury	118	49



Data analysis

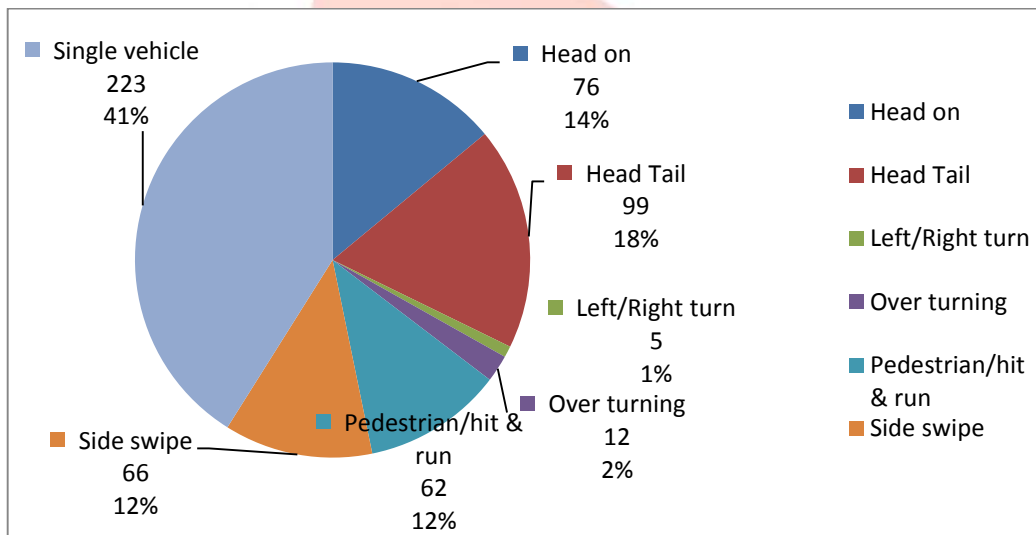
The classification of road crash as described earlier has been coded in four different categories as per NHAI coding. The amount of fatal road crashes is 8.39 per cent of the total road crashes. Classification of road crash show in figure.

Classification of road crash Section 1 (Chainage :335.17 to 369.21 + Godhra Bypass 10.22) Km:



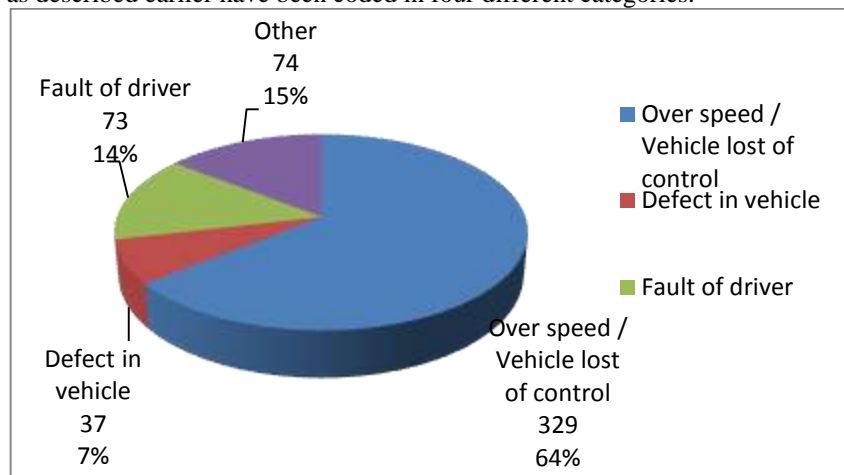
Nature of Road crash:

The nature of road crash as described earlier has been coded in seven different categories. While analyzing the nature of road crash it has been found that 223 (41 per cent) of road crash contributed to single vehicle show in Figure.



Causes of Road crash:

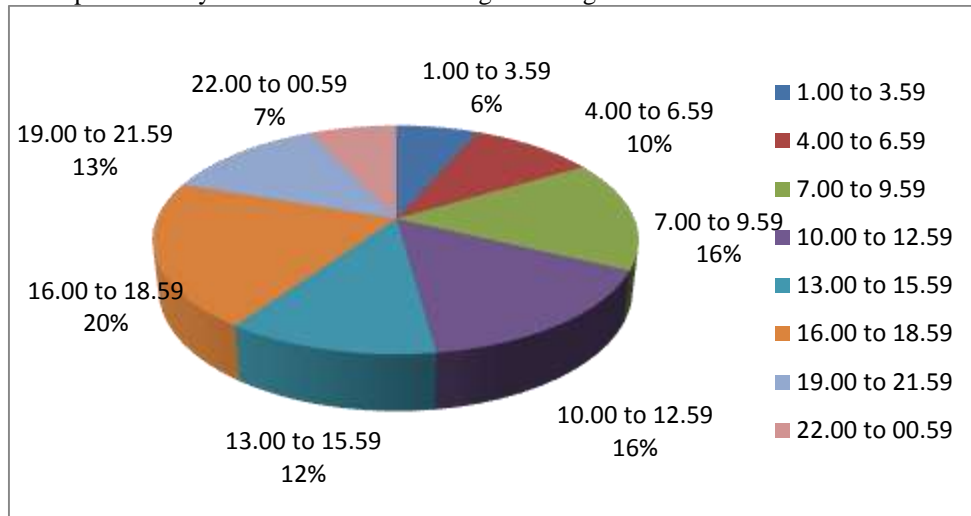
The causes of road crash as described earlier have been coded in four different categories.



“SPEED THRILLS BUT KILLS” the catchline is perfectly matched as more than 3/4th of the road crash has occurred due to over speeding.

Time of Road Crash:

Time has been divided into eight parts of 3 Hours interval each. It has been observed that around 20 per cent of the road crash has occurred during early afternoon hours i.e. between 16:00 p.M. and 18:59 p.M.(fig 4. 2) this may be attributed to the fatigue and drowsiness experienced by the drivers due to overnight driving.

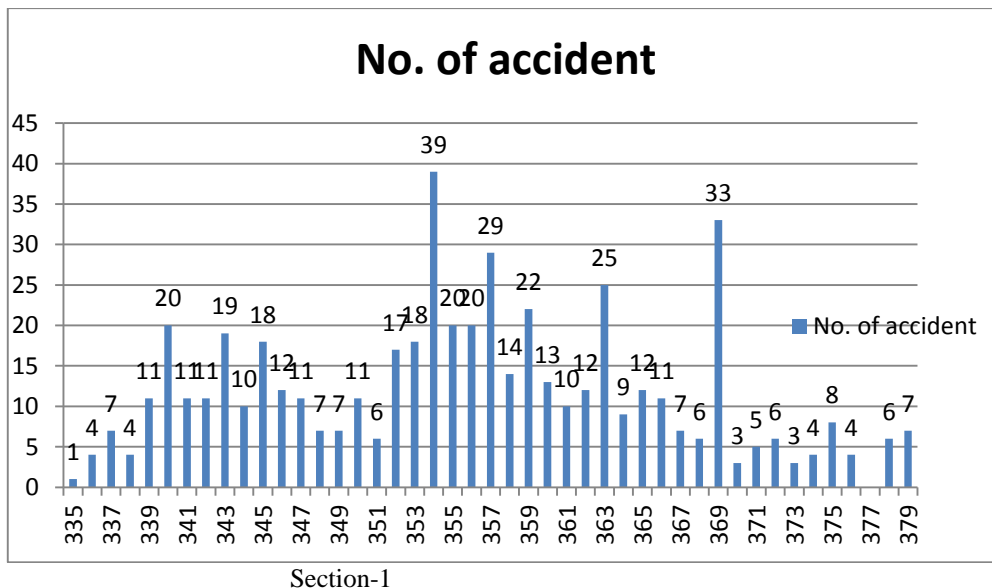


Black spot Identification

A “black spot” is defined as any location that exhibits a collision potential that is significantly high when compared with some normal collision potential derived from a group of similar location. Normally the number of road crashes at a particular site will vary widely from year to year, even if there are no changes in traffic or in the road layout. In statistical terms, road crashes at individual sites are rare, random, multifactor events. This means that comparison between the numbers of road crash at particular site must be made with respect to a fixed time period, typically one year. Furthermore, a single year data will be subjected to considerable statistical variation. Ideally, several years data are required, from which a mean, annual road crash rate can be calculated. Three years is generally regarded as a practical minimum period for which a reasonably reliable annual average rate can be calculated. Due to non availability of the data for three years, in this analysis one year data has been considered to discover the road crash prone locations.

Quantum of Road Crash Method

Road crash is defined as an unforeseen event resulting from the cumulative effect of various factors related to vehicle, roads and weather conditions. High number of road crash obviously indicates the presence of more causative factors. If more than 1 road crash has occurred in one kilometer section of the road in a month there is a reason to believe that road conditions could be creating crash situation. Based on the analysis, that is by finding number of road crashes occurring per km. length of chain age the road crash prone location has been recognized using Microsoft excel software. On SH 5 between km.369 to 370, 33 crashes have been reported in 18 months signifying 2 crashes per month per kilometre. Analyzed section of SH 5 falls in the state of Gujarat which is among the top five states in the country accounting for maximum deaths during the last five years.



Ranking of the Top Ten Road crash Section (Km)

Based on the finding of the road crash point by above listed two methods the top ten road crash sections ranking by their weight age and by their quantum of road crash has been prepared and presented in the table. Among the top ten road crash ranking by the analysis it is to be noted that it was based on data compilation over twelve to eighteen month starting from May 2009 to October 2010.

Section-1

Section-1 is the part which passes from the Halol, kalol, and Godhra having total length of about 1533 kilometer. Our selected stretches of the SH 5 are passing from the Halol to Godhra which has a dubious distinction of having highest number of road fatalities in 2013 -2014 The identified Top 10 crash locations of Halol-Shamlaji section of SH 5 has been presented in table.

Table: Identified Top 10 Crash Locations of SH 5 Section-1(Halol-Godhra)

Crash location in Km	369 -370	364 – 365	354 – 355	358 – 359	340 -341	357 – 358	363 – 364	353 – 354	359 – 360	356 – 357
Quantum of road crash	33	9	39	18	20	29	25	18	22	20
Weight age value	123.8	106.6	117.6	79.8	70.8	66.6	60.8	58.2	56.0	55.2

By critical examination of the all methods of identification of crash prone locations and probability index derived from the estimated parameters of the road crash occurrence model it has been revealed that Kilometer chain age between Km. 369 to Km. 370 is the highest vulnerable area of the analyzed section between Km. 335.800 to Km. 380.00 of SH 5 in halol-godhra section-1. The calculated combined values of road crash between Km. 369 and Km. 370 is 33 by Quantum of road crash method, is 43.4 by road crash point weight age method. The probability index for the same section has been derived by using the parameter estimates of the road crash occurrence prediction model since in occurrence prediction model we have considered Kilometer as a one variable which incorporate the influence of geographical details prevailing at the location in to the model. The probability value of the Km. 757 is 0.74 and at Km. 758 is 0.90 for a second time this value is the maximum value of the entire values. On this National Highway stretches between Kilometer 353 to 360 i.e. 7 km. stretch and Kilometer 363 to 365 i.e. 2 km. stretch, total 9 km. stretch of the 42 km. section showing high values by both the considered method as visible in the table.

Location of Black-Spot

Based on the exploratory analysis of the data and employing four different methods for the detection of the road crash prone locations the outcome of the absolute investigation has been presented on the map of country.

As a prelude to the model development, it was felt essential to understand the correlation amongst the variables being considered for model development for that purpose correlation analysis has been performed and same is elaborated in next chapter.

Black spot on Section-1

These sites were inspected during the time period where accidents most frequently occurred to investigate and identify possible causes of accidents. Analysis has included an assessment of the accident time of occurrence, vehicle type, year, accident severity and type of collision. **KM 369.800, 364.700, 354.400** were selected as the study section based on the worst site and the black spot site.



Number of Drivers/Riders involved in accidents by type of Fault:

Figure 5.7 and Table 5.8 show the accident by type of faults at KM 369.800 from year 2013 to 2014. The highest rank of fault

was 50 over speeding, followed by 11 accidents Vehicle lost control. Therefore there is a need to take more attention for over speeding and vehicle lost control.

Type of fault	Minor	Major	Fatal	Non-Injury	Total
Over speeding	30	14	1	5	50
Vehicle lost control	5	3	0	3	11
Wrong side	1	2	0	0	3
Driver negligency	0	2	1	1	4
Others	4	3	1	0	8
Total	40	24	3	9	76

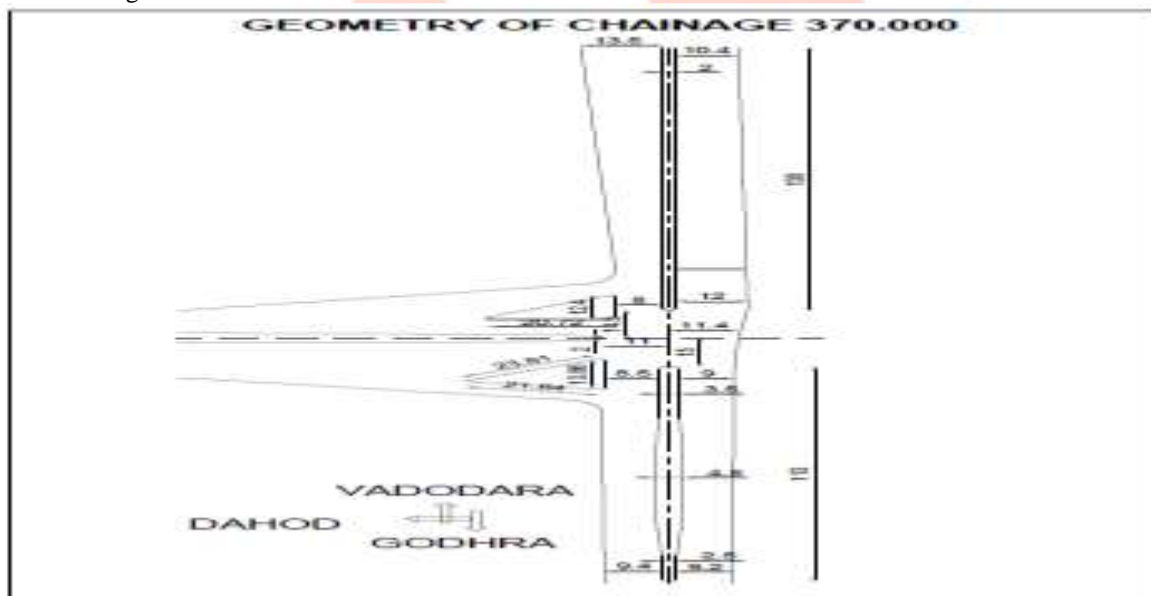
Type of Vehicle involved in Accident

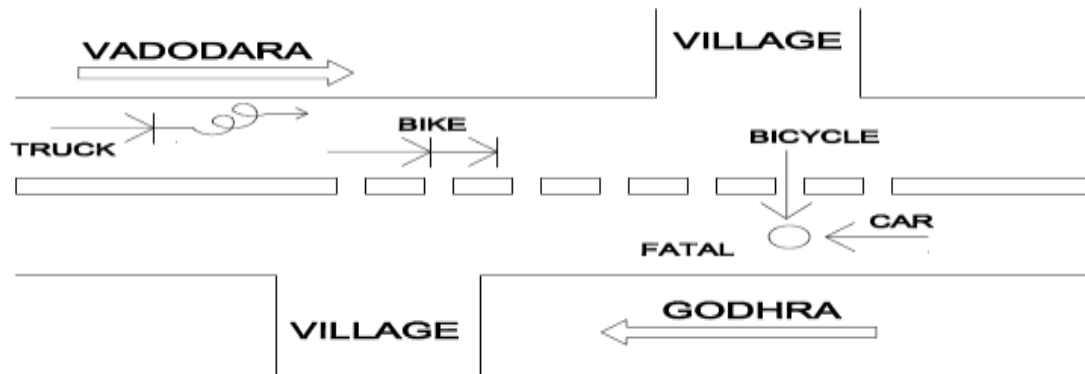
Based on the Figure 5.8 and Table 5.8, it shows the type of vehicle involved in accidents at KM 369.800 from year 2013 to 2014. The Bus/truck formed a huge proportion of the total number of accidents. Bus/Truck has contributed the highest number of accident which is 51 or 57 % of the total vehicles involved in the accident and second highest were Car which 16 accidents or 18% of vehicle involved.

Type of Vehicle	Minor	Major	Fatal	Non-Injury	Total
Two wheeler	4	7	2	0	13
Auto-rickshaw	2	3	0	0	5
Car	10	3	1	2	16
Bus/truck	30	15	1	5	51
Trailer	1	1	0	2	4
Total	47	29	4	9	89

Traffic Studies

The site inspection was carried out during daylight hours under fine condition. The road is a 4 lanes road and has divider. This road has 2 main directions, from Godhra to Vadodara and from Vadodara to Godhra. The site has T-junction at 369.800 Km Chainage shown in Figure.

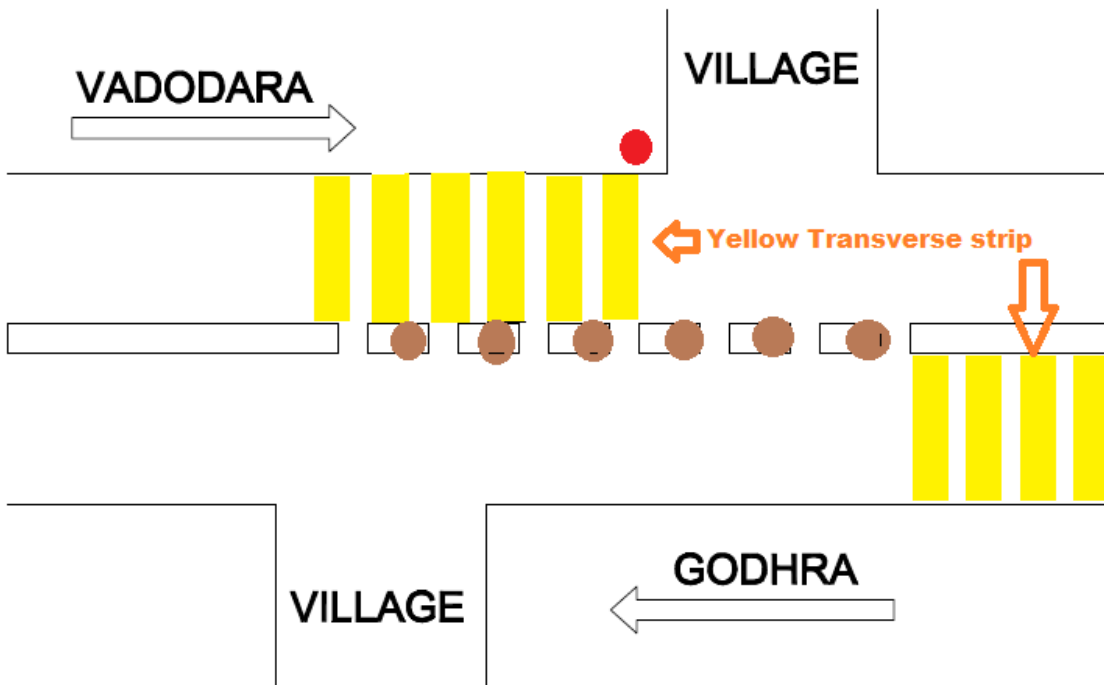




Collision Diagram at 369 to 370 Km

Preventive measure to reduce the accidents at identified black spot:

To reduce the speed from the both main stream by using speed reduction marking and the speed limit sign or slow sign. Standard marking is 90 yellow transverse line applied over this area, the spacing between which progressively reduce toward the hazards. Remove the unauthorised median cut to reduce the accident or putting the grill in this section to reduce the crashes.



Conclusion

The preventive measures brought through this study further control us to control or cut down these rates by utilizing diverse new safety measures, infrastructural configuration fatalities and most recent vehicle engineering.

The central purpose of mishap aversion and control methodology is depending on 4 E's, vis. (i) Education, (ii) Enforcement, (iii) Engineering and (iv) Environment and Emergency consideration of road accident exploited people.