ACCIDENT ANALYSIS AND BLACK SPOT IDENTIFICATION FOR KONDHWA AREA TRAFFIC ROAD

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Abstract- World wide the transportation problems faced by various nations have necessitating search for alternatives or methods that insures efficient, safe, feasible, means for transport. India is a country with high population. Transportation becomes a primary factor which is responsible for the social and economic growth of our country. It is important to control these accidents by identifing these accident prone zone and fixing these spots. This research is based on identifying black spots on Katraj To Kondhwa. These Blackspots are identified by studying Accidental density method and Weighted severity index method.

KEY WORD- Accident Density Method, Weighted severity index, Black Spot,kondhwa

INTRODUCTION

India is a second largest city with 4,865,000 km of total road length. Due to improvement of surface of its route in the past few years by the state, increases the speed of the vehicle travelling on these roads[1]. As the mobility increases the rate of accident is also increases. Road accidents can not be totally prevented, but by suitable traffic engineering and management measures, the accident rate can be decreased considerably[2]. The annual no. of deaths due to traffic accidents is more than 50 million people, therefore road safety technology research which aims to reduce traffic accidents has become increasingly important. Identification of accident prone zone sections is an effective way to improve the road safety situation. Traffic safety has become a major area of concerned for the authorities. So traffic safety is an important key and integral role in transportation development areas[4].

Percentagewise distribution of road accident fatalities	
1. Two Wheelers	40%
2. Trucks	19%
3. Hit & Run Case	11%
4. Other	30%

Table 1. Percentagewise distribution of road accident

The present study aims to identify accidental back spots on Katraj to Kondhwa area traffic road during year 2016 to 2018. In present study for identification of black spots weighted severity index (WSI) and accidental density method (ADM) is used. During these study, causes of accidents were found out and suitable remedial measures are also provided for particular spot by drawing collision diagram. In these research, we will study accidental data collected from Kondhwa traffic area is analyzed by Weighted severity index method and Accidental density method.

Motivation and Problem Statement:

From last few years, it has been observed that from Katraj to Yewalewadi, Kondhwa to Khadi Machine, there is increase in accidents and due to accidents number of fatalities also increases. Due to proposed metro as well as fly over project, during construction phase of such leads to traffic congestion n these area. The vehicles in Katraj coming from the Kondhwa towards Khadi machine and ISKON temple. There are some spots are there where the accidents are frequently happened. So, we get motivate to identify the places where accidents are frequently happened i.e BlackSpots & give preventive measures for it.

LITERATURE REVIEW

There are many studies on the Black spot identification in past few years. Government of India also focusing on the Blackspot identification, to reduce the accident rates. Previously it has been observed that by identifying BlackSpots there is decrease in rate of accidents upto 28%. Following are some of research papers.
Snehal Bobade -Sorate.(April 2015), Blackspot Analysis on pune -Banaglore national highway. India is second largest city with 4,865,000 km of total road length. Study aea Pune Banaglore highway. The first step includes collecting primary data provide by the NAIC(National Hghway Authority of India) and police record which was to be correlated and physical survey. It was analyzed by the following methods. Accident density method and Weighted severity index method.
Gopala Raju SSSV etal (June 2012) Identification of blck spot and junction improvement in Vishakhapatanm city. Total volume

of district 59% traffic volume of Vishakhapatanm city. The length of the study area 8.9 km. Data collected from police station and identified the black spot.

Xing Dawei Li Xiansherg (2015) Identification of speed way accident black spot based on the quality control method. In these paper number of methods for identificatin of black spot. for example Accident number method, Accident rate method, and Synthesis.

Apparao. G.P. Mallikaijunareddy etal (Feb 2013) Identification of Blackspot for ntional highway using GIS in this they were studied about traffic in Muzaffar nagar and meerut. In this paper studied area NH 58. Total 63 km area are selected for implement the methodology. Data collection of police station and survey of topographical map has been studdied. After the ground control point find out using GPS. Blackspot identify critical crash rate factor method and then identified the black spot. Then identified the causes of accidents and gaves remedial measurs of it.

Sanjay Kumar Singh (July2016) Road traffic accidents in India, issues challenges. Injuries and fatalities result from road traffic accidents in India are major. Increased health problems. In 2016 every week nearly 2650 peoples get killed and 900 injuries total accident analysis of road accidents scenario at nation level .
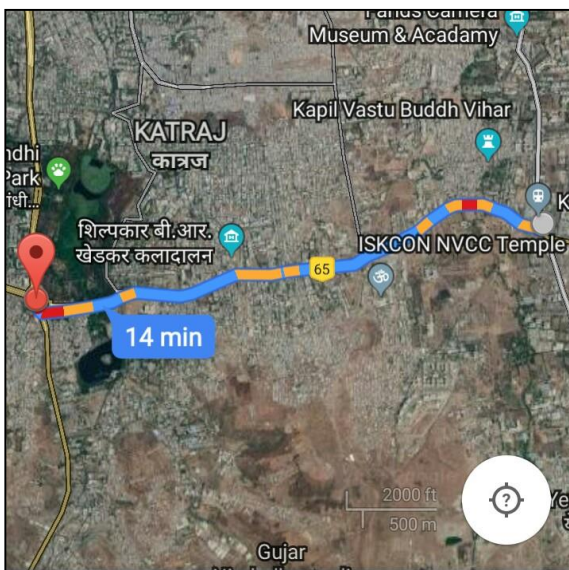
   Study Area of Project:
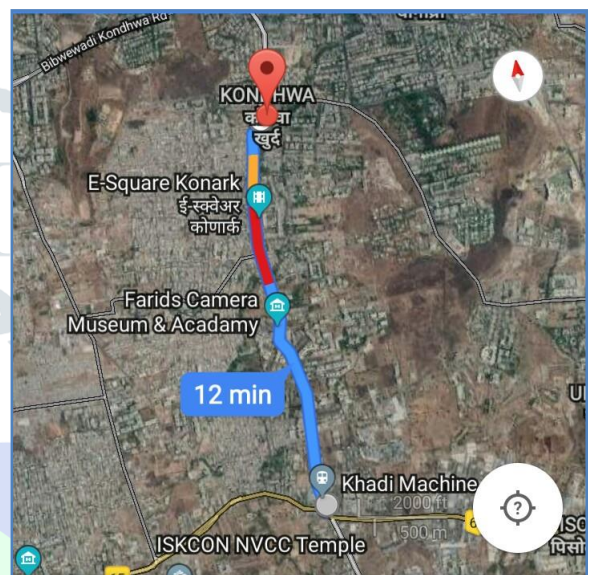

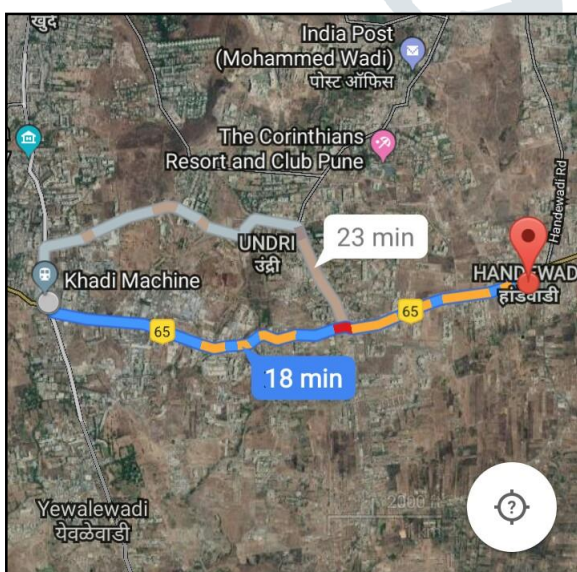Image No.1 Katraj To Khadi Machine

Image No. 2 Kondhwa to Khadi Machine

Image No. 3 Khadi Machine to Handewadi
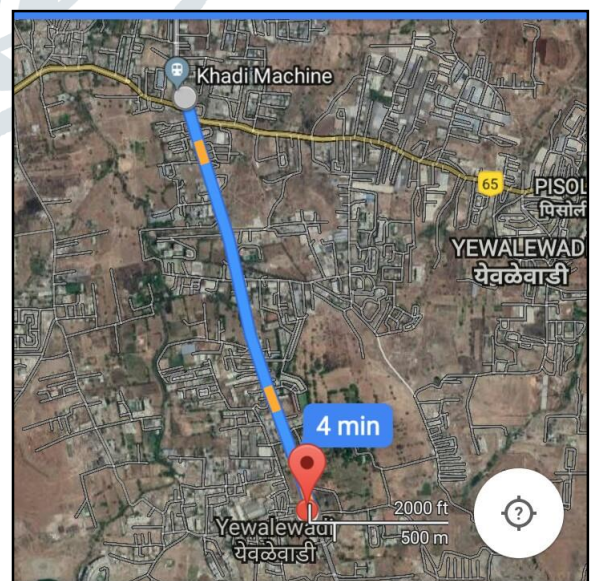
Image No. 4 Khadi Machine to Yewalewad
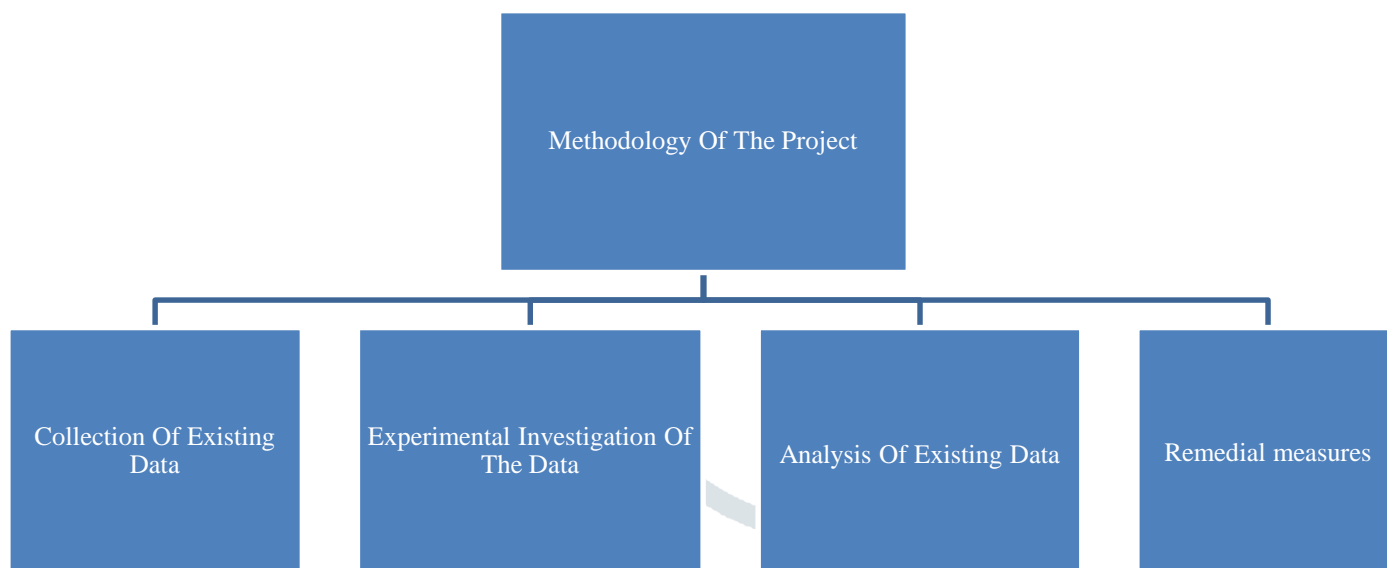
Methodology Of The Project:

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                    │  Methodology Of The Project │
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│ Collection Of │ │ Experimental │ │ Analysis Of  │ │  Remedial    │
│ Existing Data │ │ Investigation│ │ Existing Data│ │  measures    │
│               │ │ Of The Data  │ │              │ │              │
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Methodology adopted mainly includes collection of existing data, experimental investigation and analysis of existing data.

Existing Data Collection:

Existing data was collected from police stations. Methodology for this research includes identification of back spots by correleting the physical survey with existing accident data. there are two methods to identify accident black spots. one is by conducting physical survey and other is to analyze the existing accident data. Existing data was collected from police station.

Experimental Investigation: Number of parameters that can causes the accidents on road way but only the parameter that one more important in study area had to be selected and it is finalized on the basis of following factor

Selecting Parameters for Ground Survey:-

(i) International Journal Papers

(ii) Reconnaissance Survey

(iii) Interviewing Local Commuters.

Analysis of Existing Data:

Accidental data collected from the Kondhwa police station and aso data collected from he physical survey to identify accidents blackspots. It will be analyzed by following methods
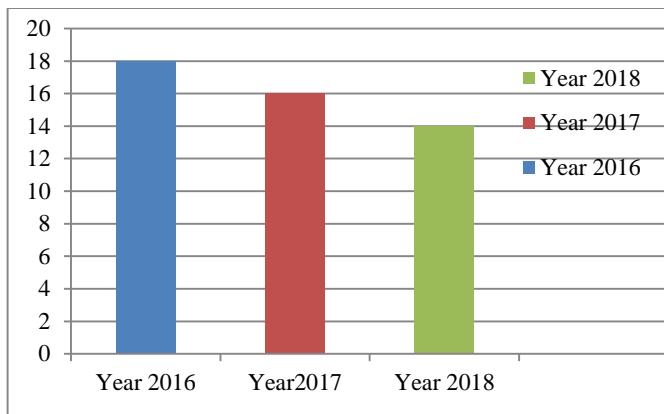
1.Accident Density Method

2.Weighted Severity Index

Data Collection

The data which is shown below is collected from the respected police stations from their FIR (First Investigation Report). As our project area is from Katraj to Khadi Machine (3.5), kondhwa to Khadi Machine(2.9), Handewadi to Khadi Machine(4.6) and Yewalewadi to Khadi Machine(1.9). The data is collected from last three years i.e 2016, 2017. The data includes number of deaths, No. of Critical Injuries, No. of Minor Injuries and Damages also. The stretch of comes under Kondhwa police stations.
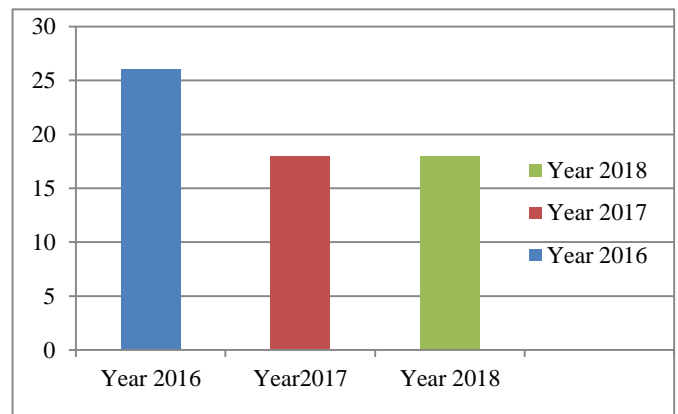
Analysis Of Existing Data

The data collected reflects the view of the reporting Police Officer. Accidental data collected from the Police Station from their FIR (First information report). Following table shows the summary of the all four police station FIR reports.

Following are the graphs which are showing above summary for year 2016 to 2018

Graph 1. Death Sheet Graph.   Graph 2. Critical injured graph

Generally following four methods are used for identification of black spots :

I.   Severity Index
II. Accident Density Method
III. Weighted Severity Index
IV. Method of Ranking

We analyse the data using accident desity method and weighted severity index method.

Accidental Density Method:

The accident density is calculated from the number of accidents per unit length.

Unit length is taken as 500m. or 1000m.

Predetermined no. of accidents is calculated as average number of accidents.

Average no. of accidents = (Total no. of accidents) / 24.5

Sample calculation,

Average no. of accidents = (115) / (24.5) = 4.69

Every 500m length of the stretch where no. accidents is more than 5 is termed as "Accidental Blackspot".

Weighted Severity Index Method :

Severity of an accident is classified as Fatal, Grievous injuries and minor injuries.

WSI is calculated by formula, WSI = (41 x K) + (4 x GI) + (1 x MI)

Where, K = Number of persons killed;

GI = Number of grievous injuries;

MI = Number of minor injuries

Locations having WSI more than or equal to 41 are termed as accident black spots.

Criteria for choosing limit of WSI

In the WSI formula a fatal accident has been given 10.02 times more weightage than grievous accident (4 << 41) also minor accident has been given a unit coefficient. (1 << 41). For grievous and minor accidents to be comparable with fatal accidents while calculating WSI more data is required and hence in this project limit of WSI is chosen as 41 i.e. coefficient of K. In the following table only those points are mentioned on which black spots are identified.

Identified Blackspots:

From Accidental Density Method seven number of BlackSpots and by Weighted Severity Index six numbers of BlackSpots are identified. After co-relating the analysis from both methods, we selected the spots which are common in both as a BlackSpots. These are mentioned in following table.

Sr. No.	Place
1	Yewalewadi
2	Khadi Machine
3	Gokul Nagar
4	Katraj Chowk
5	Kondhwa Road

accident   Table 2. Area selected of road survey

Physical Survey :

We identified five number of BlackSpots by co-relating the Accidental Density Method and Weighted Severity Index. We had visited those BlackSpots physically and try to find out the exact reasons of accidents. So, we studied the BlackSpots which are more dangerous.

Yewalewadi:

Following are the few reasons which are responsible for accidents at Yewalewadi.

1) There is no footpath is constructed, therefore people use the road for walking.

2) Width of road is narrow.

3) No speed breaker is provided as there is cross intersection of road which is connected to Yewalewadi village.

4) Large path holes are formed on the road.

Khadi Machine:

There is huge traffic jam during the 8.30am to 9.30am in the morning and after 4.30pm in the evening everyday because traffic increases due to college students. So, there is a need of traffic signals. Signals are installed but not started yet.

The vehicles coming from Undri are not able to take turn towards Yewalewadi due to rise in the road level.

Main cause of accident is people are not following traffic rules. There is only single road for college going students and heavy vehicles.

Gokul Nagar:

Maximum number of accidents is occurred due to the narrow width of road. This is the only road which is used by college students as well as heavy vehicles.

1) PMPML bus stops are not fixed.

2) Road width is slender and people are used this road to dump the garbage. Therefore only single vehicles can pass through at that site.

3) The road level is not horizontal. There is steep slope and people are use this spot road crossing, therefore accidents are occurred.

Katraj Chowk:

The bus depot for PMPML is located at wrong place. It is located at the junction where vehicles are coming from Khadi Machine.

The buses are travel on this route by wrong side towards Kondhwa therefore traffic gets congested there is possibility of head on collision.

Somaji - Kondhwa :

1) At the junction of vehicles coming from Kondhwa and Khadi Machine road there is no signal Provide

2) People are not following the traffic rules.

3) No speed breaker is constructed at this junction.
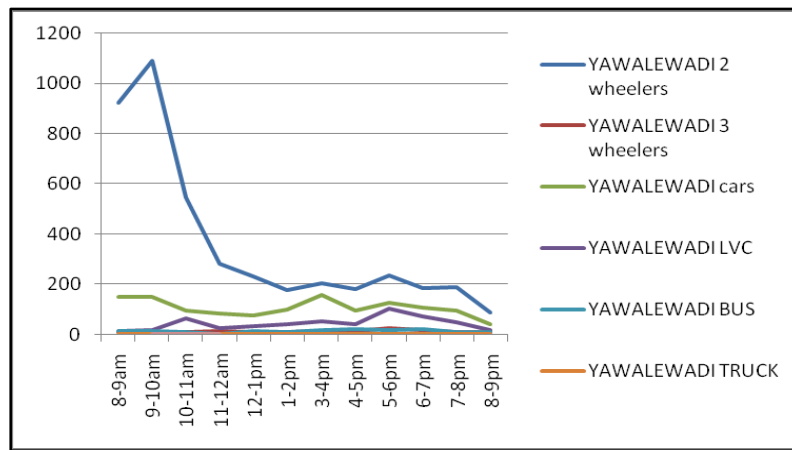
Graph 3. Traffic Density Flow from Katraj to Yewalewadi Traffic Density

There are three peaks on graph for two wheelers 1st is from 9am to 10am after then 2nd peak is from 4pm to 5pm and 3rd peak is from 7pm to 8pm. Density for cars is same throughout the day but at the end of day one peak for car is from 6pm to 7pm. Traffic density for three wheelers is constant throughout the day.

Most common reasons observed by physically are following:

People are not following the traffic rules.

Faulty Road Geometric design such as improper super elevation, horizontal curve design etc.

Improper Signal System Rash Driving of heavy vehicles.

Collision diagram and their remedial measures are as follows:
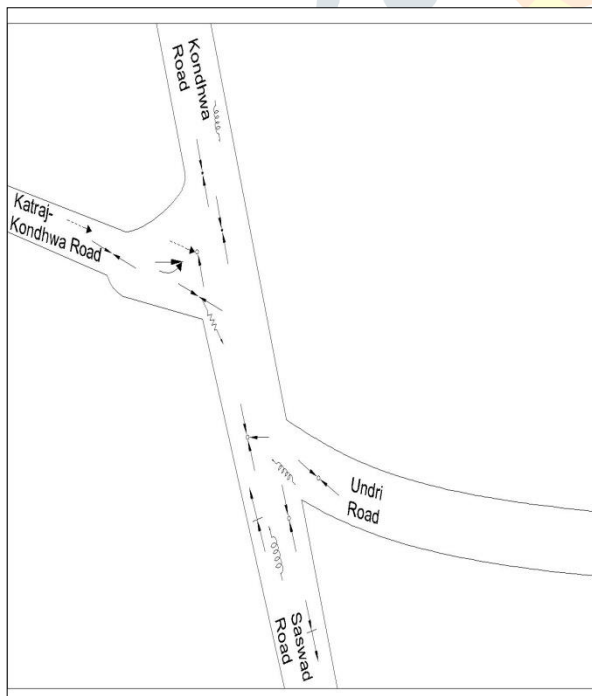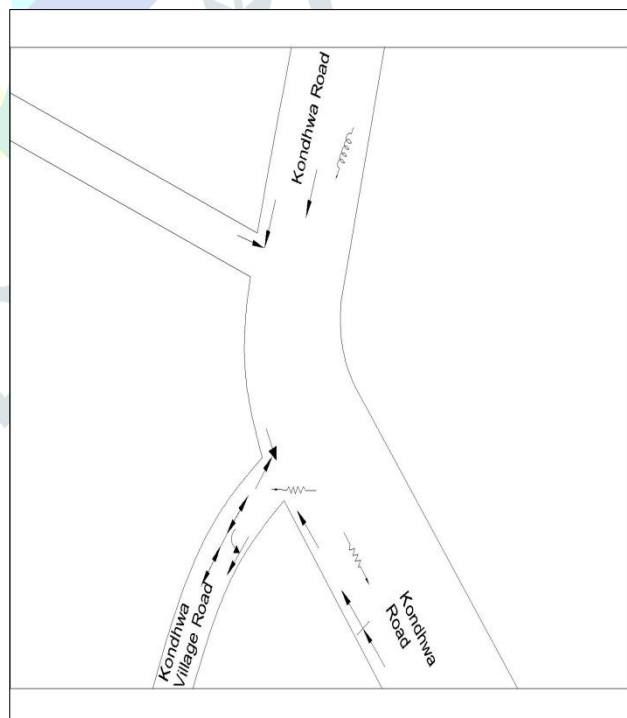

Figure No. 1 Khadi Machine Collision diagram

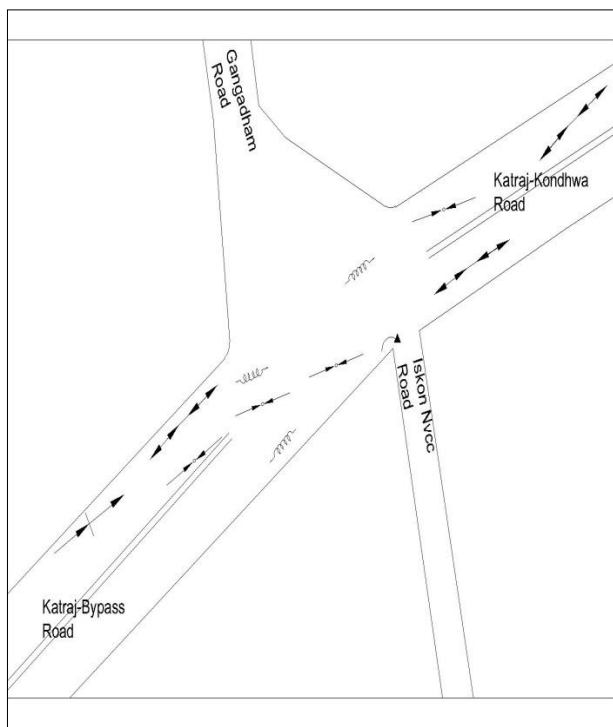Figure No. 2 Kondhwa Road (near Gagan Avenue Society)

Figure No. 3 Gokul Nagar Collision diagram
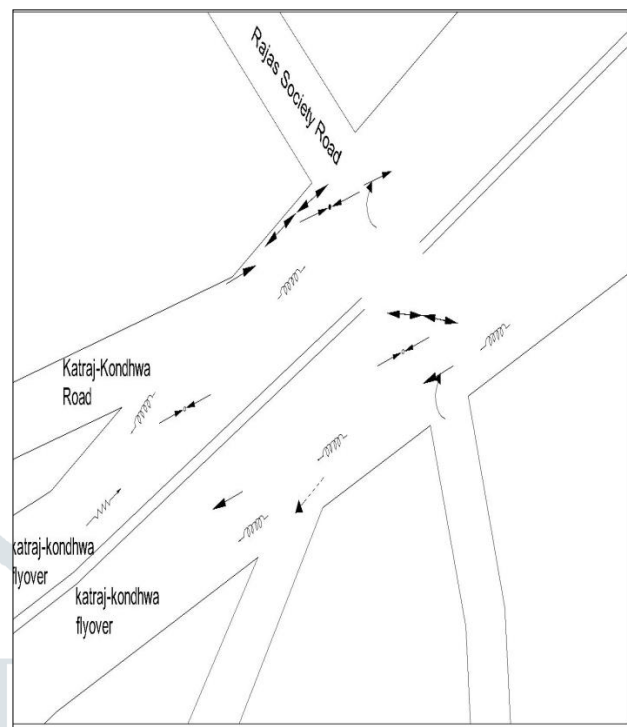

Figure No. 4 Katraj Road collision diagram

Sr. No.	Symbols	Name of symbols
1.		Path of pedestrain
2.		Out of control
3.		Side swipe
4.		Path of moving vehicle
5.		Rear end collision
6.		Property damage only
7.		Fatal accidents
8.		Injury accidents
9.		Over turned
10.		Motor vehicle backing

Remedial measure are as follows:

Construct flyover for vehicles coming from undri towards Katraj.

Make sure signals are working properly.

To increase the road width as the present road are insufficient for present traffic flow.

Proper planning of traffic management and strengthening the public transport system.

Use of intelligent traffic system and proper signal system.

constructing the bridge by considering the future traffic so as to avoid traffic congestion.

The passage of heavy vehicles is been prohibited in peak hours.

CONCLUSION

From the vast analysis and data collection it can be concluded that Traffic Congestion it cause due to over independent on private transportation and failure in upgrading the transport system and their network with the demand.

further following conclusions can be made:

1) Traffic Density at Khadi machine chowk on 59035 vehicles per day.

2) So from above conclusions it is clear that traffic congestion is nearly crossing the PCU which is far greater than compared to junctions.

3) Following are the main parameters of the accidents:

- Over speed
- Geometry of Road
- Encroachment on Road
- Habits of driver of not wearing helmet, safety belt.
- Unsafe lane changes
- Deficiency of traffic awareness, rules
- Improper Overtaking
- Slippery or potholes in road during rainy season

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