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A Case Study To Locate And Analyze Conflict Points And Deficiencies In Kr Puram Junctions And Streets [Bangalore Urban Area] Involving In Traffic Congestion And Accidents, Audit On Remedial Measures To Increase Level Of Service

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ABSTRACT

Present growth of traffic in India has been revolutionized. This directly leads to increased growth of traffic rate in metropolitan cities like Mumbai, Kolkata, Bangalore, Pune, Hyderabad, Chennai etc., Bangalore is one of the cities, which has high growth rate of traffic from year to year which leads to huge traffic congestion and hence unscientific movement of traffic in Bangalore roads, which finally results in increased number of conflict points and accidents and decrease in level of service. This results in a huge cost of society in terms of death, injury, lost productivity, fuel consumption, delay, discomfort property damage. Therefore, studying and analysing conflict points and their deficiencies has become very much essential in order to find out solution for reduction in congestion, accident rate finally aimed at increase in level of service. But it is very complex and difficult to analyse and predict the effectiveness of specific intersection improvements that are aimed reducing traffic congestion and accident frequency. In the present investigation an attempt is made to analyse and evaluate performance of selected road of Bangalore city [KR PURAM junctions and streets]. Since KR Puram roads are plying to IT corridors of Whitefield and Marathahalli, and Major areas of Bangalore city it has a huge problem of traffic congestion and accidents and it is recognized as the most congested area of Bangalore city. Presently study indicates that by adopting suggested remedial measure at the select point level of service can increased from E to B.

Keywords — Accident, Conflict points, Spot speed, Intersections, PCU.

I. INTRODUCTION

Roadways are the backbone of any country, acting as indicator for the economic development of the country. Such that, the transportation plays a very prominent role in developing countries like India. More the length of roadways, the prosperity is more of the nation. But these facilities of roadways is increasing the population of vehicles and there by resulting in increasing number of traffic congestion and accidental casualties. An unfortunate incident that happen unexpectedly and unintentionally typically resulting in damage or injury is termed as Accident. It has been observed that 13 people are dying per hour all over the world. The world health organization (WHO), in its global status reports on road safety 2013, observers that road traffic injuries "the leading cause of death for young people aged 15-29". Worldwide and that while many countries have taken steps to reduce fatal accidents from road traffic accidents the total "remains unacceptably high at

1.24 million per year" More than 80,000 people are killed on Indian roads every year and almost 1.2 billion are injured. India is having road fatality ratio 14 per 10,000 vehicles which is almost highest in the world.

Presently growth of traffic in our country has been revolutionized. This directly leads to increased growth of traffic rate & increase in accident rate especially at urban intersections & metropolitan cities like Mumbai, Kolkata, Bangalore, Pune, Hyderabad, Chennai etc.., This result in a huge cost to society in terms of death, injury, lost productivity, fuel consumption, delay, discomfort & property damage. Therefore studying & analyzing traffic accidents has become very much essential in order to finding out solution for reduction in accident rate. Bangalore is one of the cities, which has high growth rate of traffic from year to year which leads to huge traffic congestion and hence unscientific movement of traffic in Bangalore roads, which finally results in increased number of conflict points and accidents and decrease in level of service. In the present investigation an attempt is made to analyze & evaluate performance of KR Puram roads of Bengaluru city by considering past year accidents population, traffic volume, geometric standards & other relevant factors which are influencing on the performance & operation of traffic and finally finding out solution for reduction in congestion & accident rate finally aimed at increase in level of service.

II. OBJECTIVE OF THE STUDY

1. To identify the conflict points and black spots.
2. To study the causes for congestion & accidents and corrective measures at potential locations.
3. To evaluate existing design.
4. To propose new design and provide economic justification.
5. To carry out before and after studies and to demonstrate the improvement in the problem.

III. METHODOLOGY ADOPTED

The methodology which has been adopted has been recommended by the Indian road congress. The first step involved was selection of the stretch where in a number of parameters was considered. We collected the accident data from the appropriate authorities. The most accident prone sites were selected and data collection at these strategic points. Based on the data collect a number of analysis were done and in the last step a number of recommendations were given in order to increase level of service and to make stretch be more smooth and accident free.

Methodology in brief:

1. Collection of previous year data for the taken stretch (accident and traffic data).
2. Identifying black spots and locating conflict points.
3. Collection of traffic volume data at selected points and also spot speed studies.
4. Studying and analyzing the existing design at the selected points.
5. Congestion studies for the selected stretch (speed and delay studies – floating car method)
6. Developing a relation between speed, time and flow.
7. Analysis and interpretation of obtained results from the investigation.(Deciding present level of service)
8. Finding the deficiencies of selected points.
9. An audit on remedial measure for smooth flow of traffic without congestion with less delay time and also improvement in decreasing accidents at black spots.

A. Brief Description of Methodology:

Road accident data has been collected from the respective police stations and traffic departments. Major accident prone locations (Black Spots) have been identified based on the number of accidents, severity of accidents and number of fatalities. The objective of the study is to carry an audit of accident and traffic choke spots on NH-75 and NH-44 passing through urban stretch of Bengaluru and suggest counter measures to reduce the accident rate or to minimize the severity of accidents hence it is necessary to collect the details of factors responsible for accidents on this particular stretch of road such as road geometry pavement width, traffic conditions, number of intersections etc. The accident database was collected from police records for a period of 3 years, i.e., from 2014-2016. Based on accident statistics Black spots were located. Traffic volume study was conducted at selected points by manual count method to know amount of traffic plying in choke points. Spot speed studies were conducted to investigate modal average and high, low & middle speeds at choke points. Speed and delay studies were conducted using moving car method to analyze Running speed and Journey speed of the selected stretch. Keeping all parameters as an input, deficiencies at each point has been evaluated and level of service of the road has been found.

IV. RESULTS AND DISCUSSION

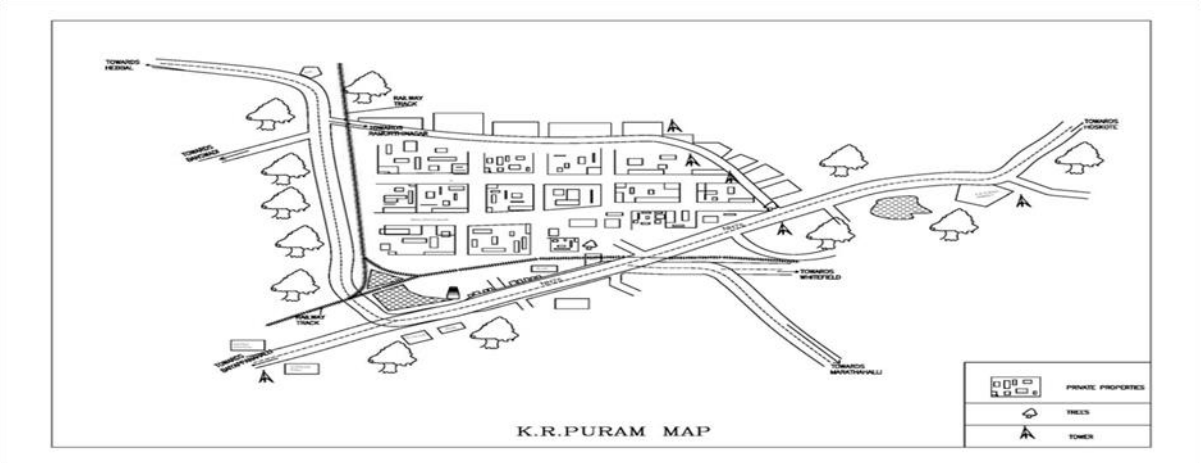

Fig 1: Shows that map of K.R.Puram junctions and streets.

A. **Accident records & Traffic Volume studies**

Table 1: Shows the no of fatal and non-fatal accidents at identified black spots

Identified Black spots	Year	No of fatal accidents	No of non fatal accidents
Mahadevpura	2014	7	60
	2015	9	66
	2016	29	151
Ram murthy nagar	2014	11	59
	2015	4	55
	2016	18	125
K R puram	2014	9	74
	2015	12	83
	2016	7	157

Table 2: Shows that traffic volume data of K.R.Puram junctions and streets.

DAYS	TIN FACTORY TO K.R.PURAM		K.R.PURAM RAILWAY STATION TO MARATHHALLI		TIN FACTORY TO HEBBAL		K.R.PURAM RAILWAY STATION TO HEBBAL	
	PCU/hr	PCU/day	PCU/hr	PCU/day	PCU/hr	PCU/day	PCU/hr	PCU/day
DAY 1	10875	261310	3284	78816	3894	93456	6814	163536
DAY 2	12466	299184	3457	82968	3953	94872	5844	140256
DAY 3	10243	245832	3480	83520	2774	66576	4896	117504
DAY 4	9536	228864	3564	85536	3882	9168	5205	124920
DAY 5	7630	183120	2544	61056	2940	70560	3096	74304
DAY6	6019	144456	2412	57888	2667	64008	4985	119640
DAY 7	5750	138000	2303	55272	2451	58824	2059	49416

B. **Spot speed studies**

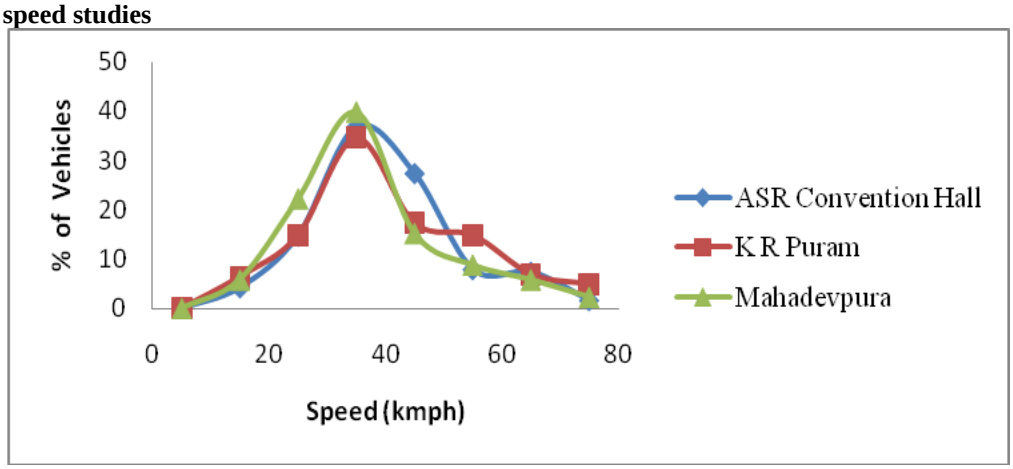

Fig 2: Variation of speed with respect percentage of vehicles plying

Table 3: Shows Maximum speed attained at each point

LOCATION	MAXIMUM SPEED (Modal avg) kmph
MAHADEVPURA	35
ASR CONVENTIONAL HALL	35
K R PURAM	35

C. **Speed & Delay studies**

Table 4: Shows that the average journey and running speed

FROM	TO	AVERAGE JOURNEY SPEED IN (Kmph)	AVERAGE RUNNING SPEED IN (Kmph)
K R PURAM	HEBAL	20.24	36.64
HEBAL	K R PURAM	29.84	35.26
MAHADEVPURA	ASR CONVENTION HALL	15.04	34.74
ASR CONVENTION HALL	MAHADEVPURA	23.35	38.68

Discussion: It is observed from table:1 that more number of fatal and non fatal accidents were reported at K.R Puram and accident rates were in increasing trend at this junction. Also it is observed from table:2 that an average of more than 1 lakh vehicle plying in the roads of KR puram per day which directly infers that road capacity has exceeded its optimum capacity. Even though it is Connecting roads of NH & SH the maximum number of vehicles moving with a speed of 35 kmph during half peak hour in clear stretch as observed in table 3 and Fig:2 this clearly indicates that there is an huge traffic congestion problem encountered in KR puram roads. It is also evident from table:4, the average journey speed obtained is 20 kmph which states that more time is required to travel small stretch of KR puram roads. Considering above obtained results it is concluded that KR puram roads offering a least level of service of E or F which is leading huge loss of fuel, more delay and accidents, unstable flow etc.,

V. AUDIT ON REMEDIAL MEASURES

A. Identification of Conflict points:

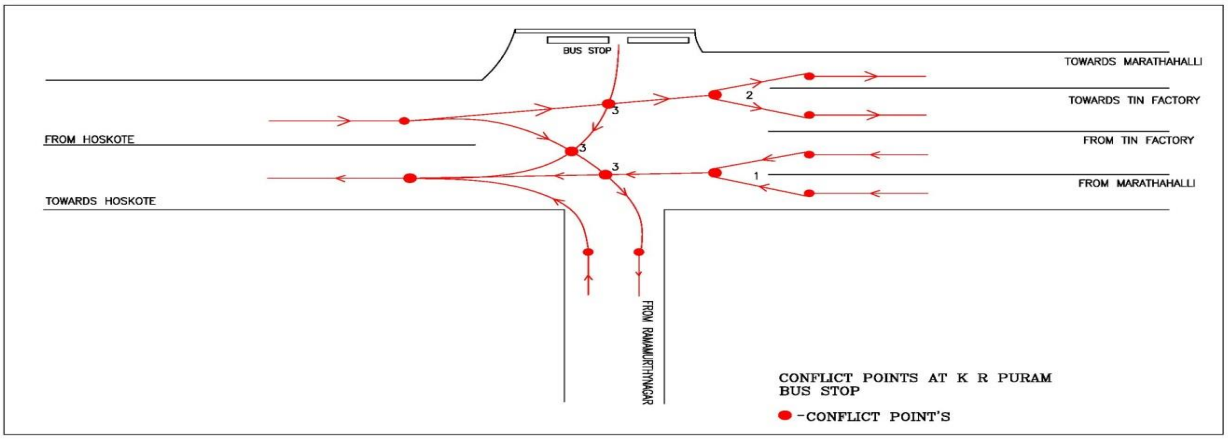

Fig 3: Shows that conflict point at K.R.Puram

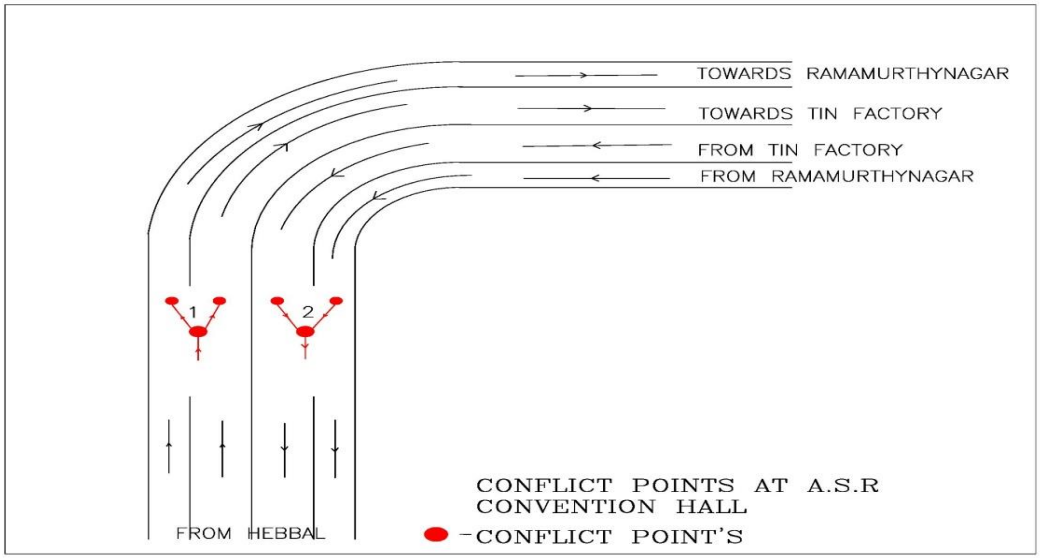

Fig 4: Shows that conflict point at ASR Conventional Hall

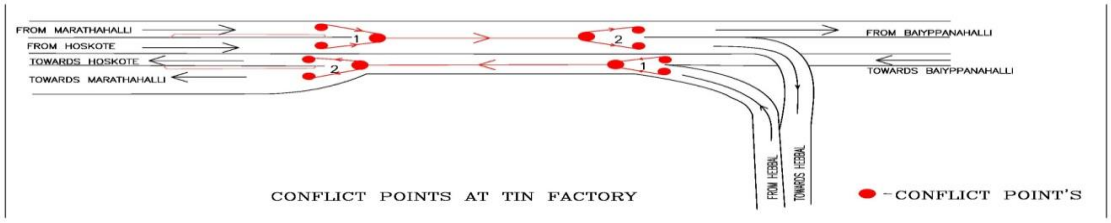

Fig 5: Shows that conflict point at Tin Factory

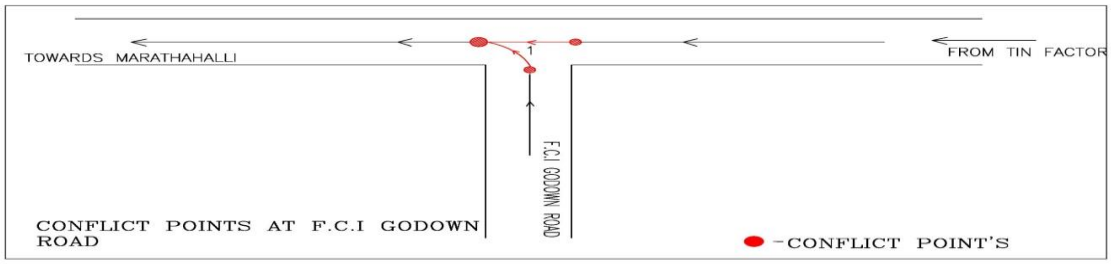

Fig 6: Shows that conflict point at Tin Factory (Intersection)

B. Proposed designs

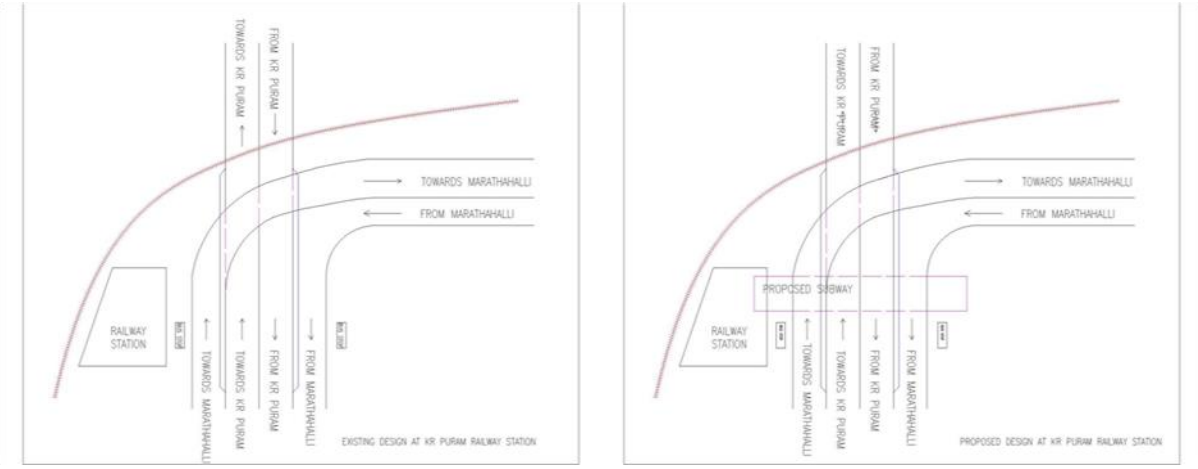

Fig 7: shows that the existing and proposed design for KR Puram railway station

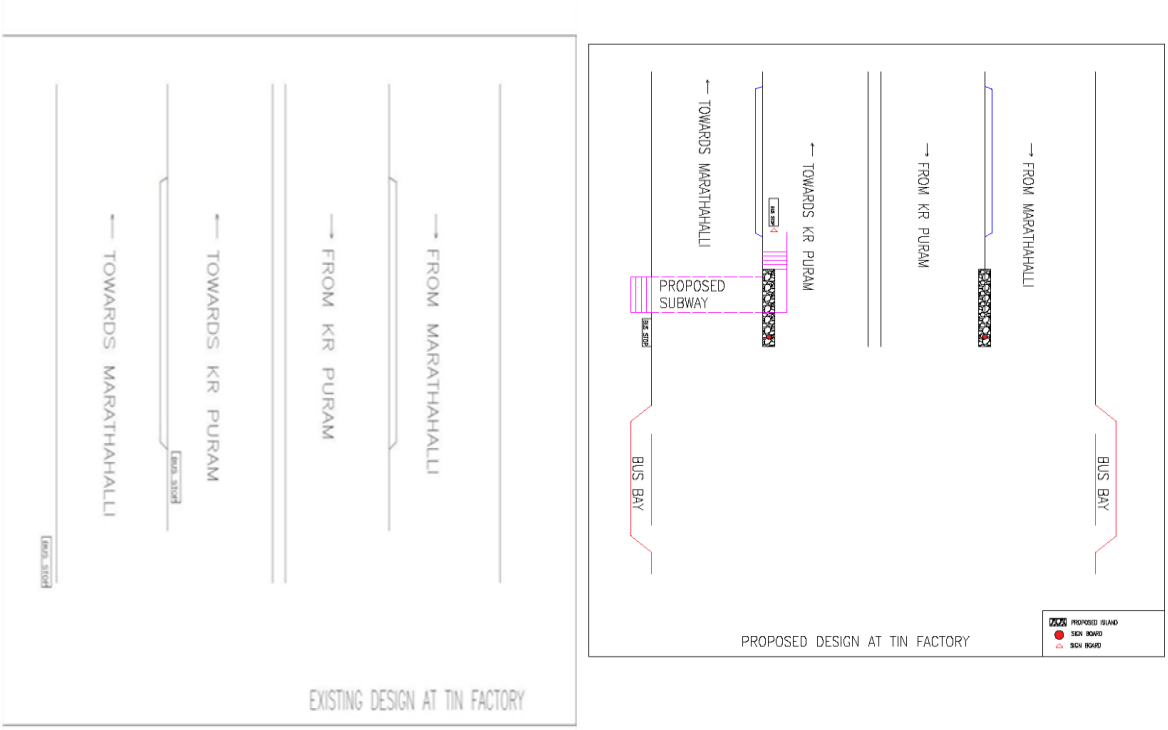

Fig 8: shows that the existing and proposed design at tin factory

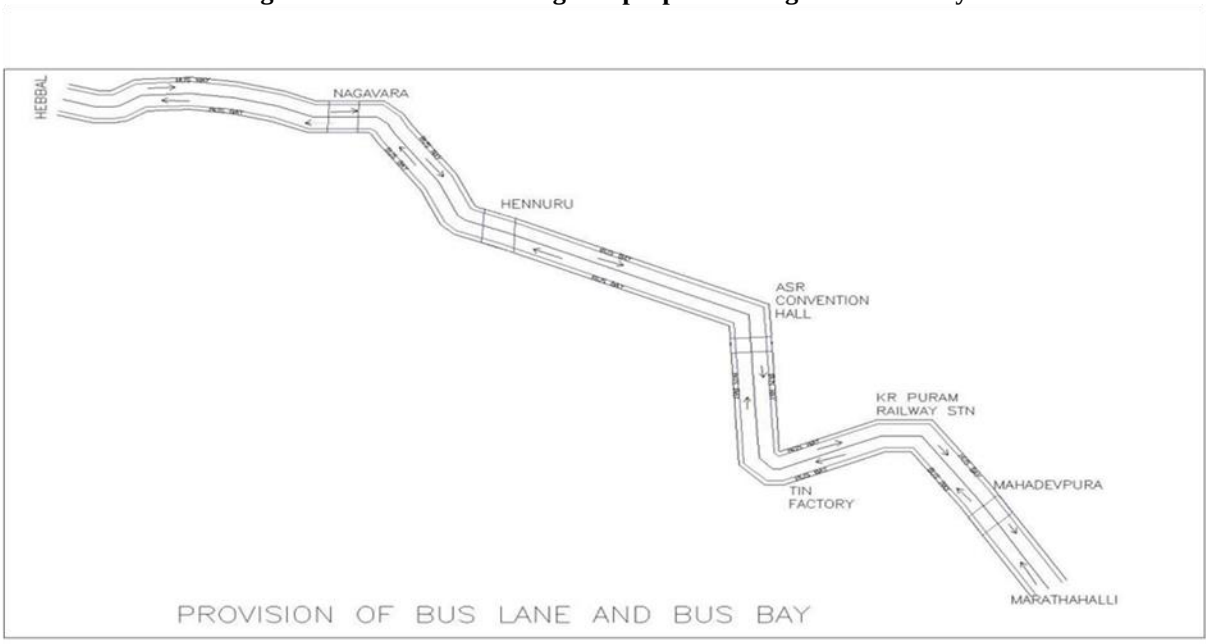

Fig 9: Provision of Bus lane & Bus Bay

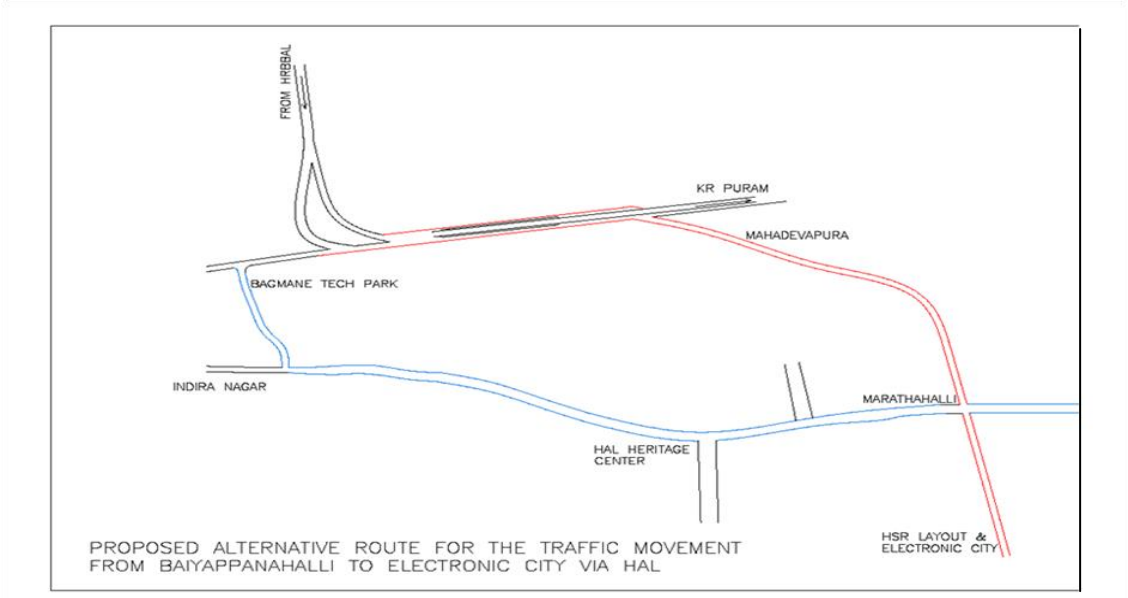

Fig 10: Proposed alternative route

VI. CONCLUSIONS

1. From floating car technique K.R.Puram roads are operating with an average journey speed of 20 Kmph and an average running speed of 35 Kmph.
2. Average volume traffic operating in KR Puram roads is 4300 PCU/hour
3. From the past and existing studies the accident rate at KR Puram roads is very much high.
4. Presently K.R.Puram roads are operating with a level of service D and E according to HCM manual hence by incorporating the suggested remedial measures level of service may be increased to B and C.
5. Incorporating Subway and Bus bay as shown in fig: 7 & 8 at the KR Puram railway station and Tin Factory flyover will effectively reduce the conflict points and congestion. This allows the smooth flow of traffic in KR Puram roads.
6. Provision of bus lane from hebbal to KR Puram as shown in fig:9 is reduces traffic congestion throughout the stretch.
7. Diverging the traffic from Byappanhalli to Electronic city via HAL road as shown in fig:10 which will reduce the congestion at Mahadevpura.

VII. APPLICATION

1. Consumption of fuel can be effectively saved which is lost during idling of the vehicle during slow movement of traffic.
2. Safe movement of traffic and less number of accidents which results in reduction in property damage and deaths.
3. Reduction in the number of conflict points which will give safety crossings for pedestrians at the intersections

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