Accident Study on NH-5 between Enikepadu and Benz Circle

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Abstract **- The study of different reasons was there for occurrence of Accidents at different locations. It may occur Naturally or by manual mistakes . But willingly no one want to participate in such activities. In this paper I am going to study at a particular location namely Enikepadu to Benz Circle which comes under NH-5 Route.**

Index Terms **- Accident, Enikepadu, Benz Circle**

1.INTRODUCTION

Accidents, tragically, are not often due to ignorance, but are due to carelessness, thoughtlessness and over confidence. William Haddon has pointed out that road accidents were associated with numerous problems each of which needed to be addressed separately. Human, vehicle and environmental factors and epidemiologically classified into time, place and person distribution. This project lays emphasis on accident studies on the 7km long National Highway -5 section between Enikepadu and Benz circle. This study stretch of National Highway -5 starts from Enikepadu village to Benz circle, with a total length of 7Kms. It is a four-lane divided highway with shoulder and side drains. The open side drains exist for some part of the study stretch. The service roads exist between Benz circle and Ramavarappadu circle only. For the purpose of the study, a Road Traffic Accident (RTA) was defined as accident, which took place on the road between two or more objects, one of which must be any kind of a moving vehicle.

There may be different conditions such as :

1. Road safety problem in developing countries:

Accident Scenario in India: 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 4lakhs persons are injured in about 3lakhs and more road accidents every year. The trend in road accidents and number of vehicle population is just 1% of the worlds, but her share of world road traffic accidents is 6%. Even though it can be observed from figure 2 that accident rate has been steadily decreasing over the past 25 years, the accident rate is still very high compared to the developed nations.

2. Road Condition and Traffic Safety:

The effect of road conditions in road safety to date is still underestimated. On the basis of wide spread scientific research involving analysis of road accidents and a study of how vehicles are driven under different road conditions, it will be probable for the highway engineer to establish the effect of road condition on accidents. The main road conditions that contribute to accidents are:

1. Road width
2. Width and state of shoulders
3. Width of the median
4. Grades
5. Deficiency in sight distance
6. Radius of the horizontal curve and deficiency in super elevation at curves.

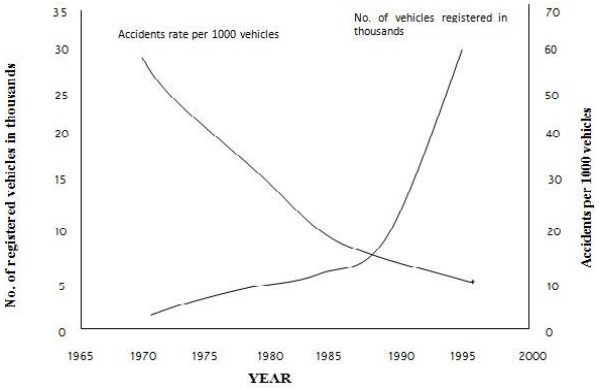


Fig: 1.2: Trends in vehicle Registration and Accidents rates in India From 1970-1995

The traffic parameters, which affect safety, are traffic volume and speed. The engineering solutions to the safety problem consist in suggesting suitable improvements to the road conditions or to suggest suitable changes in the management of traffic.

Measures for the reduction in accident rates
ENGINEERING MEASURES

- Road design: The geometric design features of the road such as sight distance, width of pavement and intersection design elements are checked and corrected if necessary. The pavement surface characteristics such as skid resistance values are checked and steps taken to bring them up to the design standard.
- Preventive maintenance of vehicles: The breaking system, steering, and lightning arrangements of vehicle playing on the road may be checked at suitable intervals.
- Road lightning: Proper Road lightning can decrease the rate of accidents during night, due to poor visibility. Lightning is particularly desirable at intersection, bridges etc.

3. ENFORCEMENT MEASURES

Speed control: To enable drivers of all vehicles to develop correct speed habits tachometers may be fitted so as to give the record of speed. Also surprise checks on spot speed of all fast-moving vehicles should be done at selected locations and timings legal action on those who violate the speed limits should be taken.
Traffic control devices: Proper traffic control device like signs, markings or channelizing islands may be installed wherever found necessary.
Medical check: The drivers should be tested for vision and reaction time at prescribed intervals, say, once in three years.
Special precautions for commercial vehicles: It may be insisted on having a conductor to help and give proper direction of heavy commercial vehicles.

4. EDUCATIONAL MEASURES

Education of road users: The passengers and pedestrians should be taught the rules of the road. The Indian Road congress has recently prepared highway safety code and the document on road safety for school children and an instruction manual on road safety education is under preparation.

Safety drive: Road users should be impressed what should and what should not be done, with the help of films and documentaries. Training courses may be conducted for drivers. The IRC has been organizing highway safety workshop in different regions of country.

Road accidents:

- In Vijayawada about 2,000 people die in road accidents, every year.
- The vehicular population in Vijayawada is around 60lakhs.
- 10,000 vehicles are added every month.
- In India about 80,000 people die on roads, i.e. 1 person dies every 6 minutes. India contributes 6.5% of total fatal accident.
- Rs.55, 000Crores are lost due to road accidents in India every year.
- Every year about 12lakhs people die in road accidents all over world.

5. Level of service concept:

When a road is carrying a traffic equal in volume to its capacity under ideal roadway and traffic conditions, the operating conditions become poor, speed drops down delay and frequency of stops mount up. The services which a roadway offers to the road user can vary due to volumes of traffic. The highway capacity manual has introduced the concept of "Levels of service" to denote the level of facility one can drive from a road under different operating characteristics and traffic volumes. The concept of levels of service is defined as a qualitative measure describing the operational conditions within a traffic stream, and their perception by motorists and/or passengers. The following are the factors which might be considered in evaluating the level of service:

- Speed and travel time, including the operating speed and overall time consumed in travelling over a section of roadway.
- Traffic interruptions or restrictions, with due consideration to the number of stops per mile, delays involved and the speed changes necessary to maintain space in the traffic stream.
- Freedom to manoeuvre to maintain the desired operating speeds.
- Driving comfort and convenience reflecting the roadway and traffic conditions in so far as they

affect driving comfort and convenience of the driver.

- Economy, with due consideration operating cost of the vehicle.

Even though it is desirable to consider all the above factors in identifying a particular level of service, it is difficult to incorporate all these in the absence of accurate data. The HCM, therefore, utilizes (i) travel speed and (ii) the ratio of the service volume to capacity, depending upon the particular problem. The latter is often referred to as "v/c" ratio in the manual. As records in the travel speed, the manual recommends the use of operating speeds on those types of highways carrying generally uninterrupted flow, such as in rural areas. For urban locations, the manual recommends the use of average overall travel speed.

The operating conditions for the six levels of service selected by the manual. There are six levels of service like Level A, Level B, Level C, Level D, Level E, Level F. Level A representing the highest and Level F representing the lowest.

Fig.1 gives a typical curve showing the relationship generally found between operating speed and volume/ capacity ratio, in this figure are depicted the zones where the different levels of service are generally found to occur. The diagram pertains to a multi- lane high- way.

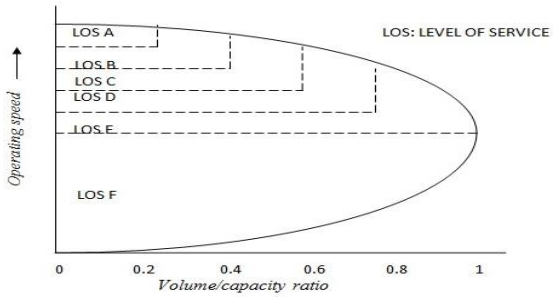


Fig: 1.3 typical speed flow curve for multilane highways

2.ACCIDENT DATA

Accident data was collected from local police station and is presented below.

- Following conclusions can be drawn from the accident data.
- 67% of fatal accidents & 62% of non-fatal accidents on the national highway without service road.

All fatal accidents occurred between pedestrians and heavy vehicle (bus or lorry) or between two wheelers and heavy vehicle.

ACCIDENT DATA BETWEEN RING ROAD TO BENZ CIRCLE-2012 (WITH SERVICE ROAD)								
RING ROAD TO GOVT.HOSPITAL INTERSECTIONS								
S.NO	NAME OF ACCIDENT	NAME OF OFFENCE	DATE	TIME	CRIME VECHICLE	VICTIMVEHICLE	NO OF DEATH	NO OF INJURE
1	NON-FATAL	OPP.G.G.H.HOSPITAL	13-01-2012	16:30	CAR	PEDESTRAIN	0	1
2	FATAL	OP.TATAMOTORS	23-02-2012	14:00	TANKER	RIDER OF MOTOR CYCLE	1	0
3	NON-FATAL	OPP.G.G.H.HOSPITAL	01-03-2012	14:00	RTC	PASSENGER	0	1
4	NON-FATAL	OPP.NTR.UNIVARCITY	19-1-2012	14:00	MOTOR CYCLE	PEDESTRAIN	0	1
5	FATAL	MAHANADU.ROAD	13-06-2012	10:00	LORRY	RIDER OF MOTOR CYCLE	1	0
6	NON-FATAL	MAHANADU.ROAD	07-08-2012	01:00	BUS PVT	AUTO DRIVER	0	1
7	NON-FATAL	CURRENCY.NAGAR	10-09-2012	05:30	LORRY	PEDESTRAIN	0	1
8	NON-FATAL	CURRENCY.BUSSTOP	16-12-2012	13:50	CAR	PEDESTRAIN	0	1
9	NON-FATAL	OPP.CURRNCY.BUS STOP	19-12-2012	15:15	CAR	PEDESTRAIN	0	1
GOVT.HOSPITAL TO RAMESH HOSPITAL INTERSECTIONS								
1	FATAL	SRINAGAR.COLC.JN	22-01-2012	06:30	UNKNOVN VECHICLE	PEDESTRAIN	1	0
2	NON-FATAL	RAMESH.H.JN	21-01-2012	23:30	CAR	RIDER OF MOTOR CYCLE	0	1
3	FATAL	OPP.SRINAGAR COLONY	15-02-2012	03:45	UNKNOVN VECHICLE	PEDESTRAIN	1	0
4	NON-FATAL	OPP.VINAYAKATHERTRE	03-05-2012	18:30	CAR	PEDESTRAIN	0	1
5	NON-FATAL	BHARATINAGAR	28-03-2012	20:30	CAR	PEDESTRAIN	0	1
6	NON-FATAL	VINAYAKATHERTRE	04-05-2012	21:30	MOTOR CYCLE	PEDESTRAIN	0	1
7	NON-FATAL	RAMESH HOSPITAL	29-06-2012	05:00	LORRY	CYCLIST	0	1
8	NON-FATAL	OPP.VINAYAKATHERTRE	22-09-2012	15:30	CAR	PEDESTRAIN	0	1
9	NON-FATAL	OPP.DASRADH.MOTORS	06-03-2012	19:30	BUS PVT	RIDER OF MOTOR CYCLE	0	1

RAMESH HOSPITAL ROAD TO NIRMALA CONVENT ROAD INTERSECTIONS								
1	NON-FATAL	NEAR STELLA COLLEGE	01-07-2012	17:30	MOTOR CYCLE	RIDER OF MOTOR CYCLE	0	3
2	NON-FATAL	OPP.INDH-THEATRE	25-08-2012	19:50	MOTOR CYCLE	PEDESTRAIN	0	1
3	FATAL	NIRMALA CONVENT.JNU	04-10-2012	23:10	RTC BUS	RIDER OF MOPED	1	0
4	NON-FATAL	MATA TOWERS,NIRMALA	24-05-2012	19:00	RTC BUS	PASSENGER OF BUS	0	1
NIRMALA CONVENT ROAD TO BENZ CIRCLE								
1	NON-FATAL	NEAR BENZ CIRCLE	30-04-2012	22:40	LORRY	MC	0	1
2	NON-FATAL	SAMARAM.HOSPITA	29-07-2012	15:45	LORRY	RIDER OF MOPED	0	1
3	NON-FATAL	BENZ CIRCLE.NH-5	10-06-2012	00:00	LORRY	CYCLIST	0	1
4	FATAL	BENZ CIRCLE.NH-5	24-11-2012	16:00	LORRY	RIDER OF MOTOR CYCLE	2	0
						TOTAL	7	22

ACCIDENT DATA BETWEEN ENIKEPADU TO RING ROAD(WITHOUT SERVICE ROAD)-2012								
S.NO	NAME OF ACCIDEN	NAME OF OFFENCE	DATE	TIME	CRIME VECHICLE	VICTIMVEHICLE	NO OF DEATH	NO OF INJURE
1	NON-FATAL	PRASDAMPADU	03-01-2012	15:30	CAR	PEDESTRAIN	0	1
2	FATAL	ENIKEPADU	07-01-2012	09:00	LORRY	CYCLIST	1	1
3	NON-FATAL	ENIKEPADU	22-01-2012	06:00	LORRY	PEDESTRAIN	0	1
4	NON-FATAL	RAMAVARAPPADU	27-01-2012	02:15	MOTOR CYCLE	PEDESTRAIN	0	2
5	NON-FATAL	ENIKEPADU	29-01-2012	06:10	MOTOR CYCLE	PEDESTRAIN	0	1
6	NON-FATAL	PRASDAMPADU	29-01-2012	09:00	CAR	RIDER OF MOTOR CYCLE	0	1
7	FATAL	ENIKEPADU	05-02-2012	17:30	MOTOR CYCLE	PEDESTRAIN	1	0
8	NON-FATAL	ENIKEPADU	06-02-2012	08:00	CAR	CYCLIST	0	1
9	NON-FATAL	ENIKEPADU	02-03-2012	15:30	AUTO	RIDER OF MOTOR CYCLE	0	1
10	FATAL	BALLEMVARI STREET	07-03-2012	01:00	UNKNOVN VEHICL	PEDESTRAIN	1	0
11	FATAL	ENIKEPADU	15-03-2012	22:30	UNKNOVN VEHICL	RIDER OF MOTOR CYCLE	1	0
12	FATAL	PRASDAMPADU	21-03-2012	21:00	CHASIS	RIDER OF MOTOR CYCLE	1	1
13	NON-FATAL	ENIKEPADU	05-04-2012	20:30	MOTOR CYCLE	PEDESTRAIN	0	1
14	NON-FATAL	RAMAVARAPPADU	15-04-2012	09:45	CAR	RICKSHA PULLER	0	1
15	NON-FATAL	RAMAVARAPPADU	19-04-2012	07:30	LORRY	RIDER OF MOPED	0	1
16	NON-FATAL	RAMAVARAPPADU	24-04-2012	20:00	MOTOR CYCLE	PILLON-RIDER	0	1
17	NON-FATAL	ENIKEPADU	05-05-2012	20:00	MC ACTIVA	PEDESTRAIN	0	1
18	NON-FATAL	ENIKEPADU	08-05-2012	16:00	MOTOR CYCLE	RIDER OF MOTOR CYCLE	0	1
19	FATAL	ENIKEPADU	13-05-2012	00:30	CAR	RIDER OF MOTOR CYCLE	1	0
20	FATAL	ENIKEPADU	13-05-2012	15:00	LORRY	RIDER OF MOTOR CYCLE	1	1
21	NON-FATAL	ENIKEPADU	20-06-2012	05:30	MOTOR CYCLE	PEDESTRAIN	0	1
22	NON-FATAL	ENIKEPADU	26-06-2012	12:15	LORRY	CYCLIST	0	1
23	NON-FATAL	RAMAVARAPPADU	27-06-2012	08:00	MOTOR CYCLE	RIDER OF MOTOR CYCLE	0	1
24	FATAL	SRK COL.,ENIKEPADU	18-07-2012	16:45	CAR	WAITING FOR BUS	1	3
25	FATAL	RAVITENT,R.P.ADU	13-07-2012	08:00	AUTO ACE	PEDESTRAIN	1	0
26	NON-FATAL	TANIKASALA-PRASA	21-07-2012	22:00	MOTOR CYCLE	CYCLIST	0	1
27	FATAL	ENIKEPADU	04-08-2012	05:00	UNKNOVN VECHIC	PEDESTRAIN	1	0
28	NON-FATAL	SUBHAKALAYAMA	06-08-2012	15:00	CAR	RIDER OF MOPED	0	1
29	NON-FATAL	ENIKEPADU	07-08-2012	09:00	CAR	AUTO DRIVER	0	1
30	NON-FATAL	ENIKEPADU	08-08-2012	10:00	LORRY	RIDER OF MOTOR CYCLE	0	1
31	NON-FATAL	ENIKEPADU	04-08-2012	15:30	AUTO	RIDER OF SCOOTER	0	1

3. ANALYSIS OF ACCIDENT DATA

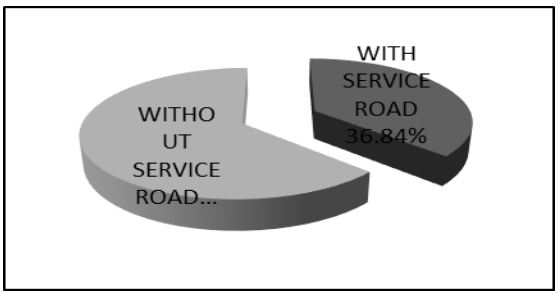


Fig: 2.1 Fatal accidents between Enikepadu and Benz circle-2012

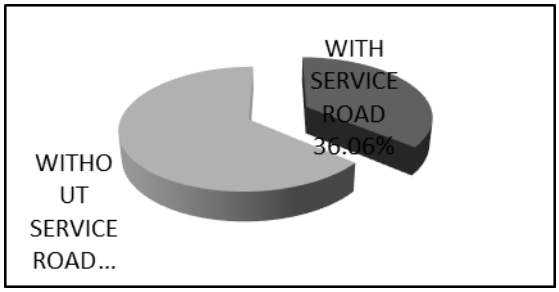


Fig: 2.2 Non-fatal accidents between Enikepadu and Benz circle-2012

ACCIDENT DATA BETWEEN ENIKEPADU AND RING ROAD. WITHOUT SERVICE ROAD

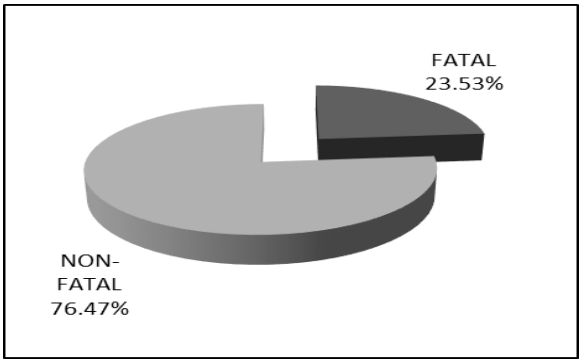


Fig: 2.3

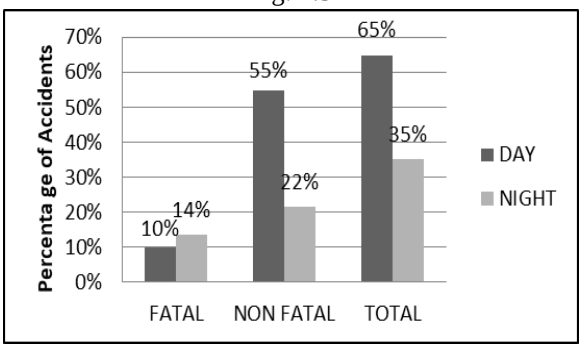


Fig: 2.4 Time wise accident distribution

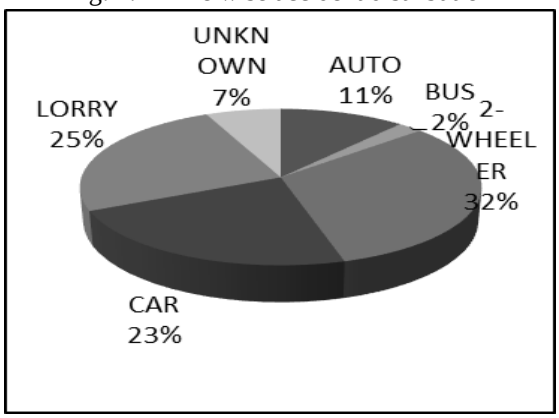


Fig: 2.5 Accident distribution based on types of vehicles

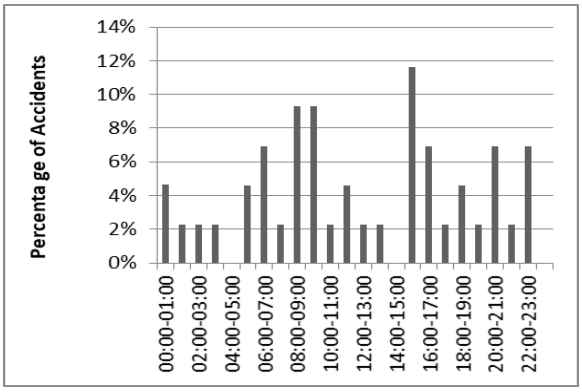


Fig: 2.6 Hourly distributions of accidents

ACCIDENT DATA BETWEEN RAMAVARAPPADU RING AND BENZ CIRCLE WITH SERVICE ROAD

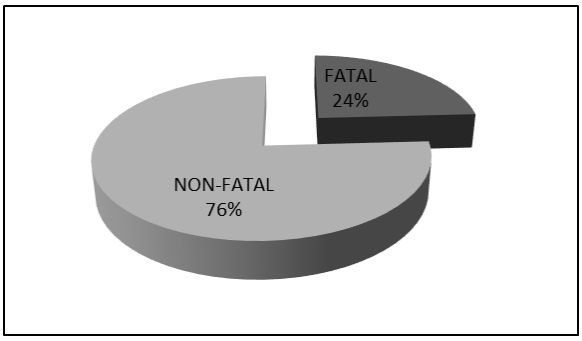


Fig: 2.7 Fatality rate between Ramavarappadu to Benz circle

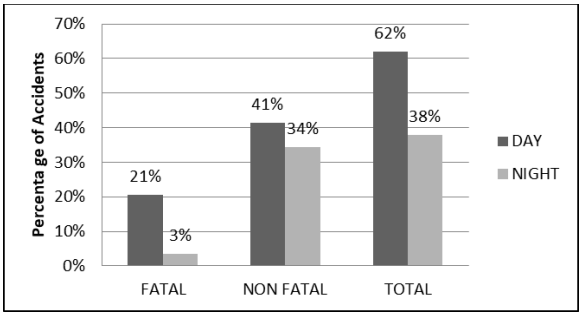


Fig: 2.8 Time wise accident distribution

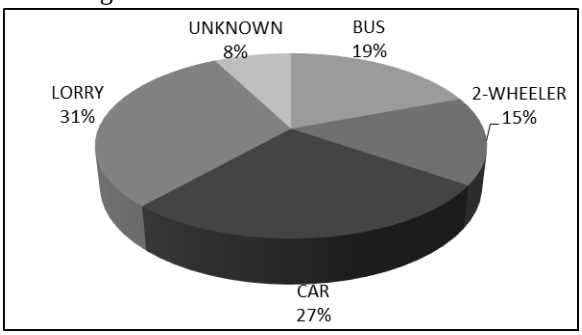


Fig: 2.9 Accident distribution based on types of vehicles

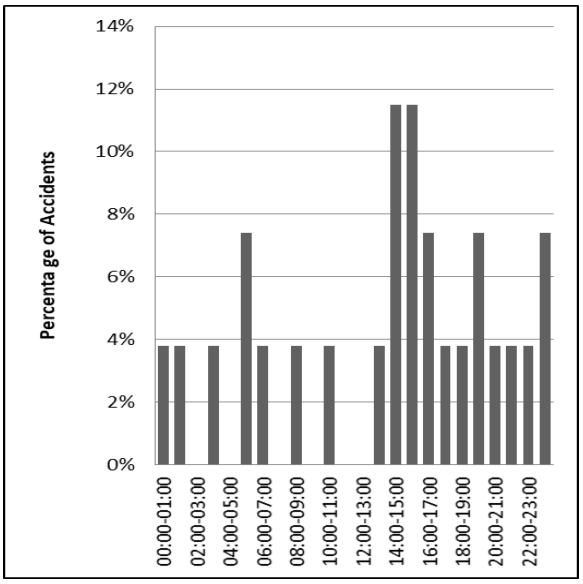


Fig: 2.10 Hourly distributions of accidents

4. INTERSECTION DETAILS

GENERAL:

AT the intersection there are through, turning and crossing traffic and these traffic movements may be handled in different ways depending on the type of intersection and its design. The efficiency, safety, speed, cost of operation and capacity of road system very much depends on the intersection design.

Intersection is classified into two basic groups:

- Intersection at grade: These include all roads which meet at more or less the same level. Merging, diverging and crossing are involved in the intersection at grade.
- Grade separated intersection: The intersecting roads are separated by difference in level, thus eliminating the crossing manoeuvres.

Intersection at grade:

All road intersections which meet at about the same level allowing traffic manoeuvres like merging, crossing, and weaving are called intersection at grade. These intersections may be further classified as unchannelized, channelized and rotary intersections.

The basic requirements of intersection at grade are:

- At the intersection the area of conflict should be as small as possible.
- Good lighting at night is desirable.

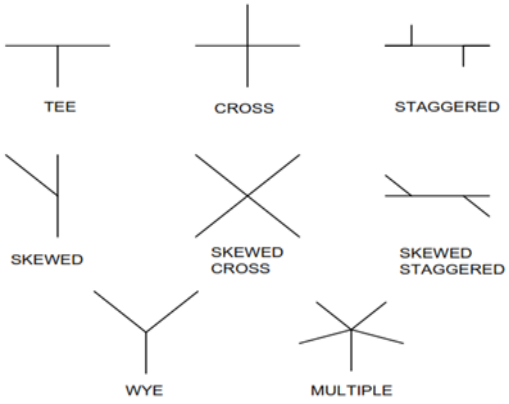


Fig: 4.1 Forms of intersection

Unchannelized intersection:

Unchannelized intersections are the lowest class of intersection, easiest in the design, but most complex in traffic operations resulting in maximum conflict area and more number of accidents, unless controlled by traffic police or signals. When no additional pavement width for turning movement is provided, it is called plain intersection. But when the pavement is widened at the intersection area, by a traffic lane or more, it is known as flared intersection.

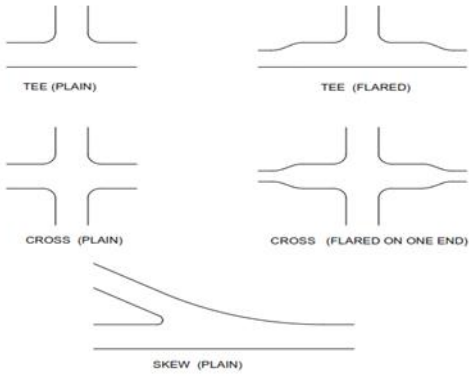


Fig: 4.2Unchannelized intersection

Channelized intersection:

Channelized intersection is achieved by introducing islands into the intersectional area, thus reducing the total conflict area available in the unchannelized intersection. These islands help to channelize turning traffic, to control their speed and angle of approach and to decrease the conflict area at the intersection. Channelization may be either partial or complete with divisional and directional islands and medians. Channelized intersections are considered superior to the all-paved types.

Advantages of channelized intersection

- By channelization vehicles can be confined to definite paths.
- Speed control can be established over vehicles entering the intersection.

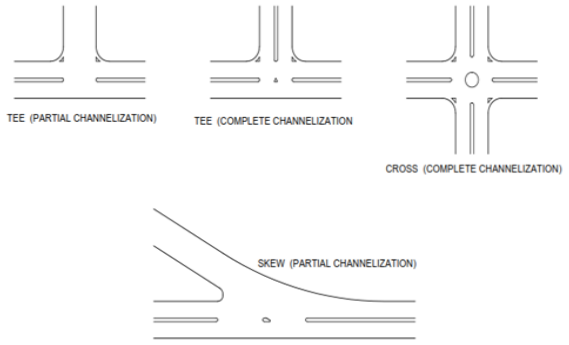
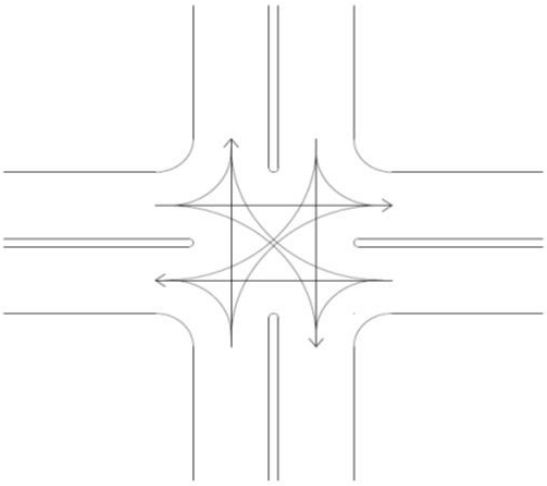


Fig: 4.3 Channelized intersection



Standard four-way intersection has 12 conflicts

Four-way intersection on NH-5with service road has 36 conflicts

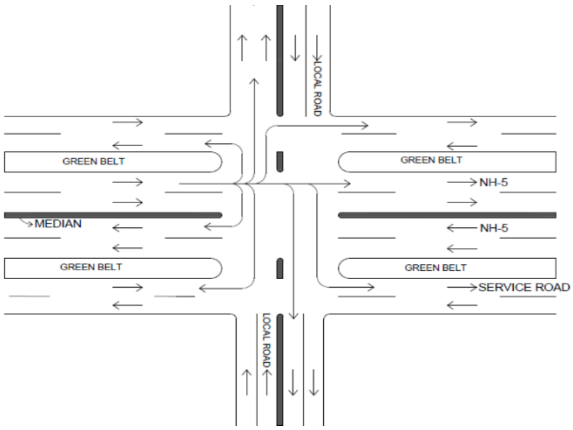


Fig: 4.4

Rotary intersection

General:

Rotary intersections are special form of at-grade intersections laid out for the movement of traffic in one direction around a central traffic island. Essentially all the major conflicts at an intersection namely the collision between through and right-turn movements are converted into milder conflicts namely merging and diverging. The vehicles entering the rotary are gently forced to move in a clockwise direction in orderly fashion.

Selection of rotary intersections:

There are few guidelines that help in deciding the suitability of a rotary.

- Rotaries are suitable when the traffic entering from all the four approaches relatively equal.
- A total volume of about 3000 vehicles per hour can be considered as the upper limiting case and a volume of 500 vehicles per hour is the lower limit.
- A rotary is very beneficial when the proportion of the right-turn traffic is very high; typically if it is more than 30%

Traffic operations in a rotary:

There are three types of traffic operations in a rotary. They are diverging, merging and weaving.

- Diverging: It is a traffic operation when the vehicles moving in one direction is separated into different streams according to their destinations.
- Merging: Merging is the opposite of diverging. Merging is referred to as the process of joining the traffic coming from different approaches and going to a common destination into a single stream.
- Weaving: Weaving is the combined movement of both merging and diverging movements in the same direction.

Design Elements:

The design elements include design speed, radius at entry, exit and the Central Island, weaving length and width, entry and exit widths. In addition the capacity of the rotary can also be determined by using some empirical formula.

Design speed:

All the vehicles are required to reduce their speed at a rotary. Therefore, the design speed of a rotary will be much lower than the roads leading to it. Although it is possible to design roundabout without much speed reduction, the geometry may lead to very large size incurring huge cost of construction. The normal practice is to keep the design speed as 30 and 40 kmph for urban and rural areas respectively.

Shape of Central Island:
The shape of Central Island depends on the number and the layout of the intersecting roads. The outline of the island consists of a number of curves of large radii, without corners. The various shapes considered to suit different conditions are circular, elliptical, turbine and tangent shapes, each having its own advantages and limitations. When two equally important roads cross at roughly right angles i.e., all the four radiating roads placed symmetrically, a circular shape is suitable.
Radius of rotary road way:
The one-way rotary road the central island has different radii at different points depending on the shape of the central island.
Adequate super elevation cannot be provided on the rotary roads and hence it is safer to neglect the super elevation and to take friction only into consideration to arrive at the allowable radius of the curve,
$R = V2/127f$
The values of the design coefficient of friction 'f' are taken as 0.43 & 0.47 for the speeds 40 & 30 kmph respectively, after allowing a factor of safety of 1.5. The IRC has suggested the radius of entry curve to be 20 to 35 m and 15 to 25m for rotary design speeds of 40 and 30 kmph.

Weaving angle and weaving distance:
The angle between the path of a vehicle entering the rotary and that of another vehicle leaving the rotary which are adjacent to each other is called weaving angle, and the distance between two vehicles is called weaving distance. The weaving length should be at least four times the width of the weaving section. The recommended value of weaving length is 45 to 90 m for 40 kmph and 30 to 60 m for 30 kmph design speeds.

Entrance and exit curves:
The curve traced by the inner rear wheel of vehicles determines the radius and shapes of entrance and exit curves. For the design speeds of 40 kmph the suggested radius at entry curves is 20 to 35 m and for 30 kmph, 15 to 25 m.

Capacity of the rotary:
The practical capacity of rotary mainly depends upon number of vehicles approaching the intersection.
The capacity is calculated by using the formula.
$Qp=280W\ (1+e/w)(1-p/3)/(1+w/l)$

Channelizing islands:
The channelizing islands should be provided at entrance & exit of rotary to reduce conflict area. The channelizing islands also help to reduce the speed of the vehicle when compared to its design speed. The shape & size of channelizing islands mainly depends upon flow of traffic.

Design factors:
Lighting:
The minimum lighting required is 1 each on the edge of Central Island facing each radiating road. Additional lights may also be provided when the diameter of central islands is greater than 60 m.

Traffic signs:
The standard traffic signs indicating the presence of rotary intersection should be installed at all approaching roads to give advance information for the traffic vertical black and white stripes of width 25 to 30 cm are provided on channelizing islands.

GRADE SEPARATED INTERSECTIONS
Grade Separated intersection is the highest form of intersection. The main advantage of this intersection is it causes least delay of crossing traffic and also reduces accidents.

Grade Separated Intersection is broadly classified into two types:

- Over pass: Bridges, Flyovers
- Under pass: tunnels

Advantages of Grade separated intersection:

- There is overall increase in comfort and vehicle operation cost.
- The movement of vehicle is quite easy and also safe.

Disadvantages of Grade separated intersection:

- It is very costly.
- If the topographic has very stepper gradients the vehicle operation may be difficult.

Over pass:

When the major highway is taken above the general ground by raising its profile by construction of an embankment is called over pass. It may be T-beam bridge or arch bridge.

Advantage of over pass:

The problem like drainage may be reduced by taking the major highway above the ground level.

Disadvantage of over pass:

If the major highway is to be taken over by constructing high embankments and by providing steep gradients, the increased grade resistance may cause speed reduction on heavy vehicles.

Under pass:

If the highway is taken by depressing it below the ground level to cross another road by means of an under-bridge.

Advantage of under pass:

The under-pass may be of advantage when the main highway is taken along the existing grade without alteration of its vertical alignment and crossroad is depressed and taken underneath.

Disadvantage of under pass:

There may be a drainage problem at under pass, especially when the ground water level is high in rainy season. So it is necessary to continuously pump the water otherwise it may leads to water logging conditions.

Existing Intersections from Ring Road to Benz circle are shown in the following pages.

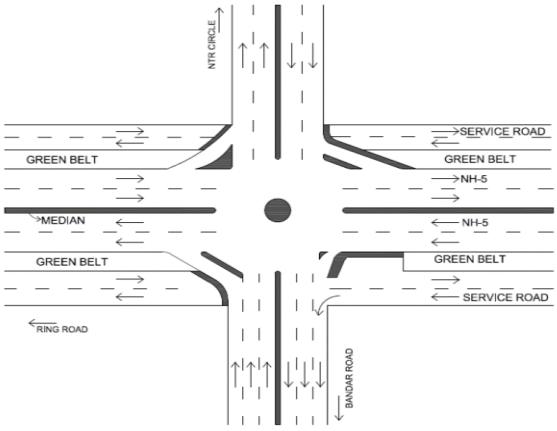


Fig: 4.5 Benz circle intersection

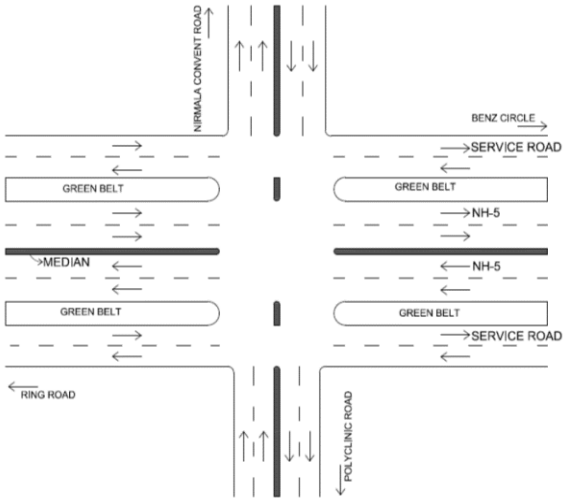


Fig: 4.6 Nirmala convent intersection

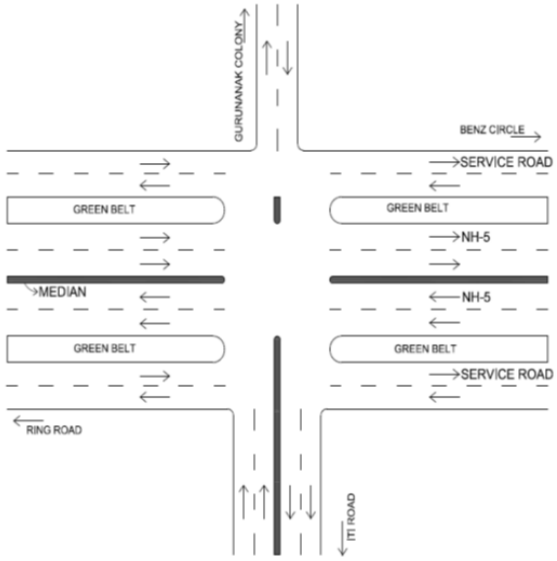


Fig: 4.7 Ramesh hospital intersection

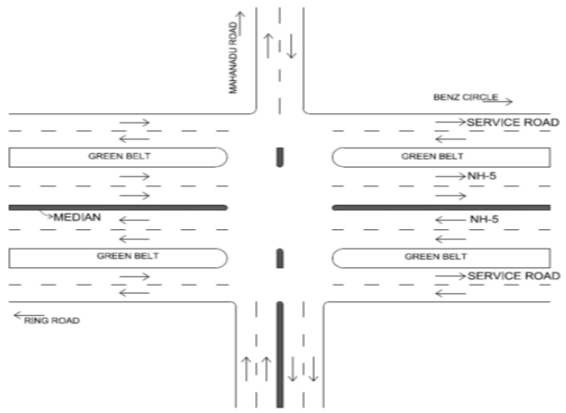


Fig: 4.8 Govt. Hospital intersection

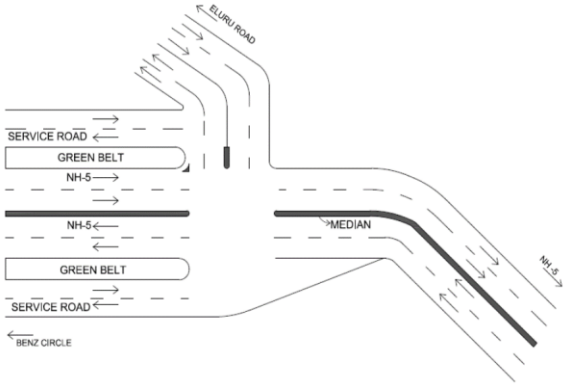


Fig: 4.9 Ramavarappadu Ring intersection

5. TRAFFIC DATA AT INTERSECTIONS:

Peak hour (5 pm to 6 pm) Traffic counts are done at all the intersection between ring road and Benz circle The data is presented in the following pages.
Following observation are made from the traffic data

- All Intersections are experiencing long delays due to traffic from service road.
- All Intersections are signalized.
- Service Roads at Benz circle are blocked from Intersection.

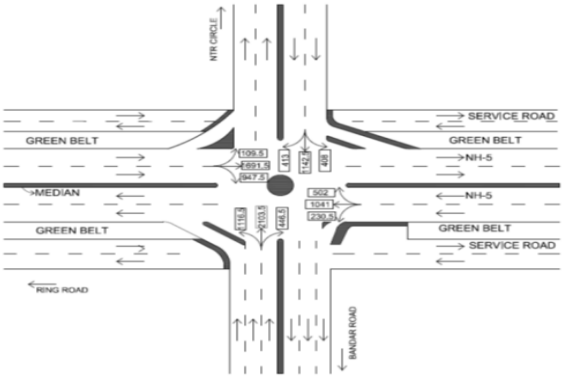


Fig: 5.1 Benz circle intersection

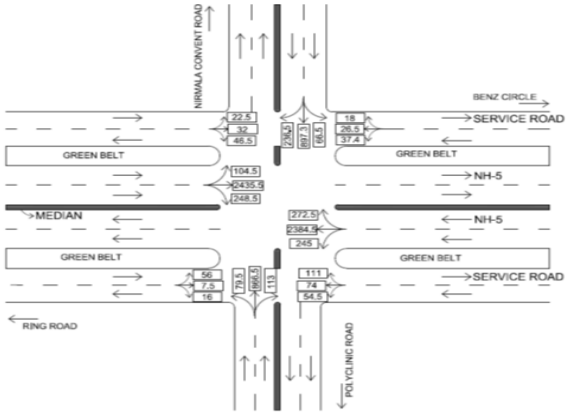


Fig: 5.2 Nirmala convent intersection

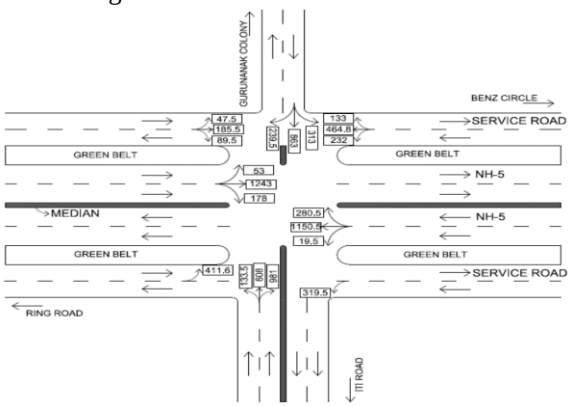


Fig: 5.3 Ramesh Hospital intersection

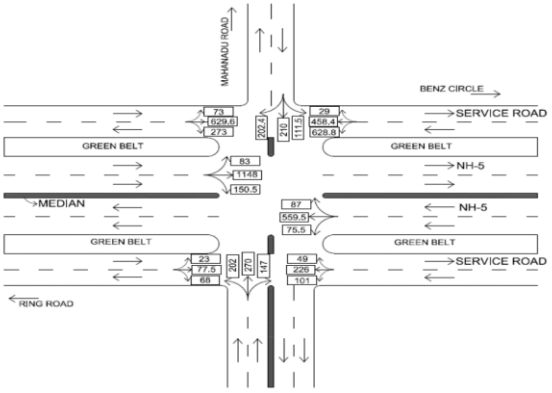


Fig: 5.4 Govt. Hospital intersection

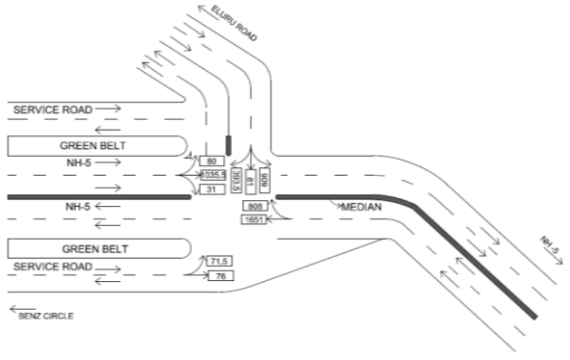


Fig: 5.5 Ring Road intersection

6. PROPOSED MODIFICATION OF INTERSECTIONS

Accidents and Level of service were studied on NH-5 from Enikepadu to Benz circle a distance of 7km. Enikepadu to Ring Road a distance of 3.3km is semi urban area. NH-5 has two lanes in each direction with a 1m wide median and 1m wide sidewalks on each side between Enikepadu and Ring Road. 12 of the Fatal Accidents occurred on this stretch of highway in the year 2012. Level of service during evening and morning peak hour reached level F with long delays.

To improve level of service and reduce accidents service road should be provided between Enikepadu and Ring Road.

NH-5 between Ring Road and Benz circle has two lanes in each direction with median Green belt and service roads. There are five intersections between Ring Road and Benz circle seven fatal accidents occurred in this stretch of road in 2012.

During peak hour it take 30 minutes to travel 3.7km with a travel speed of 7.4km per hour. The delays are due to traffic entering NH-5 from service road. Most of the accidents in this stretch are occurring at intersections.

To reduce accidents and increase level of service between Ring Road and Benz circle modifications to intersections are proposed as shown in the following pages. Since the service roads are blocked at intersections, access to service roads is proposed as shown in fig7.1

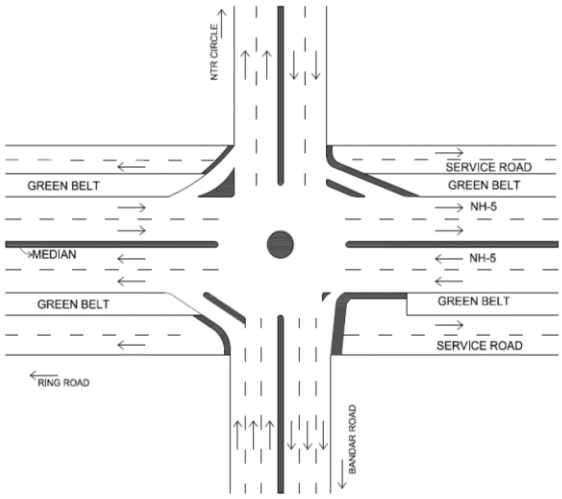


Fig: 6.1 Benz circle intersection

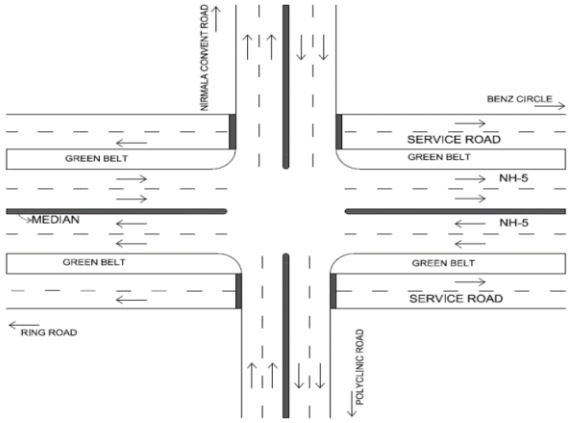


Fig: 6.2 Nirmala convent intersection

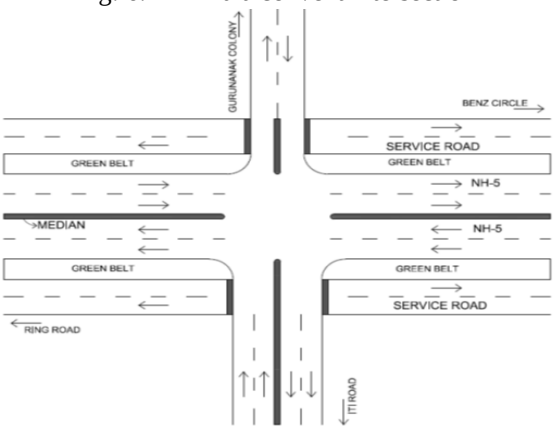


Fig: 6.3 Ramesh Hospital intersection

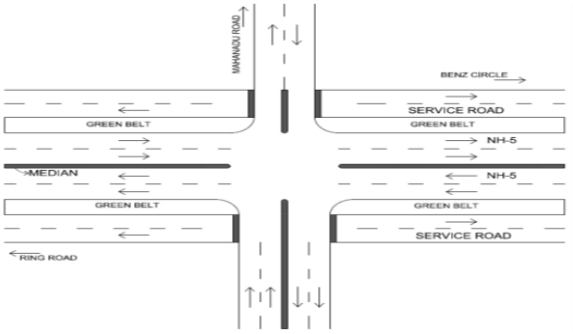


Fig: 6.4 Govt Hospital intersection

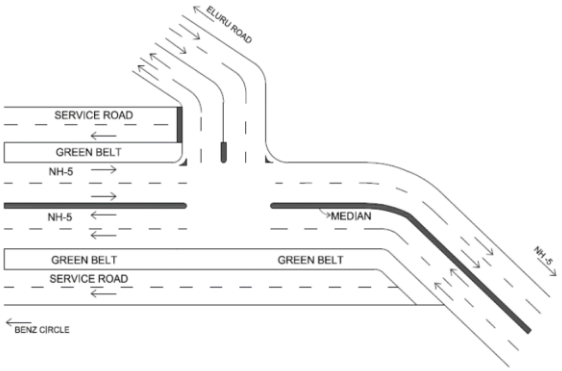


Fig: 6.5 Ring Road intersection

7. RECOMMENDATIONS

Following Recommendations are made based on study of accident data of NH-5 between Enikepadu and Benz circle

1. Provide service road bus bays and bus stops from Enikepadu to Ring Road.
2. Modify the intersections from ring road to Benz circle by blocking service roads at intersection.
3. Provide access to service roads from NH-5 in between intersections as shown in fig 7.1

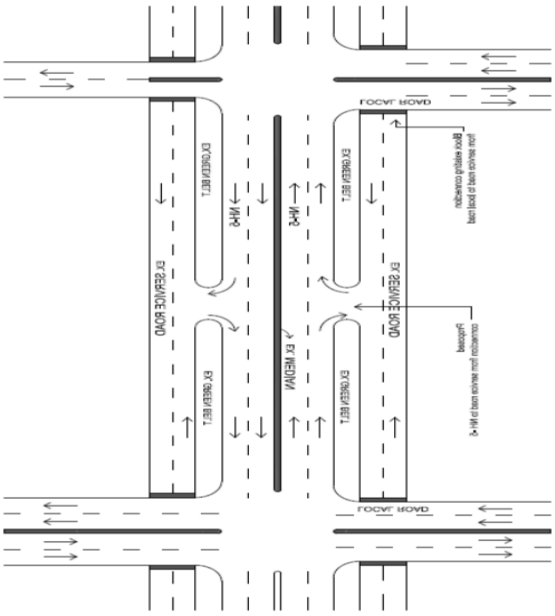


Fig: 7.1

CONCLUSIONS

As of my study I have been given some Recommendations and Proposals by intersection . If we follow these at lease we can reduce some percentage as which were happening weekly. Uther studies also will be studied.

REFERENCE

[1] Highway Engineering by S.K khanna & C.E.G Justo.
[2] Traffic Engineering by L.R.Kadiyali.
[3] Technical papers:
Accident study on NH-5 between Anakapalli to Visakhapatnam.