

Black Spot Management in NH 208 (Madurai-Virudhunagar Districts): A Case Study of Tamilnadu

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Abstract— An accident black spot is a term used in road safety management to denote 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, a hidden junction on a fast road, poor or concealed warning signs at cross-roads. This research work is focused on road accidents at identified black spots on National Highway-208 (Madurai- Virudhunagar Districts) origin from Kollam (Kerala) and terminates at Thirumangalam (Tamilnadu) where accidents cluster. After conducting field visits, deficiencies in road design were identified and remedial measures suggested with particular reference to sight distance, horizontal curvature, obstructions along the highway and junction design. This research work revealed that accidents at black spots can be prevented through better design of roads as there is relationship between speed and road geometry.

Keywords—Black spots; Road design; Remedial Measures; Tamilnadu

I. INTRODUCTION

Road transport deserves a high priority compared to other modes of transport like water transport and air transport, as it can effectively meet the demand for transport arising out of growing economic, social, health, cultural and religious needs of the people. The interaction between the level and pattern of transport resources and the average level of living of the population of an area is a critical factor affecting economic and social progress. Rapid industrial urban revolution has lead to increase in the number of vehicles and consequent traffic congestion and increased number of accidents.

II. ROAD SAFETY

Road safety is a serious global problem with more than one life is lost every minute. While the situation is improving in developed countries, less developed countries are experiencing increased number of road accidents. Several less developed countries have death rates per 10,000 vehicles, which are 20 times those of developed countries.

Accidents are due to culmination of more than one factor. Road user error is identified as the most common factor but engineering measures the road vehicle environment easier to deal with and reduce road error and improve road safety situation. This research work deals with identification of black

spots where accidents cluster and remedial measures to be adopted to reduce the occurrence of accidents.

III. IDENTIFICATION AND ANALYSIS OF ROAD ACCIDENT BLACK SPOTS

National Highways 7, 47, 49, 66, 67, 208, 209, 210, 226 and 227 are the major NH's pass through Tamilnadu State. Of these, NH 208 (195 kms) is the National Highway in south of Tamilnadu that links Madurai in Tamilnadu with Kollam (Quilon) in Kerala. NH 208, starts from NH 47 Kollam in Kerala and it joints Thirumangalam in Tamilnadu at NH 7.

Safety should be given special attention at the initial design stage of any road or intersection. It will often be possible at the initial design stage to develop designs or to incorporate at low cost safety features, which will reduce accident risks substantially. The driving tasks will be the result of the effect of a combination of geometry, road signs and markings and clear priorities should be presented to the driver. Geometric design characteristic and construction standards will depend on factors such as traffic flow and terrain, and the main accident problems and related safety features will also vary substantially.

The speed of vehicle traveling along a road will vary with vehicle type and condition, driver characteristics, road geometry and the presence of the other road users and speed controls. Geometric features presented to a driver should be consistent. The consistency is usually achieved through the concept of 'design speed'. In most current standards, the speed used for the estimation of design parameters, such as sight distance, are closely related to actual speeds.

Horizontal curves should be designed so that they can be negotiated safely by approaching vehicles. Tight horizontal curves can lead to accidents as drivers try to negotiate them at too high a speed. The side distance associated with larger radius curves encourage drivers to overtake when it is unsafe. In general, horizontal curve could either be designed geometrically so that the driver of an approaching vehicle can safely negotiate them, or the driver should be adequately warned of the need to reduce speed.

IV. METHOD OF IDENTIFYING ACCIDENT PRONE LOCATIONS

The stretch of National Highway-208 passing Madurai and Virudhunagar districts is considered on ranking basis. Data collected from the connected police record were used for

analysis. Accident analysis was carried out by the way of ranking analysis and identified the following accident prone locations.

1. T.Kalluppatti road (NH208 and NH7 Intersection)
2. Ammapatty (Alagapuri road)
3. Alagapuri Junction
4. Nathampatti road
5. Srivilliputtur Junction 1 (Church stop)
6. Srivilliputtur Junction 2 (Madavarvillagam)
7. Vanniyampatti Vilaku Junction
8. Devathanam

Field visits were taken up to study the field situation to identify deficiencies and suggest remedial measures.

V. DEFICIENCIES AND REMEDIAL MEASURES OF CASE STUDIES

A. Case 1

Kilometer stretch: 0.5 Km (NH208-Towards Kollam)

Place: Thirumangalam to T.Kalluppatti road (NH208 and NH 7 Intersection)

Fig 1 (a) shows the following deficiencies on the existing stretch under investigation:

- i. The curve is deficient of berms.
- ii. Sight/stopping distance is obstructed by encroachments.

Remedy:

- i. The curve is to be improved by providing berms to the road as shown in Fig 1 (c)
- ii. The encroachments should be removed to enable the driver to have sufficient sight/stopping distance.
- iii. Appropriate road sign boards and markings are suggested.

B. Case 2

Kilometer stretch: 19 Km (NH 208-Towards Kollam)

Place: Ammapatty

Fig 2 (a) shows the following deficiencies on the existing stretch under investigation:

- i. The existing horizontal curve is not standard.
- ii. The encroachments causing obstruction to the driver to have sufficient sight/stopping distance.

Remedy:

- i. The horizontal curve is to be improved by providing hard berms and soft berms as shown in Fig 2 (c)
- ii. The NH requires to be widened in the village limits.
- iii. The encroachments should be removed to enable the driver to have sufficient sight/stopping distance.
- iv. Appropriate road signboards and markings are suggested.

C. Case 3

Kilometer stretch: 32 Km (NH 208-Towards Kollam)

Place: Alagapuri Junction

Fig 3 (a) shows the following deficiencies on the existing stretch under investigation:

- i. The existing curve is not standard.
- ii. The feeder road is almost joining the national highway at the vertex of the curve causing accidents.

Remedy:

- i. The existing non-standard curve requires improvement. Depending on the availability of land, improvement of curve should be taken up. Being a NH minimum radius of the curve as 360 mts is suggested.
- ii. The feeder road is to be joined to the NH as shown in Fig 3 (c) to avoid accidents.
- iii. Appropriate road signboards and markings are suggested.

D. Case 4

Kilometer stretch: 35 Km (NH 208-Towards kollam)

Place: Nathampatti road

Fig 4 (a) shows the following deficiencies on the existing stretch under investigation:

- i. The shops are causing obstruction to the driver to have sufficient sight/stopping distance.

Remedy:

- i. The shops and small trees should be removed to enable the driver to have sufficient sight/stopping distance. While clearing the shops, big trees can be spared as they do not come in the way of driver for having sufficient sight/stopping distance as shown in Fig 4 (c)
- ii. Appropriate road signboards and markings are suggested.

E. Case 5

Kilometer stretch: 50 Km (NH 208-Towards kollam)

Place: Srivilliputtur Junction 1 (Church stop)

Fig 5 (a) shows the following deficiencies on the existing stretch under investigation:

- i. Congested junction

Remedy:

- i. Junction improvement is required by providing traffic island both on the NH as well as approach road as shown in Fig 5 (c)
- ii. Appropriate road sign boards and markings are suggested.

F. Case 6

Kilometer stretch: 52 Km (NH 208-Towards Kollam)

Place: Srivilliputtur Junction 2 (Madavarvillagam)

Fig 6 (a) shows the following deficiencies on the existing stretch under investigation:

- i. The existing curve is not standard.
- ii. The feeder road is almost joining the national highway at the vertex of the curve causing accidents.

Remedy:

- i. The existing non-standard curve requires improvement.
- ii. The feeder road is to be joined to the NH as shown in Fig 6 (c) to avoid accidents.
- iii. Appropriate road signboards and markings are suggested.

G. Case 7

Kilometer stretch: 56 Km (NH 208-Towards Kollam)

Place: Vanniyampatti Vilaku Junction

Fig 7 (a) shows the following deficiencies on the existing stretch under investigation:

- i. The existing curve is not standard.
- ii. The feeder road is almost joining the national highway at the vertex of the curve causing accidents.

Remedy:

- i. The existing non-standard curve requires improvement.
- ii. The feeder road is to be joined to the NH as shown in Fig 7 (c) to avoid accidents.
- iii. Appropriate road signboards and markings are suggested.

H. Case 8

Kilometer stretch: 90 Km (NH 208-Towards Kollam)

Place: Devathanam

Fig 8 (a) shows the following deficiencies on the existing stretch under investigation:

- i. The existing horizontal curve is not standard.
- ii. The encroachments causing obstruction to the driver to have sufficient sight/stopping distance.

Remedy:

- i. The horizontal curve is to be improved by providing hard berms and soft berms as shown in Fig 8 (c)
- ii. The encroachments should be removed to enable the driver to have sufficient sight/stopping distance.
- iii. Appropriate road signboards and markings are suggested.

VI. SUMMARY AND CONCLUSION

Road accident situation in India is alarming. A 2-wheeler rider is five times more likely to be killed in accidents on Indian roads than a car or a bus traveler. Nearly 60% of total road accidents take place during night though the night traffic is hardly 15% of the 24-hour volume, which means that the probability of an accident in India during night is almost 8 times higher than in day.

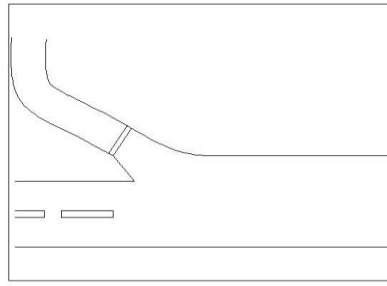
By treating accident black spots where accidents cluster substantial reductions in the number of accidents can be achieved. Accident black spots at selected locations were identified and remedial measures suggested. Analysis revealed that the rate of accidents at the black spots could have been reduced by resorting to low cost remedial measures such as erecting sign boards and lane markings before embarking on full-fledged changes in road design. From this research work it can be concluded that substantial reduction in the incidence of road accidents can be brought about by restoring to corrective measures in reducing driver error, which is the major cause of road accidents.

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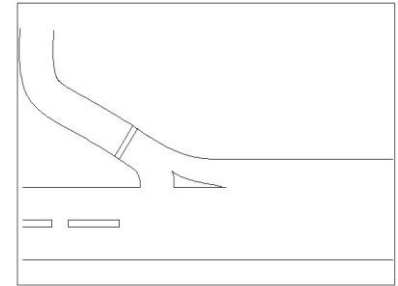
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a) T.Kallupatti road: 0.5 km-NH 208



b) Existing Road condition

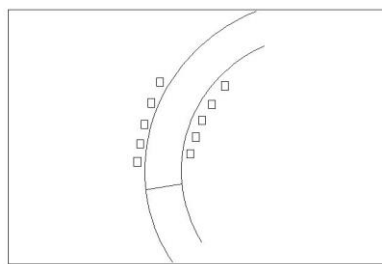


c) Proposed Improvement

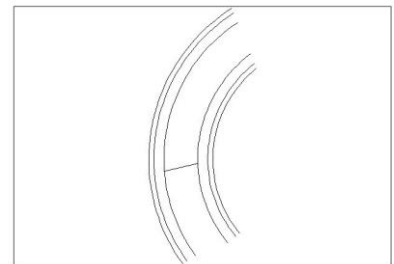
Fig. 1. Thirumangalam to T.Kallupatti road



a) Ammapatty road: 19 km-NH 208



b) Existing Road condition

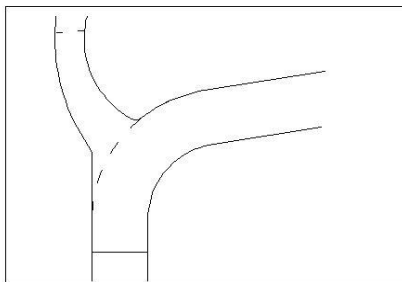


c) Proposed Improvement

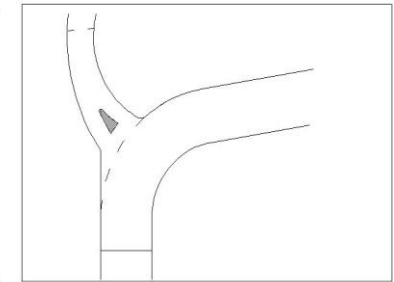
Fig. 2. Ammapatty road



a) Alagapuri Junction: 32 km-NH 208



b) Existing Road condition

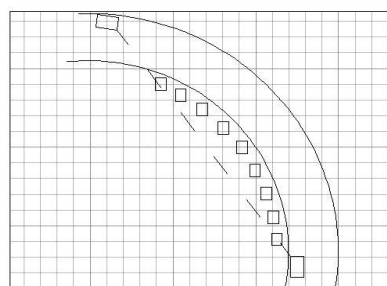


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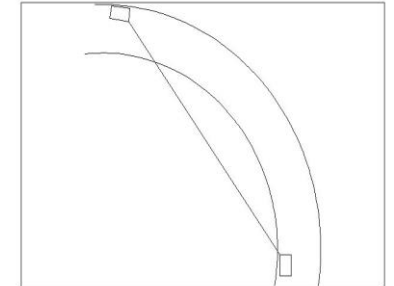
Fig. 3. Alagapuri Junction



a) Nathampatti road: 35 km-NH 208



b) Existing Road condition

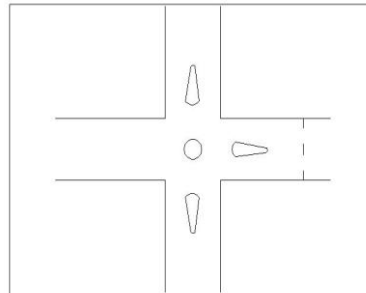


c) Proposed Improvement

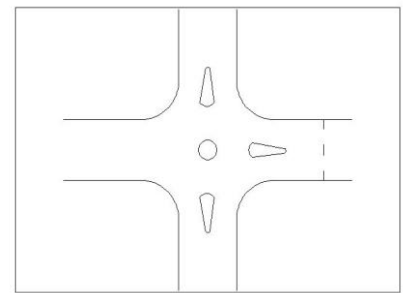
Fig. 4. Nathampatti road



a) Srivilliputtur Junction 1: 50 km-NH 208



b) Existing Road condition

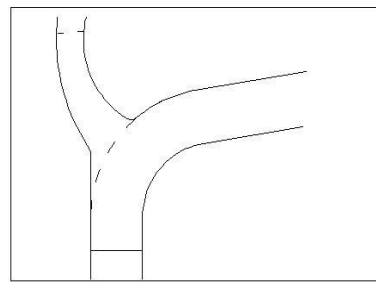


c) Proposed Improvement

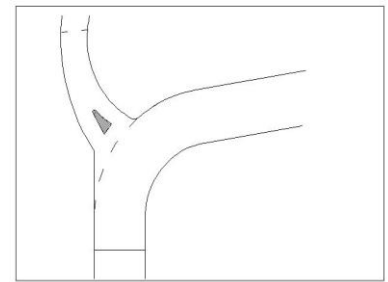
Fig. 5. Srivilliputtur Junction 1 (Church stop)



a) Srivilliputtur Junction 2: 52 km-NH 208



b) Existing Road condition

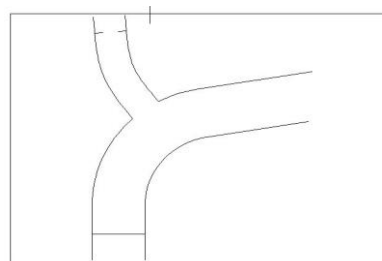


c) Proposed Improvement

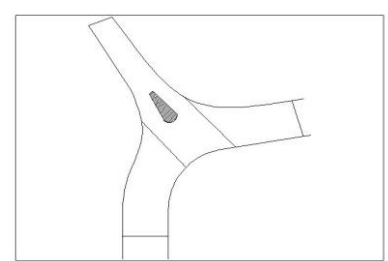
Fig. 6. Srivilliputtur Junction 2 (Madavarvillagam)



a) Vanniyampatti Junction: 56 km-NH 208



b) Existing Road condition

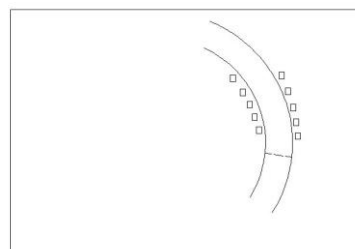


c) Proposed Improvement

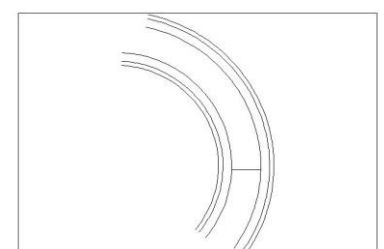
Fig. 7. Vanniyampatti Junction



a) Devathanam road: 90 km-NH 208



b) Existing Road condition



c) Proposed Improvement

Fig. 8. Devathanam road