

# Road Safety Audit of Rural Roads at Gujarat State

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*Abstract*— Road safety audit is formal procedure for assessing potential and safety performance in the provision of new road schemes, the improvement and rehabilitation of existing road and in maintenance of roads. The role of auditor is to provide independent advice in the form of recommendation. The primary role of auditing identifying the potential problems of a highway project by conducting the site inspection and collecting data. Road Safety Audit is a relatively straightforward process. For smaller projects some of the steps shown may be brief, but the sequence of the steps will still apply. Responsibility for the planning, design and construction of the project always remains with the road authority and the implementation team.

**Keywords:** Accident, Road safety audit, transportation

## I. OBJECTIVES

- To help produce designs and roads that reduce the number and severity of crashes.
- To reduce like lihoods of accidents.
- To minimize the need for remedial measures after the opening of a new road Project

## II. INTRODUCTION

India with 1,05,725 fatalities per annum (in year 2006), accounts for about 10 percent of total world's road fatalities. The share of National Highways and State Highways in the total road network is just 6 percent but these cater to 70 to 75 percent of total road traffic in India. However, the National Highways, which constitute less than 2 percent of the total road network, account for 20 percent of total road accidents and 25 percent of total road traffic fatalities occurring on Indian roads. Further, the severity of road traffic accidents on National Highways is more because of higher speeds as compared to other roads. The road safety situation in India is worsening. Accidents, fatalities and casualties have been increasing dramatically over last 20 years – about 5 percent growth rate over last two decades - partly due to exponential growth of vehicles. The death rate per vehicle is 10 to 20 times higher in India as compared to high-income countries like Sweden, Norway, Japan, Australia, UK and USA. It is much higher even when compared to many low-income countries like Brazil, Mexico and Malaysia.

There is loss of productivity, property damage and costs to the hospital system and emergency services. In addition, there is incalculable personal loss of loved ones. For India, the socio- economic cost of road accidents in 1999-2000 was estimated at 3 percent of GDP. Pedestrians,

bicyclists and motorized two-wheeler riders are the Vulnerable Road Users (VRU), which constitute 60-80 percent of all traffic fatalities in India. This seems logical as this class of road users forms the majority of those on roads. On highways, the proportion of VRU and other motor vehicle occupants are 32 percent and 68 percent respectively.

In addition, they sustain relatively more serious injuries even at low velocity crashes, unlike car occupants who are protected by impact absorbing metallic body of the vehicles. (Road safety audit manual IRC SP 088., 2010)

## III. STUDY AREA

### A. Principles of Road Safety Audit

- A formal process not an informal check.
- Carried out by the persons who are independent of the design and construction
- Carried out by the persons with appropriate expertise, experience and training.
- Restricted to road safety issues.

### B. Roles and Responsibility for Road Safety Audit:

Three parties are involved:

- 1) Client
- 2) Designer
- 3) Auditor

### C. Role of Client:

- Select an appropriate auditor.
- Provide all the relevant and necessary documents
- Hold an commencement meeting with the auditor and client

### D. Role of Designer:

- Attend commencement and completion meetings.
- Bring out the actions proposed in response to the audit report and its recommendations and to document these proposed actions.
- Implements the decisions given by the clients on the proposed actions by amending the original design.
- Feed the experience back into the designer's organization and to avoid similar design problems recurring.

### E. Role of auditor:

- Review all the documents and audit the drawings and designs.

#### IV. VARIOUS STAGES OF RSA:



##### A. Selecting Road Safety Audit Team:

Objective: To select an audit team which is independent, has appropriate skills for the particular project and would exercise due diligence in preparing the Audit Report.

The audit team may comprise of two members for small projects and three members for large projects. One of the team members should be nominated as Road Safety Audit Manager. Where specific additional skills are required in case of complex projects, a specialist can be invited to be part of the audit team for a limited time to provide advice on the relevant issues. The one essential ingredient in any road safety audit team is road safety engineering experience. The audit team should fulfill the following checklists:

- 1) Is the auditor independent? - Can he/she apply 'fresh eyes' to the task?
- 2) Is the auditor trained and/ or experienced? - At least attended a training workshop and worked on a previous audit.
- 3) Has the auditor got the necessary skills in the areas of road safety engineering, traffic engineering, traffic management, road design and accident investigation and prevention?
- 4) Does the auditor have an aptitude for the task? - To see potential safety problems from different road users' points of view.

##### B. Checklists for Carrying Out Road Safety Audit for Different Stages of the Project:

Checklists have been prepared to assist the members of the Audit Team. These checklists describe the problems and situations that can affect the road safety of selected types of project and audit stage.

The checklists for different stages of audit are presented here under:

- Checklist 1 Stage 1 Audit
- Checklist 2 Stage 2 Audit

- Checklist 3 Stage 3 Audit
- Checklist 4 Stage 4 Audit
- Checklist 5 Stage 5 Audit
- Checklist 6 Stage 6 Audit
- Checklist 7 Planning
- Checklist 8 Alignment
- Checklist 9 Cross Section
- Checklist 10 Intersections and Interchanges
- Checklist 11 Road Signs
- Checklist 12 Road Markings
- Checklist 13 Lighting
- Checklists 14 Roadside Hazards

##### C. Data requirements for road safety audit:

The database for conducting an audit should include

- plans and drawings;
- site information, such as detailed crash history and traffic volumes;
- design standards that have been used;
- environmental effects and on-site evaluations, which examine a location from the perspective of the encompass a review of all types of movements, special needs of the elderly and disabled, weather and environmental problems.

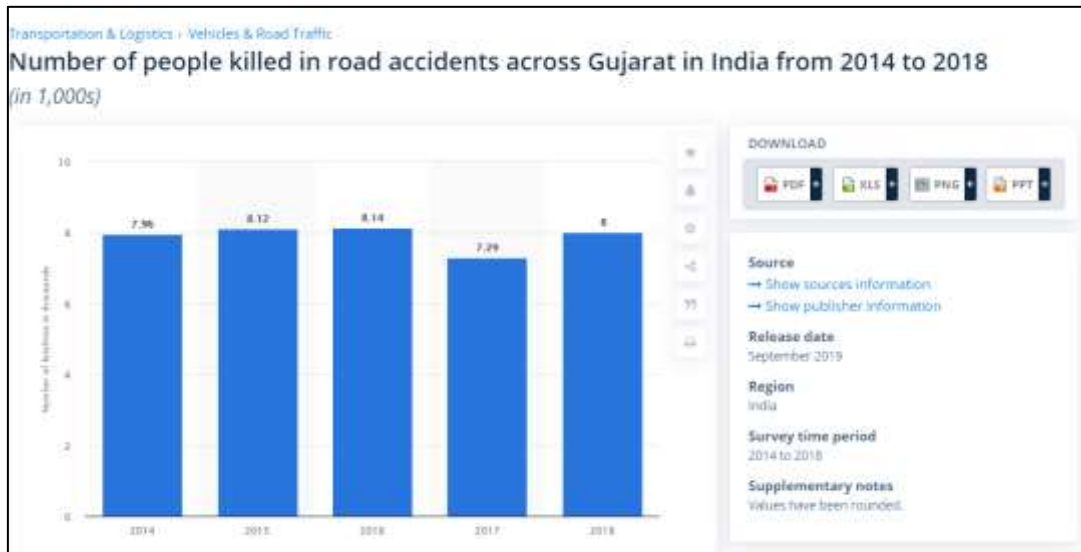
Road Inventory Data Selected road stretch is divided into number of sub stretches measuring approximately 1000 meters. At each sub-stretch details of following road geometrics are also collected.

##### D. Road Accidents –Result of Causative/ Contributory Factors:

- 1) Road Condition
- 2) Traffic Volumes and Speed
- 3) Hazards of Night Driving
- 4) Driver Inattention/ Driver Distraction

- 5) Driving Hazards in Hilly Areas
- 6) Alcohols and Driving
- 7) Information Factor

- 8) Ineffective Enforcement Systems
- 9) Overloading of Trucks



Many factors may contribute to accident occurrence, and most accidents involve more than one factor. Human factors contribute to 95%, road factors to 25%, and vehicle factors to less than 5%.

The main human errors are: going too fast for the situation, failing to give way at junctions, following too close, overtaking improperly, misperceiving or misjudging the road situation ahead, and impairment as a consequence of drinking alcohol.

Road deficiencies that are main contributory factors are: poor design of layout or control at junctions, inadequate signing, road markings and lighting, slippery roads, and obstructions on the road such as parked vehicles.

Main vehicle factors are: defects in tyres, brakes and lights, arising from poor maintenance of the vehicle.

#### V. SUGGESTIONS

- Signal system should be provided for free flow of traffic
- Width of footpath should be increased.
- Proper pedestrian crossing arrangement should be provided.
- The requirement of all informatory signs should be fulfilled at the intersection. Island should be redesign to avoid vehicles collision and illegal passing at intersection.
- Grade separator on road coming from Gurudwara should be made.
- For future traffic flow the road may require underpass at intersection for road.

#### VI. CONCLUSIONS

The conclusions that are drawn from the paper study can be summarized as follows:

Some safety defects observed during the audit study that can be considered as typical for Indian rural highway network can be mentioned as follows:

- Guardrails are deficient or not in appropriate positions

- Slopes are steep and cannot be considered as gentle regarding road safety
- Pavement damages such as potholes and pavement edge deterioration are considerably remarkable
- Shoulders are insufficient, narrow and are not paved at most locations.

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