



Rural Road Safety Manual - Promoting Safer Connectivity in Rural India



National Rural Roads Development Agency
Ministry of Rural Development
Government of India



Rural Road Safety Manual - Promoting Safer Connectivity in Rural India

TA-8110 IND - Funded by the Government of India, Asian Development Bank and Japan Fund for Poverty Reduction

Final Revision
20 May 2016



National Rural Roads Development Agency (NRRDA)
Ministry of Rural Development
Government of India

Cover page caption:

FOREWORD

Pradhan Mantri Gram Sadak Yojana (PMGSY) aims to provide all weather connectivity to eligible unconnected habitations in the rural area. Rural Roads are critical for the rural development, as they provide access to market, health, education and other related services. Pradhan Mantri Gram Sadak Yojana (PMGSY) has so far constructed more than 4,84,000 KM roads connecting nearly 1,19,309 habitations nationwide to a greater transportation network. Rural Roads which comprise 80% of total road network in India are considered the last link in the transport network. As the rural road network has increased so has the number of accidents on these roads.

2. Death and serious injuries as a result of road accidents not only represent considerable waste of national resources but also cause anguish to family and friends of those killed. Cost to the community in purely economic terms is high. Pedestrians, bicyclist, and motorised two wheeler riders are most vulnerable road users which constitute 60% to 80% of all traffic fatalities in India. They sustain relatively more serious injuries even at low velocity crashes. The high percentage of two wheeler, three wheeler and non motorised road users in rural area create particularly difficult challenge to those seeking to improve road safety on rural roads.
3. Lot of initiatives have been taken at different levels to improve road safety on rural roads in India. National Rural Roads Development Agency (NRRDA) has issued several advisories to the States to cater to road safety issues in planning, execution and operationlisation of rural roads. There was a need for a comprehensive Rural Road Safety Manual which can cover all engineering as well as social aspects including community participation and behaviour change of the drivers. The present Road Safety Manual has been developed to cater to the specific need of road safety on rural roads and broadly covers the following topics:-
 - a. Data Management
 - b. Safer Road
 - c. Safer People
 - d. Road Safety Audit and Overview
 - e. Road Safety Management
4. The users of this manual are expected to be technical and non technical officers dealing with rural roads in India. It is expected that all engineers working on rural roads will extensively use this manual which will help in reducing road accidents on rural roads.
5. It is hoped that Road Safety Manual will find a wide spread acceptance in rural road sector. Suggestions for improvement of this manual are most welcome.



(Rajesh Bhushan)

Joint Secretary (RC), MORD & Director General, NRRDA

Contents

1. INTRODUCTION	9
2. ACCIDENT DATA COLLECTION AND ANALYSIS	10
2.1 Road Accident - A Multi-Factored Event	10
2.2 Accident Data	10
2.2.1 Primary Accident Data	10
2.2.2 Secondary Accident Data	11
2.3 Management of Accident Data	13
2.4 Definitions	13
2.5 Accident Data Analysis	14
2.6 Accident Investigation and Prevention Program	15
2.6.1 Identification of Hazardous Locations	16
2.6.2 Problem Diagnosis	16
2.6.3 Selection and Implementation of Counter-measures	24
2.6.4 Monitoring and Evaluation of Counter-measures	24
2.7 Publishing of Accident Information	25
2.7.1 Accident Information for Public Domain	25
2.7.2 Accident Management through the On-Line Management, Monitoring and Accounting System (OMMAS)	25
3. SAFER RURAL ROAD	27
3.1 Road Safety at the Design Stage	27
3.2 Road Safety Hazards	27
3.3 Accident Prevention through Traffic Control	38
3.3.1 Traffic Control at Intersections	39
3.3.2 Traffic Control at Mid-Block Sections	44
3.4 Road Safety During Roadwork or Temporary Lane Closure	47
3.4.1 Construction Zone	47
3.4.2 Traffic Control Devices during Roadwork	49
3.4.3 Safety for Temporary Traffic Diversion	51
3.4.4 Partial Closures of Existing Carriageway	51
3.4.5 Small Maintenance Work	52
3.4.6 On-site Safety for Road Workers	52
3.5 Safety for Pedestrian	52

4. ROAD SAFETY AUDIT	53
4.1 Road Safety Audit - Introduction	53
4.2 RSA Checklist	53
4.3 Incorporating RSA Outputs	67
5. SAFER RURAL COMMUNITY	68
5.1 Public Advocacy Campaign Targeting User Behavior	68
5.1.1 Choosing the Appropriate Approach	68
5.1.2 Building a Successful Campaign	68
5.2 Educational Requisite for Local Authorities	71
5.2.1 Understanding Road Safety as a System	72
5.2.2 Understanding Road Safety Education Issues for Communities	72
5.2.3 Designing and Delivering Road Safety Education for Communities	73
5.2.4 What Makes Road Safety Education for Communities Effective?	73
5.3 "Safe Route to School" Program for Teachers and Students	74
5.3.1 Safe Route to School Approaches	74
5.3.2 Designing Safe Route to School	75
5.4 Training Program on First Aid for Local Community and Schools	77
5.4.1 First Aid and Road Safety	77
5.4.2 Rural Road Accident Response Mechanism	78
5.5 'Safety Champions' and 'Safety Volunteers'	78
5.6 Guidelines for Annual Awards for Road Safety Achievements in PMGSY	79
5.6.1 Proposed Categories for the Award	80
5.6.2 Evaluation Criteria	81
6. ROAD SAFETY MANAGEMENT AND TRAINING PROGRAM	83
6.1 Annual Road Safety Plan and Rural Road Safety Improvement Program	83
6.2 Road Safety Cell (RSC)	84
6.3 Training Program on Rural Road Safety Manual	86

List of Tables

Table 1	Typical Accident Data Collection Format For Rural Roads	12
Table 2	Accident Investigation and Prevention Program Elements	16
Table 3	Priority for Implementing Rural Road Safety Measures	17
Table 4	Analysis Format According to Total Number of Accidents by Month of The Year	18
Table 5	Accidents Analysis Format by Type of Area And Time	19
Table 6	Accidents Analysis Format by Type of Collision	20
Table 7	Accidents Analysis Format by Weather	20
Table 8	Accidents Analysis Format According To Location of Accident Spot	21
Table 9	Accidents Analysis Format According To Age Profile of Victim (Including Drivers)	21
Table 10	Accidents Analysis Format by Presence of Alcohol and Safety Device Profile of Victim	22
Table 11	Accidents Analysis Format According to Nature of Traffic Violations	22
Table 12	Accidents Analysis Format by Type of Vehicle	23
Table 13	Several Criteria for Countermeasure Selection	24
Table 14	Safe Stopping Sight Distance of Intersections	43
Table 15	Visibility Distance on Major Roads	43
Table 16	Recommended Length of Construction Zone	48
Table 17	Training Program on Road Safety	86

List of Figures

Figure 1	Typical Carriageway Markings at Intersections	39
Figure 2	Typical Warning Signs at Intersections	40
Figure 3	Signs Used at Urban Intersection	41
Figure 4	Signs Used at Rural Intersections	41
Figure 5	Minimum Sight Triangle at Uncontrolled Intersections	42
Figure 6	Minimum Sight Triangle at Priority Intersections	42
Figure 7	Trimming of Trees and Hedges Required for Clear Sight Distance	43
Figure 8	Typical Speed Breaker Design	46
Figure 9	Components of Construction Zone	49
Figure 10	Typical Positioning of Signs	50
Figure 11	Factors Affecting Accident Reduction Scheme	83
Figure 12	Rural Road Safety Cell Institutional Arrangement	84

List of Abbreviations

ADB	Asian Development Bank
APs	Affective Persons
ARSP	Annual Road Safety Plan
BT	Bituminous Topping/Black Topping
CBR	California Bearing Ratio
CC	Cement Concrete
CD	Cross Drainage
C-DAC	Centre for Development of Advance Computing
CN	Core Network
CPF	Community Participation Framework
CPR	Cardio Pulmonary Resuscitation
CRRI	Central Road Research Institute
DCL	Data Collection Ltd
DPR	Detailed Project Report
DRRP	Disability and Rehabilitation Research Program
EAR	External Air Resuscitation
EP	Electric Poles
FIR	First Information Report
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
HP	Hand Pump
IEE	Initial Environment Examination Checklist
IIM	Indian Institute of Management
IRC	Indian Roads Congress
IT	Information Technology
KM	Kilometer
LAN	Local Area Network
LCVs	Light Commercial Vehicles
LL	Liquid Limit
LRP	Location Reference Point
MAAP	Microcomputer Accident Analysis Package
MDD	Maximum Dry Density
MDR	Major District Roads
MLA	Member of Legislative Assembly
MLC	Medico legal Cases
Moue	Memorandum of Understanding

MP	Madhya Pradesh
NGO	Non-Government Organization
NH	National Highway
NHAI	National Highway Authority of India
NICMAR	National Institute of Construction Management and Research
NRRDA	National Rural Roads Development Authority
NRRSC	National Rural Road Safety Council
OMC	Optimum Moisture Content
OMMS	On-Line Monitoring and Management System
PCR	Police Control Room
PCU	Passenger Car Unit
PI	Plasticity Index
PIC	Project Implementation Consultant
PIU	Project Implementation Unit
PMGSY	Pradhan Mantri Gram Sadak Yojana
PPP	Public Private Partnership
PRI	Panchayati Raj Institutions
PWD	Public Works Department
QC	Quality Control
RCIP	Rural Connectivity Investment Program
RCTRC	Rural Connectivity Training and Research Center
ROMDAS	Road Measurement Data Acquisition System
RR	Rural road
RRNMU	Rural Road Network Management Unit
RRS	Rural Road Safety
RSA	Road Safety Audit
RSC	Road Safety Cell
RSIP	Road Safety Improvement Program
SH	State Highway
SQC	Supervision of Quality Control
SQM	State Quality Monitor
SRRDA	State Rural Roads Development Agency
SRTS	Safer Route to School
STA	State Technical Agency
TRL	Transport Research Laboratory

1. INTRODUCTION

1. The absence of all-weather road connectivity is a serious problem in India, particularly in rural areas. Poor road infrastructure affects economic growth, agricultural productivity, and employment in rural areas, and has a strong link to poverty. The Government of India is addressing this problem through implementation of a nationwide rural road investment program - the Prime Minister's Rural Roads Program PMGSY - aimed at providing all-weather road connectivity to eligible habitations in India's rural areas.

2. With an extensive focus on infrastructural development, the National Rural Roads Development Agency (NRRDA) has expressed its intention to minimize the adverse impact of the rural road by enhancing road safety aspects at every stage of its development. This Rural Road Safety Manual was developed under the ADB's Technical Assistance embedded within the Rural Connectivity Investment Program (RCIP) for India, to assist NRRDA and the state governments in addressing safety issues in rural road development.¹

3. This document was prepared to provide reverences on technical aspects and practices to enhance safety of rural roads at the design and operational stages, which are consistent to the prevailing guidelines in rural road projects under PMGSY.² This document contains systemic approaches to understand the philosophy and the suggested practice to provide sustainable solution to the issues; therefore, even though this report presents various features on road safety, it is not intended to include road safety parameters which have been naturally embedded within the road and traffic engineering principles. For this purpose, one should refer to various Indian Road Congress (IRC) codes of practice and guidelines from the relevant authorities.

4. This document consists of five sections, each discusses about different aspects of road safety in rural road development, namely:

- **Chapter 1**, discusses about accidents and their consequences in rural communities. This section also discusses the process of collection of those accident data, and the use of such information for further analysis to prevent recurrence of the event in the future;
- **Chapter 2**, discusses about various possible hazards in rural road operation, risks of accident caused by these hazards, and the relevant mitigation measures;
- **Chapter 3**, discusses about enhancing safety on rural roads, specifically featuring road safety audit (RSA) as the key tool;
- **Chapter 4**, discusses about enhancing safety through education and community participation; and
- **Chapter 5**, discusses about sustainable rural road safety management through proper planning and systemic approaches. This section also presents the training program for road safety.

¹ ADB. 2012. *Report and Recommendation of the President to the Board of Directors on a Proposed Multitranche Financing Facility, Technical Assistance, and Administration of Technical Assistance to India for the Rural Connectivity Investment Program.* (Approved on 12 July 2012)

² The PMGSY guideline can be accessed via www.pmgsy.nic.inRural Road Safety Manual - Promoting Safer Connectivity in Rural India

2. ACCIDENT DATA COLLECTION AND ANALYSIS

2.1 Road Accident - A Multi-Factored Event

5. A complete definition of a road traffic accident is: "a rare, random, multi-factor event always preceded by a situation in which one or more road users have failed to cope with their environment, resulting in a collision on the public highway which should be recorded by the police". Accident is an unpredictable event caused by one or combination of multiple factors, which can be grouped into three main categories, namely:

- Infrastructure, e.g. road design, road environment and traffic conditions;
- Vehicle; and
- Road user behavior.

6. In general, road accident tends to result in personal injury, loss of life or damage of property. While road accidents are unpredictable events, the intensity can be reduced to a certain extent by employing suitable road safety measures. Therefore, a systematic analysis of traffic accidents is essential.

7. The potential for accident reduction for rural roads through low-cost engineering measures at hazardous sites is particularly high. Simple measures can significantly reduce problems at such sites. However, it is essential that a systematic approach is adapted to identify the contributing factors of road accidents so that the most appropriate treatments are selected and implemented.

8. As also for any other type of road, accidents on rural roads may be caused by one or a combination of the following factors:

- a) Road users: excessive speed and dangerous driving, failure to perceive traffic situation in adequate time, carelessness, fatigue, high level of alcohol, etc.;
- b) Vehicle: defects such as failure of brakes, steering system, tyre burst, lighting system;
- c) Road condition: uneven and slippery road surface, pot holes;
- d) Road design: defective geometric design, such as inadequate sight distance, improper curve design, and improper lighting;
- e) Environmental factors: unfavorable weather conditions such as mist, smoke and heavy rainfall, which restrict normal visibility, and creates unsafe driving environment; and
- f) Other causes, such as human factors (carelessness): failure to close gates at rail level crossing when required, etc.

2.2 Accident Data

2.2.1 Primary Accident Data

9. The accident data collection is the first step in identifying the cause of accident. The data to be collected for each incident should comprise the following:

- a) General Weather condition, Date, time, person involved in accident, classification of accident like such as fatal, serious, minor;
- b) Location - Description and detail of location of accident;
- c) Details of vehicle involved - Registration number, description of vehicle (color, type), loading detail, vehicular defects;
- d) Nature of accident - Details of collision (side swipe, head on, right angle, etc.), damages, injury and casualty;
- e) Road and traffic condition - Details of road geometry, surface characteristics, type of traffic, traffic density, etc.;

- f) Primary causes of accident - Details of various possible cases (already mentioned), which are the main causes of accident; and
- g) Estimated accident cost - Financial losses incurred due to property damage, personal injury and casualty.

10. Ideally, the information required for each accident should be collected at the scene using an easy-to-complete form. It is also recommended that a single form be utilized for all purposes (i.e. used for filing and computer data entry). Table 1 shows an example of standard accident data collection form.

2.2.2 Secondary Accident Data

11. The best source of validated secondary accident data will be from the Traffic Police Department, either collected directly at the accident scene, or from the reports submitted by the involved parties/witnesses. Some police authorities produce an annual statistical report containing simple tables of types of accidents and regional variations. Whilst these contain useful background information, they rarely contain sufficient detail for the identification of hazardous locations or accident analysis. It is essential that the accident report should include an accurate geographic location of the accident, basic information describing the accident and its victims, the events leading up to the accident and summary information regarding the road at the accident location. It is important that road authority should have a good coordination with local police in terms of access to the accident data in effort to improve road safety.

12. Another source of validated secondary accident data is hospital records. Hospitals often maintain a register for the treatment offered to the accident victims. However, this data will not include 'damage only' type of accident, where none was injured.

13. In rural roads, it is understood that some minor accidents remain unreported. It is therefore recommended that regular consultation with local communities may be done to collect information of such accidents.

Table 1: Typical Accident Data Collection Form for Rural Road

Accident Record						
Name of State- Name of PIU-	Name of Dist.-			Package No. :-		
Sr. No.	Name of Road	Police FIR (If available)	Status of Road Completed/ Ongoing	Chain age / Location *	Time of Accident **	Mode of Accident ***
1						
2						
3						
4						

Coding for filling the format -

* Location - L-1- Junction, L-2- Sharp curve, L-3- Habitation, L-4- school

** Time of Accident - T-1- Morning, T-2- Afternoon, T-3- Evening, T-4- Night

*** Mode of Accident - M-1- Motor able to Non-motorable, M-2- Motor able to Motor able, M-3- Motor able to Vulnerable (child, cattle, pedestrian), M-4- Other

Nature of Accident - N-1 - Head on collision, N-2- Rear End collision, N-3- Overturning, N-4- Skidding

Cause of Accident - C-1- Sharp/ Blind Curve, C-2- Junction, C-3- Over taking, C-4- Overspeeding, C-5- Drunken Driving, C-6 Faulty design of speed breakers

Intensity of Accident - I-1 - Fatal, I-2- Non recoverable Serious injury Like Amputation of limb, I-3- Recoverable serious injury, I-4- Minor injury

2.3 Management of Accident Data

14. The data collected needs to be properly stored and easily retrieved for the following purposes:
- Identification of location where unusually high number of accident occur;
 - Detailed evaluation of critical accident location to identify the causes of accidents;
 - Development of procedure that allows identification of hazardous location; and
 - Development of statistical analysis of various accident related factors to provide insight into general trends, common factors, driver profiles, etc.
15. A liable accident database is a crucial element in the management of road safety. Accident data is needed by many authorities, which include road safety officers, highway engineers, police, lawyers, research groups, politicians, teachers, statisticians, insurance company and members of the public. They have differing needs and reasons for the data, which include:
- The investigation of particular or road user groups;
 - Designing safety schemes/devices;
 - Justification for highway planning;
 - Enforcement planning or prosecutions; and
 - Education and training; and insurance claims.
16. For Highway Engineer, the basic data system needs to serve three main purposes, namely:
- Investigation and assessment of sites to support accident reduction by cost effective measures;
 - Assessment on the application of safety measures (including improved traffic management scheme) in road development schemes; and
 - Monitoring results.
17. It is essential to have a standard and well maintained system of data collection for the entire rural road network. However, this basic system should not be distinguished from subsidiary data collection for detailed investigations of specific locations or problem areas. It is also essential that accident is recorded properly and consistently. The accident investigator needs to identify particular problems which are treatable and for which specific appropriate action can be designed. In order to do this, reliable and comprehensive accident database are required.

2.4 Definitions

18. “Black spot” is one of the most common terms used by highway practitioners and police to identify a location where accidents cluster, and it is likely that aspects of highway design, layout and state of road or traffic control are contributory factors in the accident. Road users may benefit from the application of appropriate road engineering or traffic management measures in such location, which may act as accident countermeasures.

19. Other than black spot, the following terminologies are commonly used in accident data collections in India, and used in this document:

“Road accident” is an event that occurred on a road resulting in either injury or loss of life, and or damage to property, where at least one moving vehicle is involved. Rural Road Safety Manual - Promoting Safer Connectivity in Rural India

“Fatalities” is death resulting from injuries sustained in a road accident, and occurred within 30 days of the event.

“Grievously injured person” is a person who has received grievous injuries (in accident) such as

fractures, concussions, internal lesions, crushing, severe cuts and lacerations, severe general shock requiring medical treatment and any other serious lesions requiring detention in hospital. This includes those who hurt grievously as defined in the Indian Penal Code in accidents, as follows:

- a) Emasculation;
- b) Permanent privation of the sight of either eye;
- c) Permanent privation of hearing of either ear;
- d) Privation of any member or joint;
- e) Destruction or permanent impairing of the powers of any member or joint;
- f) Permanent disfigurement of the head or face;
- g) Fracture or dislocation of a bone or tooth; and
- h) Any hurt which endangers life or which causes the sufferer to be, during the space of twenty days, in severe bodily pain, unable to follow his ordinary pursuits.

“Minor injury accident” is an accident in which persons sustain minor injuries and do not require hospitalization i.e. only first aid is needed.

“Non-injury accidents” is an accident in which no one is killed or injured. However, some property damages take place.

“Pedestrian” refers to any person other than the driver or passenger of a vehicle who shares the same road space. This includes persons in wheelchair, push cart driver, and persons attending to a vehicle (e.g. for changing tires or repairs).

“Cycle” refers to a two- or three-wheeled vehicle fitted with pedals and using human energy as its sole means of propulsion.

“Motorized vehicle” refers to mechanically propelled road vehicle including tractor and cycle fitted with an auxiliary engine.

“Motor cycle” refers to a motorized vehicle with two wheels of more than 450 mm in diameter.

“Motor car” refers to a motorized vehicle designed for passenger transport with a maximum seating capacity of 7 passengers.

“Taxi” refers to a motor car constructed, adapted, or used to carry more than 6 passengers excluding the driver for hire or reward.

“Auto-rickshaw” refers to a motorized vehicle with three wheels of less than 450 mm in diameter.

“Scooter” refers to a motorized vehicle with two wheels of less than 450 mm in diameter.

“Light Commercial Vehicles (LCVs)” usually refers to vehicle designed for goods transport with a maximum permissible capacity of 3.5 tones.“Articulated Goods Vehicles” refers to a semi-trailer truck or articulated truck consisting of a towing engine and a semi-trailer (plus possible additional trailers) for freight transport.

2.5 Accident Data Analysis

20. From an engineering perspective, the goal of accident analysis is to identify locations where accidents commonly occurred and to improve these locations by using proven road safety measures. By focusing on sites with significant accident history, a priority list or program can be developed to ensure that any investment in reducing accidents delivers maximum returns.

21. Black spots management program is the most efficient approach by most road authorities in reducing

the number of accidents on their road networks. This program begins by identifying and analyzing sections of road with a high accident rate. In addition to accident analysis, a detailed site inspection that takes into consideration traffic volume, traffic composition and road utilization may also be required. Once an analysis has been completed, a recommendation for road safety treatments will be provided. Based on the same analysis, particularly regarding the cause of the accident, a prevention measure should also be performed to avoid similar accidents elsewhere.

22. Technically, the coverage of accident analysis includes, but not limited to the following characteristics:
 - a) Road user type Information relating to age groups, mode of transport (i.e. pedestrian, passenger or driver).
 - b) Vehicle type Information relating to characteristic of vehicle, severity, location and extent of damage related to the vehicles.
 - c) Road condition Information relating to characteristics of the road, including road conditions and relative values of changes related to roadways.
23. Other than to identify causes of accident and the corrective or preventive measures, accident analysis can be used for the following:
 - a) To determine financial losses that may have incurred;
 - b) To provide economic justification for the suggested safety measures; and
 - c) To perform before and after studies and identify outcomes of improvements made at the location.
24. Statistical analysis on accident data covering a certain period of time should be carried out periodically for effective accident prevention measures. The analysis will provide oversight on the linkages between the number of accident, type of accidents, geographical and demographical condition, infrastructure condition, and other factors that may have impact on road safety, which will enable the selection of the most appropriate prevention measure.
25. As part of the accident data analysis, calculating accident rate is essential in providing an objective analysis between different types of road or highway. Similar analysis may also be done for each type of drivers and vehicles.

2.6 Accident Investigation and Prevention Program

26. Accident investigation and prevention program for rural roads can be divided into four broad steps as outlined in Table 2, and further detailed below.

Table 2: Accident Investigation and Prevention Program Elements

<i>1. Identification of Hazardous Road Locations</i>
Step 1.1 - Investigation to Identify and Prioritize Sites
Step 1.2 – Preliminary Accident Analysis
Step 1.3 – Initial Site Visit & Ranking Site for in-depth Investigation
<i>2. Problem Diagnosis</i>
Step 2.1 – Collection of Further Data from Accident forms and Site Studies
Step 2.2 –Site Visit
Step 2.3 –Data Analysis
<i>3. Selection and Implementation of Countermeasures</i>
Step 3.1 – Countermeasures Selection
Step 3.2 – Priorities Treatments and Sites
Step 3.3 – Detail Design and Implementation
<i>4. Monitoring and Evaluation of Countermeasures</i>
Step 4.1 – Monitoring
Step 4.2 – Evaluation
Step 4.3 – Cost Benefit Analysis

2.6.1 Identification of Hazardous Locations

27. Preliminary analysis should be done to identify the locations of hazard which contribute to increase of accident risks. The analysis includes determining the nature of the problem in particular location. Once specific sites have been identified, it is necessary to carry out a more in-depth accident data analysis of the sites over a certain period.

28. A minimum period of 3 years of accident data is required for each site to produce a reliable ranking of hazardous sites, and to evaluate the implemented treatments (i.e. comparing before and after conditions after 3 years of implementation).

29. In addition, all sites should be compared using an agreed selection criterion.

2.6.2 Problem Diagnosis

30. Once hazardous sites have been identified, it is necessary to conduct an in-depth analysis of these sites, including detailed analysis of the characteristics of the accidents to determine the urgency or priority of treatment required. This will also assist in identifying the cause and severity factors and help determine appropriate safety countermeasures.

31. Priority ranking for implementing rural road safety measures at hazardous locations or black spot should be based on criteria as shown in **Table 3** below.

Table 3: Priority for Implementing Rural Road Safety Measures

No.	Criteria	Remarks
1	Number / Type of accident	All injury accidents All pedestrian injury accidents Severity
2	Type of road section	Kilometer length Within 50/100 m from junction Mid-block section (e.g. between two junctions) Roads in sensitive areas
3	Time period	Frequency of occurrence, e.g. 12 months

32. The forms shown as **Table 4** to **Table 12** are the examples of accident analysis formats according to various types of incidents which can be used as reference for analysis of accident data. These are distinguished by:

- 1) Number of accident by month of the year
- 2) Type of area and time
- 3) Type of collision
- 4) Weather conditions
- 5) Location of accident spot
- 6) Age profile of victim (including drivers)
- 7) Presence of alcohol and safety device profile of victim
- 8) Nature of traffic violations
- 9) Type of vehicle involved in accident.

Table 4: Analysis Format According to Total Number of Accidents by Month of the Year

Table 5: Accident Analysis Format by Type of Area and Time

S. No	Name of Road	Time	Habitation-		Number of Accident		Rural-		
			Fatal	Injury needing Hospitalization	Injury not needing Hospitalization	Total	Fatal	Injury needing Hospitalization	Injury not needing Hospitalization
		600 - 700							
		700 - 800							
		800 - 900							
		900 - 1000							
		1000 - 1100							
		1100 - 1200							
		1200 - 1300							
		1300 - 1400							
		1400 - 1500							
		1500 - 1600							
		1600 - 1700							
		1700 - 1800							
		1800 - 1900							
		1900 - 2000							
		2000 - 2100							
		2100 - 2200							
		2200 - 2300							
		2300 - 2400							

Table 6: Accident Analysis Format by Type of Collision

Name of State-	Name of Dist.-				
Name of PIU-	Package no-				
S. No	Name of Road	NUMBER OF FATALITIES	Number of Accident		
			Fatal	Injury needing Hospitalization	Damage to Property
	Head on collision				
	Hit from Back				
	Hit from side				
	Overturn				
	Hit fix object				
	Hit Pedestrian				
	Run off the road				
	Unknown / Hit & Run				
	Total				

Table 7: Accident Analysis Format by Weather

Name of State-	Name of Dist.-			
Name of PIU-	Package no-			
S. No	Name of Road	Location	Fatal	Number of Accident
				Injury not needing Hospitalization
	1. Fine / Clear			Damage to Property
	2. Rainy			
	3. Foggy			
	4. Other			
	5. Total			

Table 8: Accident Analysis Format According to Location of Accident Spot

Name of State- Name of Dist- Name of PIU-		Package no- Number of Accident						
S. No	Name of Road	Driver Details		Fatal	Injury needing Hospitalization	Injury not needing Hospitalization	Damage to Property	Total
		1. Road Section						
		2. At / Near Junction						
		3. Others						
		Total						

Table 9: Accident Analysis Format According to Age Profile of Victim (Including Drivers)

Name of State- Name of PIU-		Package no- Number of Accident						
S. No	Name of Road	Driver Details		Fatal	Injury needing Hospitalization	Injury not needing Hospitalization	Damage to Property	Total
		(A) Sex						
		Male						
		Female						
		(B) Age						
		1. Under 18 Years						
		2. 18-25 Years						
		3. 26-40 Years						
		4. 41-60 Years						
		5. Age above 60						
		(C) License						
		1. Proper License						
		2. No / Expired License						

Table 10: Accident Analysis Format by Presence of Alcohol and Safety Device Profile of Victim

Name of State- Name of PIU-		Name of Dist.-		Package no-	
S. No	Name of Road	Injury Profile Of Victim	Fatal	Injury needing Hospitalization	Injury not needing Hospitalization
		(A) Presence of Alcohol & Drugs			
		1. Yes			
		2. No.			
		3. Unknown			
		4. Total			
		(B) Use of Requisite Safety Devices			
		1. Yes			
		2. No.			
		3. Unknown			
		4. Total			

Table 11: Accident Analysis Format According to Nature of Traffic Violations

Name of State- Name of PIU-		Name of Dist.-		Package no-	
S. No	Name of Road	Traffic Violations by involved vehicle (S)	Fatal	Injury needing Hospitalization	Injury not needing Hospitalization
		1. Over-Speeding			
		2. Jumping Red Lights			
		3. Driving on Wrong Side			
		4. Unknown			
		5. Not Applicable			
		6. Total			

Table 12: Accident Analysis Format by Type of Vehicle

Name of State- Madhya Pradesh		Name of Dist.-		Package no-		Number of Accident				
S. No	Name of Road	TYPE OF VEHICLE		Fatal	Injury needing Hospitalization	Injury not needing Hospitalization	Damage to Property	Total		
1		Motorized two Wheeler								
2		Auto Rickshaw								
3		Car/Jeep/Van/Taxi								
4		Bus								
5		Light Truck								
6		Heavy Articulated Truck								
7		Tempo / Tractor								
8		Bicycle								
9		Cycle Rickshaw								
10		Hand Drawn Cart								
11		Animal Drawn Cart								
12		Total								

2.6.3 Selection and Implementation of Counter-measures

33. For each accident problem studied, a number of countermeasures may appear both feasible and effective. However, they will present different costs and different levels of effectiveness. The selection of a treatment or a package of treatments will require certain assessments to ensure the feasibility of implementation. Table 13 below shows the list of aspects against which the assessment is to be made.

34. Community consultation should also be conducted to ensure community support. The design and implementation of the countermeasures should also be checked to ensure consistency.

Table 13: Several Criteria for Countermeasure Selection

Criterion	Description
Technical Feasibility	Can the countermeasure provide safety benefits, and does it have technical basis for success?
Economic Feasibility	Is the countermeasure likely to be cost-effective and will it provide benefits comparable to cost? Will it be supported by the organization responsible for its installation and on-going management?
Affordability	Can it be accommodated within the Program budget? If not, should it be deferred? Or should a cheaper, perhaps interim situation be adopted?
Acceptability	Does the countermeasure target the identified problem and will it be acceptable by the community?
Practicability	Is there likely to be problem of non-compliance, or can the measure work without unreasonable enforcement effects?
Political Institutional Acceptability	Is the countermeasure likely to attract political support?

35. A balance between safety, economy and efficiency principles must be considered in prioritizing the implementation of safety countermeasures.

2.6.4 Monitoring and Evaluation of Countermeasures

36. Monitoring and evaluation activities typically occur after countermeasure treatment has been implemented. Monitoring is the systematic collection of data on the performance of road safety treatments after their implementation. Monitoring helps to identify if safety has been improved and which countermeasures are most effective to enhance future crash saving predictions.

37. Knowledge on the success or failure of countermeasures is fundamental to the accident investigation and prevention Program. It is to be stressed that road safety treatments need to have proven sound scientific basis. This means that there is a need to systematically observe the effect of various treatments, and analyze these observations to ensure robust conclusions can be drawn from an analysis of data.

38. Dissemination of this knowledge is vital to avoid using unsuccessful countermeasures in the future and in making more accurate estimates of the benefits of the successful ones. For road based countermeasures,

each project should have a record of the type of treatment as executed, including photographs of the final work, the cost and the start and finish dates of the project.

2.7 Publishing of Accident Information

2.7.1 Accident Information for Public Domain

39. Publishing accident information is required to avail the information for planning purposes by any parties on their convenience without prior approval from the rural road authorities. However, it should be noted that the accident information should be already processed and validated, and without revealing the detailed identity of the victims. Raw accident data should not be made available for public without specific prior approval from the appropriate authorities, and should be on a register-basis. For accident in rural roads, approval of issuance of raw accident data should be obtained from the relevant SRRDA or equivalent in each state.

40. The most efficient way for publishing accident data is by posting the accident database online, ideally with support for downloading in desired formats. The system for this should be flexible and capable of producing various reports, for example by period (monthly, annual etc.), frequencies, fatalities, and vehicles involved. It is recommended that the accident publishing system will be able to produce non-standard stand-alone reports for certain queries for special requirement. The accident information could be hosted as part of the traffic police or state government website. National level database on accidents on rural roads could be hosted under the website of MORD.

41. Further development of this online database could be to enhance its ability to provide the user with a list of accident sites of GIS basis, which can import/export data to provide a road (accident) map. Another useful analysis tool frequently used by highway engineers is to produce diagrams which are the representation of type of collision and time of day. The diagrams could be made for each accident site.

2.7.2 Accident Management through the On-Line Management, Monitoring and Accounting System (OMMAS)

42. Accident management on rural roads should be monitored internally within the authority. NRRDA and the SRRDAs through its PIUs should ensure that accident is treated systematically, timely and effectively. Even though such information may not be made available for public domain, it should be ensured that this information is available within the relevant institutions.

43. PMGSY uses On-Line Management, Monitoring and Accounting System (OMMAS), an online web-based system with a centralized database for monitoring the overall progress and performance of rural road development under the PMGSY program under the Ministry of Rural Department. It is recommended that a system to record and monitor treatments of accidents on rural roads be incorporated under a 'Road Safety Module' to be developed within the OMMAS system itself. The proposed module should consist of at least the following features, namely:

- a) Accident data recording;
- b) Accident data analysis; and
- c) Treatment provided with photographs.

44. The following principles apply for the internal accident data recording and monitoring through the proposed module:

- a) Data entry should be done at the point where data will be generated i.e. Project Implementation Unit (PIU) levels for project data and at the NRRDA/SRRDA levels where their intervention contributes value addition to the data.
- b) The data entry should be near real-time, to enable outputs to be useful for management as well as monitoring. This implies that the data entry should closely parallel the actual work process and to

- ensure this, system checks must be in place to ensure that the data precedent is on-line before processing for the next step is done.
- c) The full power of the software is to be brought to bear to generate outputs useful at all levels monitoring and management output at PIU levels, progress management and management-by-exception outputs at SRRDA level and abstracted and analyzed information policy and overall management information for use in SRRDA.
 - d) It is important that the staff involved should be well trained and can apply checks and complete forms with minimum missing data fields.
45. For this proposal, the SRRDA appoints a state IT Nodal Officer, who is responsible for overseeing the consistency and accuracy of data supplied by the PIUs. The IT Nodal Officer is responsible for the management and maintenance of the hardware, software and training requirements of personnel, as well as maintaining relationship with the Center for Development of Advance Computing (C-DAC).
46. As the data is stored in the, state server, the IT Nodal Officer should also ensure that the server is functional at all times.

3. SAFER RURAL ROAD

3.1 Road Safety at the Design Stage

48. In dealing with rural road safety, road safety aspects have to be incorporated as part of the design criteria during the development of Detailed Project Report (DPR) for the project. Application of the PMGSY standard in rural roads development should be accompanied with sufficient knowledge of the PMGSY engineer in road safety requirements. Sufficient budget to allow the sufficient provision of road safety features in the project should be provided by the central government for full utilization by the state governments during construction and maintenance of rural roads. The road safety requirement is as reflected in IRC SP-88-2010: Manual on Road Safety Audit.

49. During the project design, 'transect walk' should be carried out to engage with local communities in order to identify hazards, local black spots effectively and most importantly to identify the possible and locally acceptable countermeasures. Inputs from this exercise should be registered and addressed during the development of the DPR. The PIU should ensure that this exercise is carried out and the recommender actions to deal with the road safety issues is incorporated in the design and the BOQ of the bidding documents.

3.2 Road Safety Hazards

50. Road safety in rural road operations of motorized vehicles are primarily deals with physical hazards, traffic operations at intersections, traffic operations passing through habitations or center of activities such as schools and markets.

- a) *Physical hazards.* A roadside hazard is any roadside object or feature that is located on or near the roadway and which is likely to create a danger to the occupants or riders of any vehicle leaving the carriageway. Collisions with roadside objects are a concern not only because of the numbers of accidents occurring but also because of their severity. The likelihood of this type of collision resulting in a fatality or serious injury is generally greater than most of other types of accident.
- b) *Road intersections.* Road safety issues at intersections is primarily caused by poor sight towards oncoming traffic, for example by high fences, and sometimes combined by high speed of the vehicles so that collision cannot be avoided.
- c) *Habitations or other center of activities.* Road safety issues related to habitations usually involve pedestrians, non-motorized vehicle users, or cattle belong to the inhabitants.

51. Various innovations and countermeasures can be done to minimize the risk of accident caused by these hazards. The following pictures illustrate various road safety issues in rural area, and some possible treatment at design and post-construction stage.

No.	Hazard Type	Mitigation Measures
	<ul style="list-style-type: none"> Start/end point of junction 	<p>Design Stage:</p> <ul style="list-style-type: none"> The junction should be properly designed with adequate junction visibility. Speed breakers should be provided with Mandatory, Cautionary or Informatory signs as per IRC guidelines (refer IRCSP-41,IRC-66, 67, 99). <p>Post Construction Stage:</p> <ul style="list-style-type: none"> Junction visibility (sight distance triangle) should be kept free from any encroachment all the time. Traffic calming devices, Traffic signs should be as per IRC guidelines and it should be maintained in good condition all the time (refer IRC- 66, 67, 99).
	 	

No.	Hazard Type	Mitigation Measures
	<ul style="list-style-type: none"> • Cross Drainage (CD) structures 	<p>Design Stage:</p> <ul style="list-style-type: none"> • Proper cross drainage (CD) structure /causeway to pass water under/over the road should be designed as per IRC guideline. • Wheel guard in the form of parapet wall should be placed to prevent vehicle toppling • Hazard marker should be installed at the side of parapet wall to caution running traffic. • Guard post should be provided before and after CD structure till embankment height is >1.5m <p>Post Construction Stage:</p> <ul style="list-style-type: none"> • Placement, condition of CD structure should be checked for any damages. • Placement, condition of parapet wall, hazard marker, guard post should be checked for any damages.
	<ul style="list-style-type: none"> • Sharp bends/blind curves 	<p>Design Stage:</p> <ul style="list-style-type: none"> • Provision of guard stones on the outer side of the curve and extra widening on the inner side of horizontal curve should be kept. • Provision for speed regulatory and warning sign should be kept at approach. • Design and super elevation should be provided as per design sped in IRC guideline <p>Post Construction Stage:</p> <ul style="list-style-type: none"> • Correct horizontal design parameters should be ensured. • Checking should be done for correct position and placement of signs and guard post.

No.	Hazard Type	Mitigation Measures
	<ul style="list-style-type: none"> Overhead hazard – e.g. electric line crossing 	
		<ul style="list-style-type: none"> Vertical and horizontal clearance from the carriageway should be sufficient, as per IRC-32 guideline. If any point minimum clearance couldn't be maintained, running traffic should be warned adequately about the potential hazard well before approaching to that zone
	<ul style="list-style-type: none"> Road-side permanent hazard – e.g. electric poles, trees, wells, hand pump 	
	 	<p>Design Stage:</p> <ul style="list-style-type: none"> Relocation of hazards from roadway should be suggested. <p>Post Construction Stage:</p> <ul style="list-style-type: none"> Electric poles, trees, hand pump or any permanent object close to roadway should be painted as hazards, so that they remain visible from distance all the time. Hand pumps should have proper concrete platform. Proper drain should be provided to prevent spilling of water on road/shoulder. As the road section is passing through habitation, provide cement concrete (CC) road.

No.	Hazard Type	Mitigation Measures
	<ul style="list-style-type: none"> Road-side temporary hazard – e.g. encroachment 	
	 	<ul style="list-style-type: none"> Road capacity gets reduced, hence such temporary encroachments should be removed taking local community into confidence Wooden posts for tying cattle should be removed as it may cause serious injury to drivers Law and order through competent authority should be enforced to keep roadway free for road users only. And any kind of private use by villagers should be prohibited. <p>Design Stage:</p> <ul style="list-style-type: none"> Hazards should be removed from the carriageway or shifted out of roadway at any cost, through meeting with the community and discussing about the potential hazards condition. <p>Post Construction Stage:</p> <ul style="list-style-type: none"> If elimination of hazard is not at all possible, then it should be painted as hazard, so that it remains visible from distance all the time. Traffic should be warned about the potential hazard before approaching to the point.

No.	Hazard Type	Mitigation Measures
	<ul style="list-style-type: none"> • Hazard on carriageways 	<p>Design Stage:</p> <ul style="list-style-type: none"> • Hazards should be removed from the carriageway or shifted out of roadway at any cost, through meeting with the community and discussing about the potential hazards condition. <p>Post Construction Stage:</p> <ul style="list-style-type: none"> • If elimination of hazard is not at all possible, then it should be painted as hazard, so that it remains visible from distance all the time and traffic calming measures should be installed. • Traffic should be warned about the potential hazard before approaching to the point.
	<ul style="list-style-type: none"> • Community platforms/habitations/sensitive locations 	<p>Design Stage:</p> <ul style="list-style-type: none"> • Speed should be regulated before entering into this zone through speed breakers and traffic signs • Running traffic should be warned well before approaching into this zone about the potential hazards • Some sort of physical separation (like bamboo, wire fencing, tree planting etc.) between road way edge and habitation or sensitive locations should be provided to prevent sudden mix-up with running traffic <p>Post Construction Stage:</p> <ul style="list-style-type: none"> • Efforts should be made to shift religious structures with consensus of community. • Edge of structure should be painted for night visibility, until it is shifted. • Suitable pedestrian crossing points need to be developed at the specific locations near the market , schools and other sensitive locations

No.	Hazard Type	Mitigation Measures
	• Junctions	<p>Design Stage:</p> <ul style="list-style-type: none"> Provision of traffic calming measures along with informative and warning signs should be adopted. <p>Post Construction Stage:</p> <ul style="list-style-type: none"> Safety at junction should be checked for missing or damaged signs. Condition and effectiveness of traffic calming measures, traffic signs should be checked.
	• Water body	<p>Design Stage:</p> <ul style="list-style-type: none"> Pitching work for protection should be done at the base of water bodies to protect the embankment. Provision of guard stones, retaining wall or any other form of vehicle restrain system along the Pond to protect vehicle from falling into the Pond should be kept. If required, provide slope protection along the road section. Tree plantation can be encouraged along the edge of roadway to act as natural guard post and provide embankment stability. <p>Post Construction Stage:</p> <ul style="list-style-type: none"> To be checked, all the road restrain systems and slope protection measures are functioning properly and in good condition. Restoration of embankment soil erosion, rain cuts, shoulder dropping.

No.	Hazard Type	Mitigation Measures
	<ul style="list-style-type: none"> • High embankment  	<p>Design Stage:</p> <ul style="list-style-type: none"> • Provision of guard stones, retaining wall or any other form of vehicle restraint system along the high embankment to protect errant vehicle from running off the road • Provision of slope protection along the road section should be made. • Tree plantation can be encouraged along the edge of roadway to act as natural vehicle restraint system and provide embankment stability. <p>Post Construction Stage:</p> <ul style="list-style-type: none"> • Checking shall be done to see all the road restrain systems and slope protection measures are functioning properly and in good condition • Restoration of embankment soil erosion, rain cuts, shoulder dropping if found anywhere on high embankment.
	<ul style="list-style-type: none"> • Hill section – valley side  	<p>Design Stage:</p> <ul style="list-style-type: none"> • Mandatory provision of guard Stones, retaining wall on valley side shall be made • Parapet wall over retaining wall shall be provided to act as wheelguard • Provision of cautionary sign board with potential hazard shall be kept <p>Post Construction Stage:</p> <ul style="list-style-type: none"> • Checking shall be done to see all the Road restraint system s are functioning properly or not and are all in good condition.

No.	Hazard Type	Mitigation Measures
	<ul style="list-style-type: none"> • Hill section – cutside 	<p>Design Stage:</p> <ul style="list-style-type: none"> • Mandatory provision of breast wall or any other measure to protect running vehicle from falling material and land slides. • Provision of cautionary sign board with potential hazard shall be kept. <p>Post Construction Stage:</p> <ul style="list-style-type: none"> • Checking shall be done to see all the Road restraint system s are functioning properly or not and are all in good condition.
	<ul style="list-style-type: none"> • Road-side openchannel 	<ul style="list-style-type: none"> • Drain at urban area should always be lined and covered to prevent slipping of wheel into the drain. • Drain should always be clean and functional to drain out rain water from the carriageway. • Drain in rural area should be constructed at the edge of roadway.
	 	

No.	Hazard Type	Mitigation Measures
	<ul style="list-style-type: none"> Vandalism, e.g. damaged/stolen road signs. 	
		<ul style="list-style-type: none"> Maintaining sign post at rural area is a challenge. Due to socio-economic and other reasons and from many places they get stolen after few days of installation. Presence of road side trees and electric poles (EP) are very common on rural roads. Positioning traffic signs on nearby EP or tree trunk could be thought off to tackle this
	<ul style="list-style-type: none"> Construction zone 	
		<ul style="list-style-type: none"> Adequate road informative signs should be installed to inform driver of up and down vehicles about the probable hazards well before the approach to this location Proper barricading should be done at the construction zone to prevent sudden entry of running traffic into the area.
		<ul style="list-style-type: none"> Construction materials should be stacked on road side in a orderly manner, keeping as much road width as possible free for running traffic. Barricading of the same should be done to prevent any spillage over the carriageway, which can create unsafe road condition for running traffic.

No.	Hazard Type	Mitigation Measures
	<ul style="list-style-type: none"> • Construction zone - workers 	 <ul style="list-style-type: none"> • Use of safety gears such as helmet, boots etc for the workers shall be made mandatory to prevent any unwanted accident at construction site. • No worker should be allowed to enter the construction zone or work without wearing proper safety gear • Supervisor should ensure all workers within the construction zone are in good health and mental condition. • Except people related to the work, no unauthorized person, local curious people should not be entertained to be within work zone.
		

No.	Hazard Type	Mitigation Measures
	<ul style="list-style-type: none"> Alternative measures for vehicle protection at hilly areas. 	
		<ul style="list-style-type: none"> In hilly area on valley side, instead of guard post, provision of parapet wall over retaining wall as shown in the picture should be made. This will act as continuous wheel guard and visual barrier for the running traffic on road and guide them to keep safe offset from the edge of the road.
		<ul style="list-style-type: none"> If project cost or other reason prevent from providing adequate numbers of guard posts at required locations, plantation of trees (which, when matured forms girth of diameter 0.2m to 0.6m) at a safe offset from roadway edge could serve the purpose and act as natural road restrain system too. This will also help to stabilize the embankment and protect the same from erosion.
		<ul style="list-style-type: none"> Road side tree plantation, while used as traffic guard post should have two rows. First row should consist of soft trunked and quickly growing trees. These can act as shock absorber too at the time of collision. And the second row should consist of strong, durable trunked trees, which can act as second line of defense and prevent vehicle from toppling down at the time of collision.
		<ul style="list-style-type: none"> Plantation of tree as road restrain system also saves recurring cost of maintenance of conventional guard posts or parapet wall.

3.3 Accident Prevention through Traffic Control

52. Not all hazards in rural road projects can be removed, particularly when the cost implication is unjustifiable, or if the hazard is difficult to control, for example cattle crossing the roads. In such situations, the risk of accidents should be reduced through the most appropriate preventive measures. In rural roads, soft measures such as community engagement play a very important role in addition to any road safety infrastructure development.

53. In terms of infrastructure or facility, provisions for accident prevention can be done by traffic controlling measures, such as speed control and warning signs. Traffic control in terms of vehicle type restriction or weight limitations are usually implemented if the rural road passes through old or narrow bridges, geo-technically unstable area or other sensitive areas which requires protection from the impacts.

54. Traffic control can be distinguished between at intersections and mid-block (road sections between two junctions), as explained in the following sections.

3.3.1 Traffic Control at Intersections

55. To ensure efficient and safe traffic and pedestrian movements at rural road intersection, the design may include safety measures using road markings, road signs, signals, railing and flashing lights.

Road Markings

56. Road markings at intersection guide road users passing the intersection safely. **Figure 1** below illustrates typical carriageway markings of road intersections. For more details, IRC 35:1970 (under revision) may be referred. Depending on the actual intersection conditions, carriageway markings of intersections may consist of one or more of the followings:

- a) Centre line-solid or broken;
- b) Solid center lines preceded by broken center lines on approaches to important intersections as an additional aid to channelize traffic ;
- c) Centre line along with barrier lines;
- d) Turn markings;
- e) Directions markings; and
- f) Lane markings.

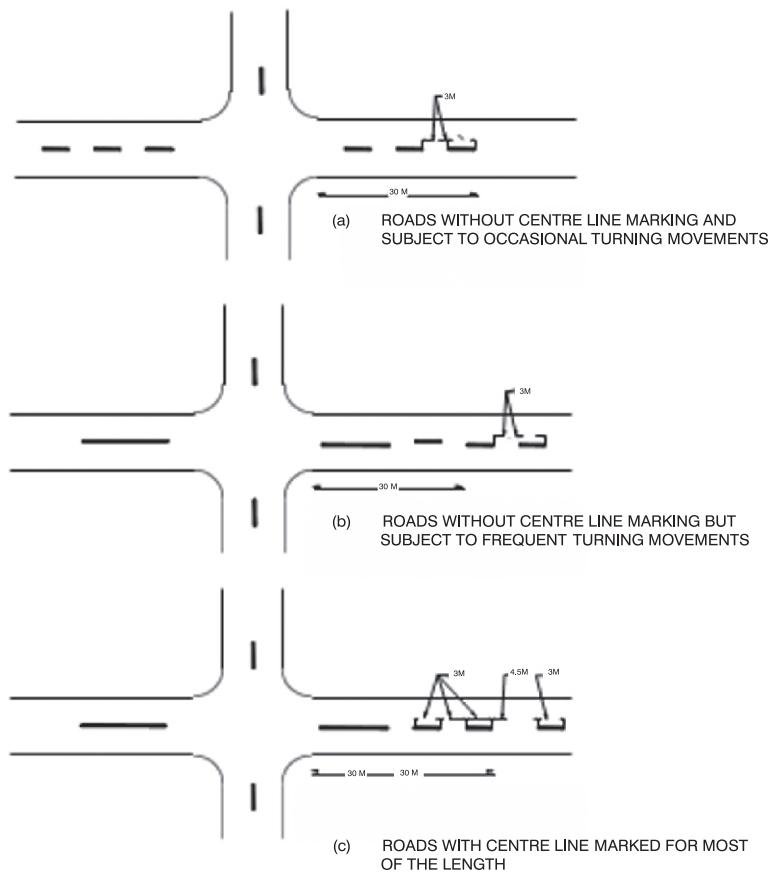


Figure 1: Typical Carriageway Markings at Intersections

Signs and Signals

57. To properly guide and control the traffic approaching junctions, traffic signs and signals are installed. IRC:67-1977 "Code of Practice for Road Signs" provides a more detailed description of various traffic signs and their applications. Design and provisions of traffic signals has been dealt separately under section 7 of these guidelines. While providing traffic signs at intersection, due care must be taken to ensure the effectiveness of the sign posted. It should always be noted that too many signs with inadequate spacing may become totally ineffective and at times result in confusion and accidents. Some of the traffic signs which are useful in guiding/regulating the traffic at intersections are shown in **Figure 2**. For other details on their sizes and color codes, IRC:67-1977 may be referred.

58. The posting of traffic signs must be done with adequate care so that they perform their intended function most effectively, in as much as the sign must be posted ahead of the spot to which it refers. When more than one sign is to be posted, they should be adequately separated in space so as to be seen one at a time and convey the message with complete effect. Signs with reflective properties (preferably retro-reflective type) must be used so as to meet the requirements of night traffic.

59. While posting the signs, adequate care should be taken so as to avoid the chance of their causing obstruction to pedestrian and vehicular traffic. In urban areas the lowest edge of any traffic sign should not be lower than 2.1 m from the pavement when posted on footpaths/ sidewalks. In rural areas the clear height of sign from the edge of the pavement should be 1.5 m. The nearest edge of the sign should be at least 1.2 m away from the edge of the carriageway on rural roads. When posted on raised foot-paths the same should be away by at least 30 cm from the edge of the kern. A few typical examples of posting traffic signs at urban and rural intersections are illustrated in Figure 3 and Figure 4 respectively.

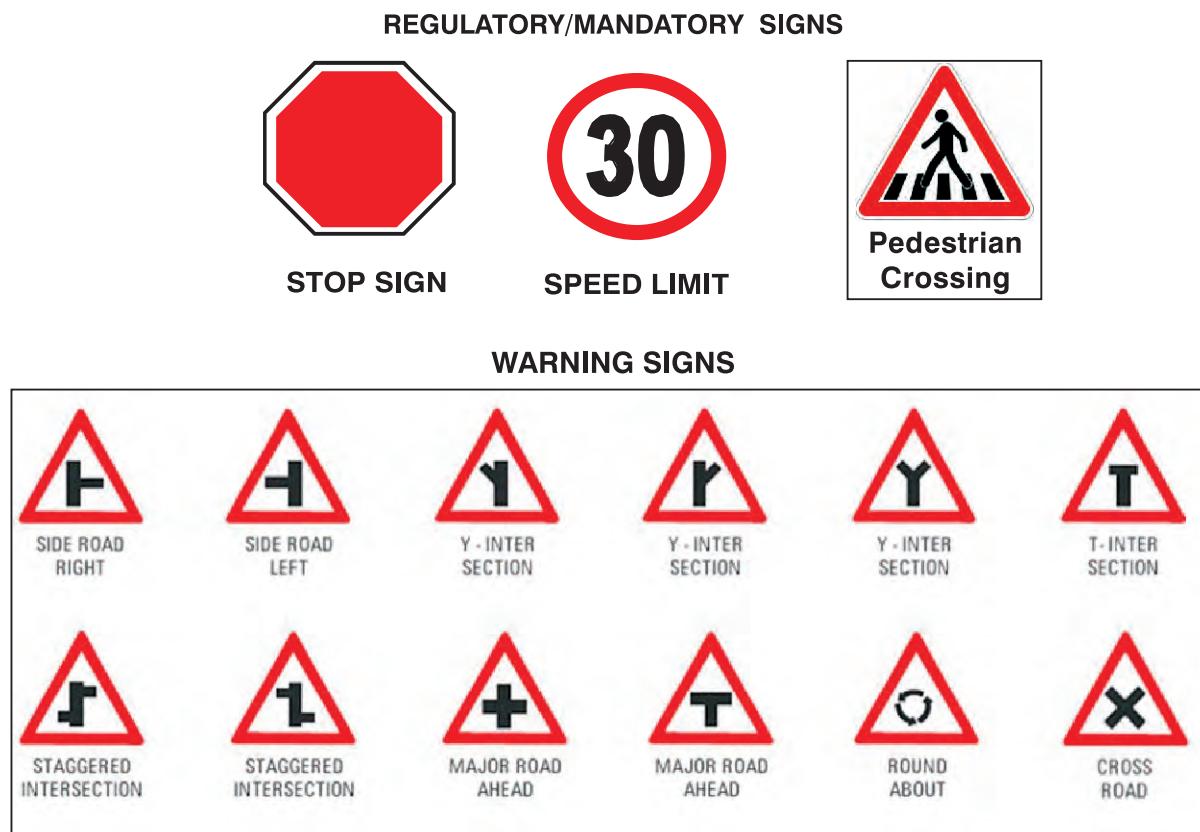


Figure 2: Typical Warning Signs at Intersections

INFORMATORY SIGNS

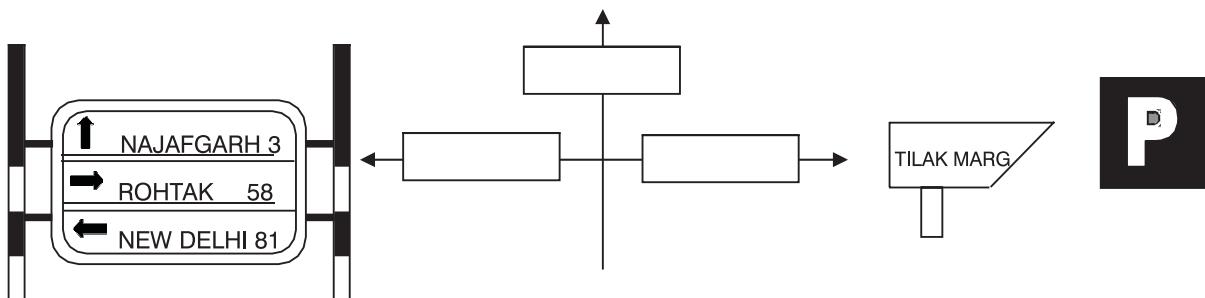


Figure 3: Signs Used at Urban Intersections

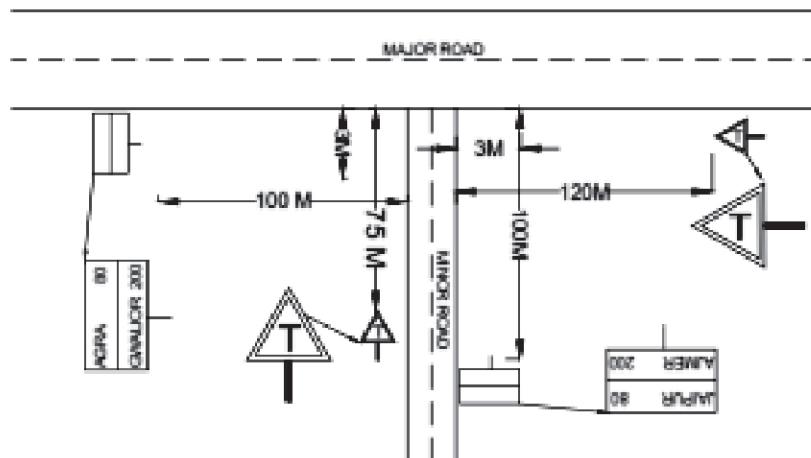


Figure 4: Signs Used at Rural Intersections

Reflectors

60. Large percentage of accidents at intersections occurs at night due to poor visibility and hazards such as traffic islands, median openings or other objects close to the carriageway. At such locations, use of reflector units of suitable dimensions can improve safety considerably. A typical unit suitable for use on island consists of three circular reflective units mounted on triangular plate as per IRC: 79-1981. In urban or sub-urban areas, safety is best improved by illuminating the entire intersection area adequately.

Railings

61. The requirements of railings at intersection have been dealt in IRC: 103-1988 "Guidelines for Pedestrians Facilities" which may be referred to for more details.

62. The sight distance is one of the major factors in safety at intersections. There are two considerations which are important to the driver as he approaches an intersection:

- Overall visibility at intersection layout so that it can be comprehended properly at first glance by the approaching driver, for visualizing the prospective worthiness of the layout, a simple method for this

is to hold the junction drawing horizontally at eye level and observe the proposed layout from the direction of each approach, simulating the drivers view of the junctions. This squinting procedure can remarkably bring out many defects in the design.

- b) Sight triangle visibility to negotiate an intersection is another important requirement on becoming aware of approaching intersection, the driver must be able to observe and comprehend the speed and direction of approaching traffic from all other legs of the intersection. If a vehicle is approaching he should be able to safely stop prior to reaching the intersection. The approaching driver must be able to see sufficient distance along the cross road so as to judge if he can cross by suitably adjusting the speed and direction. Special care to ensure visibility should be taken if intersection is located on high land in a cutting at or near a summit or near a bridge. Telephone poles, kiosks, signs, light posts etc. should not be placed where they restrict visibility.

63. IRC: 66 - 1976, identifies two specific intersection conditions that are relevant to minimum sight triangle. These conditions are:

- (i). "Uncontrolled intersections", where the intersecting roads are of more or less equal importance and there is no established priority.
- (ii). "Priority intersection", where PMGSY road is meeting with higher category of roads such as National Highway or State Highway.

64. Sight distance requirements in both these cases have been illustrated in Figure 5 and Figure 6. The stopping sight distance required at uncontrolled intersections for different vehicles speeds is given in **Table 14**.

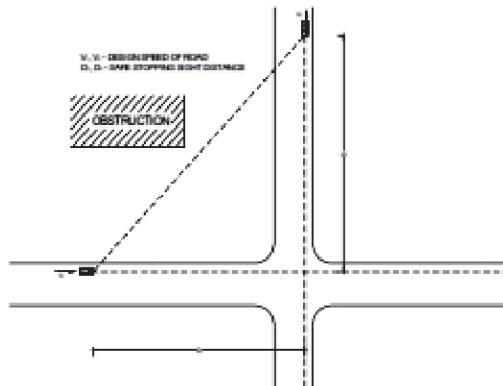


Figure 5: Minimum Sight Triangle at Uncontrolled Intersections

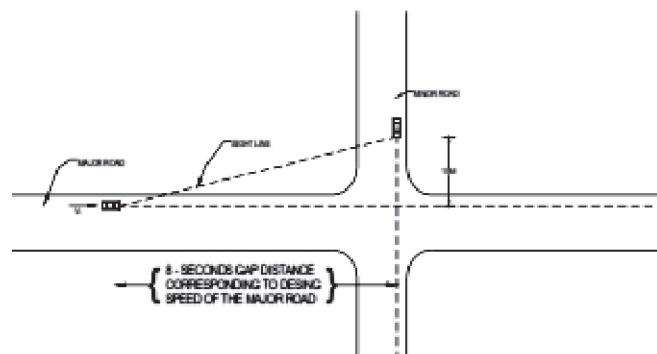


Figure 6: Minimum Sight Triangle at Priority Intersections

Table 14: Safe Stopping Sight Distance of Intersections

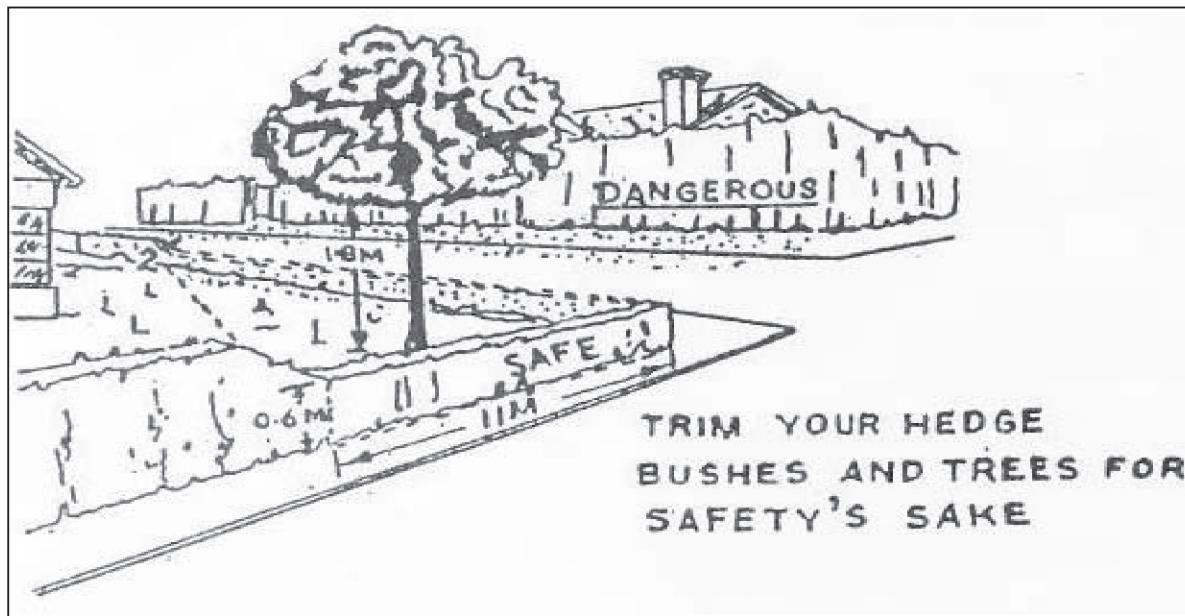
Speed	Safe Stopping Sight Distance
20	20
25	25
30	30
45	45
50	60

65. For priority intersections IRC: 66-1976 recommends a minimum visibility of 15 m along the minor road while for the major road, sight distance equal to 8 seconds travel at design speed is recommended. Visibility distances corresponding to 8 seconds travel time are set out below in **Table 15**.

Table 15: Visibility Distance on Major Roads

Design Speed (km/h)	Minimum Visibility Distance along major road (m)
100	270
80	180
65	145
50	110

66. All sight distance obstructions, such as bushes, trees and hoardings in the visibility triangle should be removed to improve safety. **Figure 7** illustrates the desirable amount of trimming to be done to hedges and trees at intersections.

**Figure 7: Trimming of Trees and Hedges Required for Clear Sight Distance**

67. To ensure junction visibility on road following points should always be considered
- Junction visibility should be ensured at all junction locations, especially at start and end of the project road and crossing of important and busy roads.

- b) In rural roads, at urban locations it may not be possible to keep provision for extra land to ensure junction visibility, but at open area and junction to busy and important roads this provision must be kept.
- c) Adequate land at the face of the junction to have free junction visibility should be acquired and ensured it is not encroached in future to build shops or other structures (permanent or temporary) which can obstruct junction visibility.
- d) Design consultant should prescribe extent of land required at the face of the junction and the Authority should preserve that land by fencing or other means so that any future encroachment is prevented.

3.3.2 Traffic Control at Mid-Block Sections

68. One of the main causes of the road accidents include inappropriate speed, inattention to hazards on heavily trafficked roads, absence of safe crossing facilities for pedestrians and other vulnerable road users, violation of traffic rules including erratic parking and driving under the influence of alcohol, and above all a general lack of road safety awareness. Appropriate measures are imperative to tackle the causes of road accidents and reduce the risk of injuries and deaths. Traffic calming is currently one of the most suitable measures for reducing road accidents; they are used to make people drive slowly on road so that they have better control on their vehicle and thus enhancing the safety for themselves as well as other road users. However, it should be coupled with a comprehensive road safety education campaign to achieve the greatest benefits and public consultation is also required during the planning and design stage as this may affect the design at large. In present context, in rural roads, generally traffic calming should be provided in the habitation areas and along the section where some commercial activities take place such as weekly/bi- weekly markets where there is possibility of accidents is more. Traffic calming is a mean of designing roads using physical measures to encourage people to drive slowly and carefully and enhance the safety of walking and bicycling. The main advantage of traffic calming is that it is self-enforcing and does not normally require any complicated traffic control devices and is usually highly cost-effective; achieving benefits with a value far greater than the costs.

69. In rural roads, heterogeneous mix of traffic comprising of fast as well slow vehicles, commercial vehicles including tractors with/without trolley and passenger vehicles. The foremost requirement in rural areas should be to provide adequate space for non-motorized users. The next important aspect is identifying the crossing points for pedestrians in zones of high pedestrian activity and providing proper crossing (such as speed breakers with pedestrian crossings) as part of the traffic calming measures. This will encourage pedestrians to cross at a designated safer point and thus increases their safety. The junctions with the highest level of pedestrian activity should also be identified and should be provided with proper traffic calming measures.

70. Most of rural roads have low traffic volume, localized traffic, designed with limited width and without footpath for pedestrian. Traffic calming measures, road markings, signs are the most common traffic control measures for rural roads.

Traffic calming

71. Traffic calming is widely used for reducing the number as well as the fatality of road accidents by forcing vehicles to reduce its running speed. It should be used together with a comprehensive road safety education campaign to achieve the greatest benefits. Public consultation is also required during the planning and design stage as this may affect the design at large. In rural roads, traffic calming should be provided in the habitation areas and along the section where commercial activities take place such as weekly/bi-weekly markets, where there is increased possibility of accidents. The main advantage of traffic calming is that it is self-enforcing and does not require complicated traffic control devices and is usually highly cost-effective achieving benefits with a value far greater than the costs.

72. Speed humps or speed breakers are generally paved and placed across the road having a height of 100 mm. around schools/habitations and other sensitive locations. They should be provided at junctions and threshold of sharp blind horizontal curves or at places where visibility at greater speed is an issue. All Speed breaker design should comply with IRC 99-1988 guideline with minor modification as per Figure 8. Where earthen shoulder part at speed breaker location has been suggested to converted to paved or hard shoulder to prevent erosion and pond of earthen shoulder at that point for longer durability of road.

73. Alternate to speed humps, other techniques such as rumble strips, speed table, and raised pedestrian crossing can also be adopted as traffic calming measure for both at mid-block and at the approach of intersections. But whatever method is adopted, that should be implanted/constructed and used as per proper standard guideline and reference of the same should be clearly mentioned and detailed in the design report or any such authentic document used by the authority.

74. Speed Table. Speed tables are generally similar to speed humps but cover a larger area and have a flat top. The material of the speed table is usually different than pavement. Speed tables generally have a relatively smooth gradient on the approach ramps. The flat top should be designed to accommodate the full wheel base of typical large vehicles passing over it.

75. Raised Pedestrian Crossing. A raised pedestrian crossing is a modified speed table where the width of the flat portion is same to that of the pedestrian crossing. It encourages the pedestrian to cross the road at a particular location increasing the safety and also makes them more visible. This measure also encourages the driver to yield. In many cases different materials are used in it for better identification.

76. Textured Pavement. This type of traffic calming measure is basically used to create an uneven surface in pavement by using different pavement material blocks or other means to caution the driver. This technique generates low level noise, creating a psychological effect which encourages drivers to slow down. Any pedestrian crossings should be demarcated clearly in this technique, potentially by using blocks of a contrasting color. In rural roads, the textured pavement can successfully be used in habitation area.

77. Construction of traffic calming measures without referencing any standard guideline will not serve its purpose. Figure 8 below is reproduction of speed breaker details provided in IRC 99-1988, with minor modifications, which could be adopted in rural roads as standard traffic calming measure. In absence of standard guideline for other types of traffic calming measures, this shall be used in all rural roads.

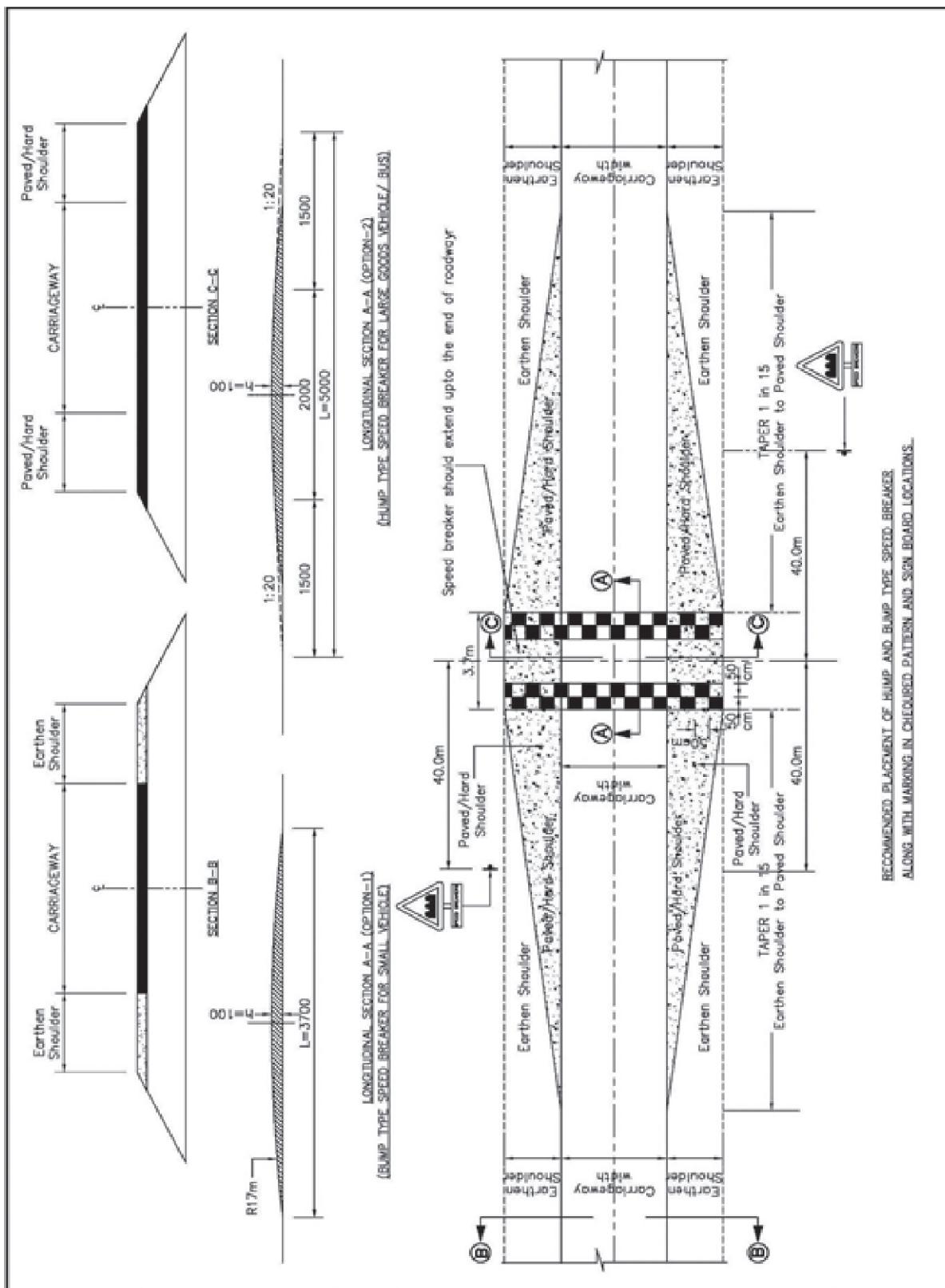


Figure 8: Typical Speed Breaker Design

Road marking

78. Low traffic volume for both vehicle and pedestrian has raised issues whether investment on road marking on rural roads is justified. Though it is always recommended from safety point of view, road marking such as for longitudinal carriageway marking for center line and or along the edge of the roads is a costly affair and impose budgetary restriction in rural roads. Therefore it is recommended that road markings should be provided at locations based on priority, such as at accident black spots and sensitive locations such as intersections, hazardous locations on road, object markers for object within or adjacent to carriageway.

79. Provision for road marking should as per the standard guideline (Refer: IRC-35, 1997). Depending on the actual intersection conditions, carriageway markings of intersections may consist of one or more of the followings:

- a) Centre line-solid or broken
- b) Solid center lines preceded by broken center lines on approaches to important intersections as an additional aid to channelize traffic
- c) Centre line along with barrier lines
- d) Turn markings
- e) Directions markings
- f) Lane markings

80. In choosing the type of markings, discretion should be exercised by judiciously, considering the conditions at site where the lane markings are to be provided; care must be taken to ensure continuity of lanes across the intersection.

Signs and reflectors

81. Road signs can also be used to control vehicular traffic, particularly to provide advance warning in approaching sensitive areas. Similar to those for intersections, traffic signs should be installed as per IRC: 67-1977 "Code of Practice for Road Signs".

82. Road signs need to be continuously maintained. Vandalism, such as sign post gets stolen, is one key problem that are faced by authority. One way to deal with this issue is by posting the sign on a tree or electric poles. In the case where sign is to be posted on tree, it should not be nailed to the trunk, instead it should be wrapped over.

83. A large percentage of accidents at intersections occur at night due to poor visibility and hazards such as traffic islands, median openings or other objects close to the carriageway. At such locations, use of reflector units of suitable dimensions can improve safety considerably. A typical unit suitable for use on island consists of three circular reflective units mounted on triangular plate as per IRC: 79-1981.

3.4 Road Safety during Roadwork or Temporary Lane Closure

84. The key principles for safety measures during roadwork or any temporary lane closure shall include

- a) Warning to the drivers unambiguously and sufficient in advance of the situation on the road;
- b) Providing clear demarcation of movement of vehicles;
- c) Providing devices to guide the drivers and their movements through construction zones/lane closures/traffic diversion; and
- d) Protection to project workers.

3.4.1 Construction Zone

85. In order to plan and provide appropriate traffic management and safety measures, it is necessary to

appreciate the concept of a construction zone. A construction zone can be defined as an area of the road which involves the conflict of the right of use between the road users and authority responsible for the maintenance/improvement of the road. From traffic safety point of view, construction zones comprise four sub-zones (shown in Figure 9) as described here in under:

Advance Warning Sub Zone

86. The advance warning sub-zone is meant to prepare the driver for an alert behavior and is an essential part of any traffic control system. The warning system shall prepare the driver well in advance by providing information regarding distance, extent and type of hazard ahead so that he can gradually reduce the speed of his vehicles. The information in this sub-zone is conveyed mostly through a series of traffic signs along its length.

Transition Sub-Zone

87. The transition sub-zone in the area in which the traffic is steered and guided into and out of the diverted path around the work sub-zone. This is the most crucial sub-zone from safety point of view since most of the movements are turning movements. The traffic in this sub-zone is mostly taken across with the help of barricades and channelizes.

Work Sub-Zone

88. This is the actual area where a construction or maintenance activity is taking place and the main concern therefore, is the safety of the workers at the site from the moving traffic. The path of the traffic must, therefore, be very clearly delineated to avoid intrusion of vehicles moving into the work area. The work sub-zones shall not be close to each other and the distance between the two work sub-zones shall be such that the flow of traffic can return to normal stream by permitting fast moving traffic to overtake slow moving vehicle. The traffic across sub zones is guided and taken with the help of various traffic control devices erected at the site. The length of warning and transition sub-zones shall be basically governed by the speed of approaching vehicles and shall be regulated as shown in **Table 16** below:

Table 16: Recommended Length of Construction Zone

Average Speed (kHz)	Length of Advance Warning Sub-Zone (m)	Length of Transition Sub-Zone (m)	Length of Work Sub-zone (m)
50	60	30	Varies

Termination Sub-Zones

79. An information sign board shall be erected to inform road users of the end of construction zone.

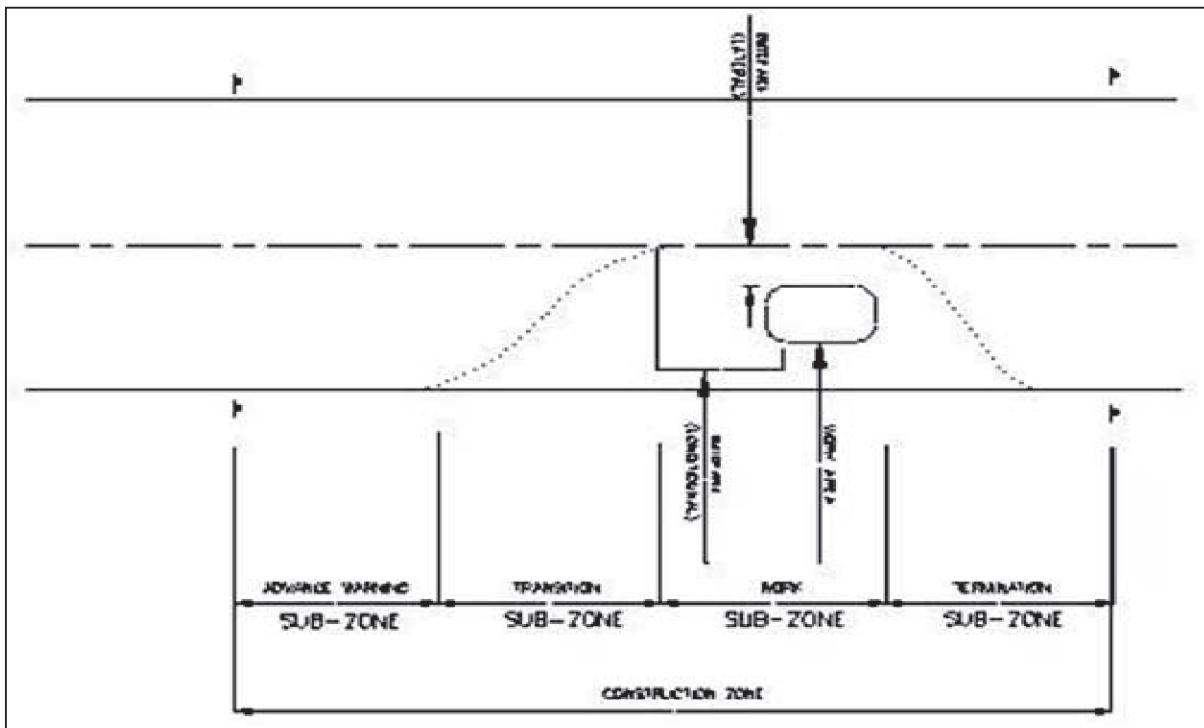


Figure 9: Components of Construction Zone

3.4.2 Traffic Control Devices during Roadwork

80. Traffic control devices in the construction zones perform the crucial task of warning, informing and alerting the driver apart from guiding the vehicle movements so that the driver of the vehicles as well as the workers on site are protected and safe passage to the traffic is possible.

81. The primary traffic control devices used in work sub-zones are signs, delineators, barricades, cones, pavement markings, flashing lights etc. They shall be such that they are easily understood without any confusion, are clearly visible during day and night, conform to the prevailing seeds in immediate vicinity, stable against sudden adverse weather conditions and are easy in installation, removal and maintenance. Warning signs shall be put to allow drivers to slow down their speed of vehicles for sage passage through such construction zones

Signs

82. The IRC:67-2012 (Code of Practice for Road Signs) gives a comprehensive list of traffic signs to which the size, color and placement of signs shall conform. Figure 10 shows typical positioning of signs. Similar to those for other purposes, traffic signs for roadwork can be categorized into:

- Regulatory signs.* Regulatory signs mean legal restrictions on the traffic they shall be used only in consultation with the local police and/or authorities. The most common types for use in construction zones are "Do not Enter", "Road Closed", "Give Way to Pedestrians", "Speed limit" etc.
- Warning Signs.* The most common type of warning signs to alert the drivers of the possible dangers ahead in construction zones are "Lane Closed", "Diversion to other Carriageway", "Divided Carriageway Starts", "Divided Carriageway Ends" and "Two Way Traffic" etc. Sometimes it might be advisable to explain these signs with help of a rectangular definition plate of size appropriate to the size of warning triangle and placed 0.15 m below, from the bottom of the triangle.

- c) *Guide Signs.* Guide signs in construction zones shall have different background color than the normal informative signs of IRC: 67-2001. These signs shall have black messages and arrows on yellow (Traffic Yellow of IS: 5-1978) background. The commonly used guide signs are: "Diversion", "Road Ahead Closed" and "sharp Deviation of route" etc.

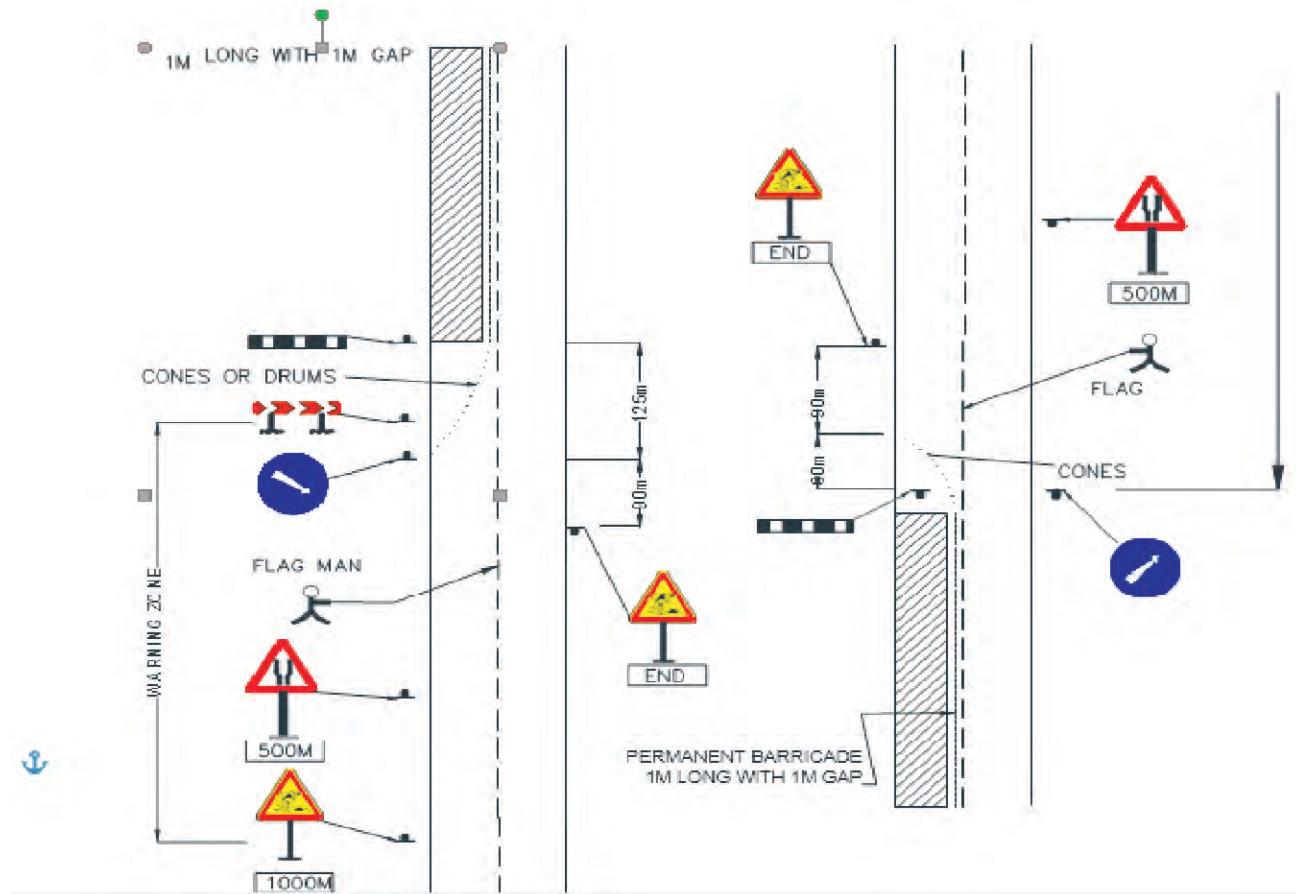


Figure 10: Typical Positioning of Signs

Delineators

83. These channelizing devices such as cones, traffic cylinders, tapes, drums are placed or adjacent to the roadway to guide the drivers along a safe path and to control the flow of traffic. These shall normally be retro-reflectories for night visibility. IRC: 79-1981 (Recommended Practice for Road Delineators) gives details of some of the delineators. The other delineators are discussed in following pares.

Traffic cones

84. Traffic cones shall normally be 0.5-0.75 m high and 0.3-0.4 m in diameter or in square shape at the base. These are mostly made of plastic or rubber with retro-reflectories red and white band and have suitable anchoring so that they are not easily blown over or displaced, it might be preferable to use double cones, one over the continuity. The spacing shall be 3 m (close) to 9 m (normal). Larger size cones can be used for high speeds or where more conspicuous guidance is required.

Drums

85. Empty bitumen drums (made of metal) cut to the required height can be used as channelizing devices since they are highly visible, give the appearance of being formidable objects, thereby commanding the respect of the drivers. These drums can also be of plastic which are lighter, easy to transport and store. As delineators, these drums shall be about 0.80 to 1 m high and 0.30 m in diameter. They shall be painted in circumferential strips 0.10 m to 0.15 m wide of black and white.

Bamboo poles/bellies

86. A 1.2 m high bamboo pole/bally painted red and white with 100 mm wide strips can also be used as delineators as alternative to metal-based pole.

Filled empty cement bags

87. At times, filled while empty cement bags also act as good delineators, which can be used to indicate the edges of existing roadway.

Barricades

88. Whenever the traffic has to be restricted from entering the work areas, such as excavations or material storage sites so that protection to workers is provided or there is a need for separating the two way traffic, barricades can be used. The barricades can portable or permanent type and can be made of wooden planks, metal or other suitable material. The horizontal component facing the traffic is made of 0.30 m wide wooden planks joined together and painted in alternate yellow and white strips of 0.15 m width and sloping down at an angle of 45 degree in the direction of the traffic.

Flagmen

89. In large construction site, flagmen with flags and sign paddles shall be effectively used to guide the sage movements. The flags for signaling shall be 0.60 m x 0.60 m size, made of a good red cloth ad securely fastened to a staff of approximately 1 m length. The sign conform to IRC: 67 2012 and provided with a rigid handle.

3.4.3 Safety for Temporary Traffic Diversion

90. In the cases of major repairs of reconstruction of cross drainage structures on a highway section, damaged due to flood etc., the traffic may have to pass on a diversion, moving parallel to the road. A temporary diversion road shall satisfy the following requirements:

- a) designed with smooth horizontal and vertical profile with smooth vertical and horizontal curves;
- b) all-weather operation;
- c) designed with adequate capacity to cater for the diverted traffic;
- d) dust free and clear visibility at all times of day;
- e) provided with the required safety standards; and

91. The warning for the construction ahead shall be provided by the sign " Men at Work" about 500 m earlier to the work zone, In addition, a supplementary plate indication "Diversion ahead" and sign: Road Closed Ahead shall be placed. It shall be followed by "Compulsory Turn Right/Left Sign". The "Detour" and "Sharp Deviation" sign shall be used to guide the traffic onto the diversion. Hazard markers shall be placed just where the railings for the cross drainage structures on the diversion starts.

3.4.4 Partial Closures of Existing Carriageway

92. Partial closures of existing carriageway will be required only in a special situation where the existing lane in use for the main traffic need emergency repairs and the new lanes under construction are not available for diversion of the traffic. It will become necessary to carry out special repairs through partial closures of the existing

lane. In this situation care shall be taken that the traffic is guided from the closed portion of lane onto the operating lane without conflicting with the traffic from opposite direction.

93. The warning sign for "Men at Work" shall be the first sign to be seen by the drivers of the approaching vehicles. This sign shall have supplementary plate also showing the distance of work zone. The next warning sign shall be for the "Road Narrowing" (depending upon the situation shall be provided at eh beginning of the transition zone and taper. The point from where the traffic is to deviate from its normal path, channel for traffic shall be clearly marked with aid of painted drums or traffic cones. The spacing of these cones and/or drums shall be about 9 m or closer as per site requirement. "Traffic lane or carriageway closed" sign shall also be provided at barricades along with "keep Right/Left" sign.

3.4.5 Small Maintenance Work

94. When the work is of small magnitude, to be done in the middle of the carriageway, such as minor repairs of potholes, cracks and parches, the traffic control measures shall include provision of cautionary signs such as "Men at Work", at about 500 m before the work zone for approaching vehicles and other cautionary sign such as "Road Narrow" at 100 m ahead of the work area. Regularity sign of "Keep Left/Right" shall be placed at the commencement point of the work zone and next to the barriers for the approaching vehicles. Movable type or barriers shall also be placed on both sides of the work area. Cones or drums shall be placed at suitable interval to demarcate the work area. If the operation is to continue during night time, necessary lightning arrangements with flashing lights shall be provided.

3.4.6 On-site Safety for Road Workers

95. The contractor is usually responsible for the safety of the project workers at the project site during duty hours. This requirement should be clearly stated in the bidding document and in the contract. The contractor has to ensure that occupational health and safety procedures and regulation are followed by the workers, such as wearing high-visibility jacket and helmets. Additionally, the contractor shall insure all workers against accident and fully follow the applicable labor laws.

96. Safety of road users and workers on the project road during its construction, operation and maintenance is obligatory and the contractor shall be fully responsible to discharge it in terms of the construction Agreement.

97. In case of emergency situations the contractor shall take action (s) for the safety of the road users and the workers as required by the site conditions immediately without consultation with road authority/agency.

3.5 Safety for Pedestrian

98. Lack of pedestrian facility in rural road has always been a major concern from road safety point of view. Low traffic volume for both vehicle and pedestrian has raised issues whether investment for pedestrian facility on rural roads is justified. Nevertheless, safety for pedestrian remains important.

99. The recommended measures to protect pedestrian from risks of accident are as follows:

- a) Traffic calming measures around centers of activities, such as habitations, schools, markets, etc.
- b) Pedestrian crossing facilities. This will encourage pedestrians to cross at a designated safer point and thus increases their safety. The junctions with the highest level of pedestrian activity should also be identified and should be provided with proper traffic calming measures.
- c) Safety campaign to increase awareness to local communities about road safety for pedestrians, for example to encourage walking on the road side facing oncoming traffic. Safety campaign should also include treatment of cattle that will also be subject to the risks of road accident.
- d) Detailed provision for pedestrian facility refers to IRC-103-1988.

4. ROAD SAFETY AUDIT

4.1 Road Safety Audit - Introduction

100. Road Safety Audit (RSA) is a formal procedure for assessing accident potential and safety performance in the road network. RSA applies to planned roads, newly constructed roads and existing roads. Its systematic application ensures that a growing awareness of good safety design principles is achieved throughout planning, design, construction and maintenance of the road network.

101. The main aim of road safety audit is to ensure that necessary provisions for road safety have been taken into account in the project design and sustained throughout the entire duration of its operation. This means that road safety should be considered throughout the entire project cycle, from the design, construction, pre-opening and during operation of the road. RSA may contribute to the effort in reducing the risks of accident to occur, but it does not reduce the number of accidents itself.

102. RSA assesses the operation of a road from road users' perspective, which includes pedestrians, cyclists, motorcyclists, truck/bus drivers, public transport users, etc. One important output of from the RSA is the identification of any road safety risks and deficiencies in the entire project cycle, and issue recommendations aimed at removing or reducing these deficiencies.

103. RSA should be carried out by an independent auditor, who is not involved in the design and or in the construction of the road. The auditor should be of a qualified individual with expertise, experience and training in road safety engineering and design. Highway designers apply quality assurance techniques to ensure that all aspects of road design have been incorporated. While this method also includes checking on road safety aspects, this procedure is different from RSA, because it is not done independently.

104. The cost of RSA and the consequent cost of changing a design are significantly less than the cost of remedial treatments after the works are constructed. With less remedial work by the SRRDAs, funding for the construction and maintenance rural roads can be better managed and spent more effectively.

4.2 RSA Checklist

105. Checklists are useful to assist the RSA team in the audit process as a prompter, so that key road safety measures are not overlooked. These checklists describe the performance and situations that can affect safety of selected types of project and audit stage. These checklists include planning, alignment, cross-section, junctions, link road, traffic signs, road markings, roadside hazards, road side furniture, vulnerable road users, cross-drainage structures etc. The checklists should be used as a guide to focus the audit process. Each road site is different and will raise specific issues that may result in further safety implications. When reviewing each of these issues, the team should consider how the road user would cope with different conditions such as at night and in adverse weather conditions. The road safety audit team should visit the site and identify the location's deficiencies from safety perspective and suggest remedial actions.

106. RSA checklist should be prepared for every project. This generic checklist provided below could be used as reference to develop the project specific RSA for rural roads under PMGSY, and prepared for each stage of rural road developments. The checklist for RSA on PMGSY roads should be reviewed and agreed with the SRRDAs in each state and NRRDA.

Check List-1: Completion of Design and Estimate Preparation Stage

Issue	Y	N	N/A	Comments
New and existing road interface				
Whether adequate measure has been taken during design to connect new and existing road interface safely?				
Whether the transition from old road to the new scheme is as safe as possible?				
Cross sections				
Whether the cross section is as per the standard contract agreement?				
Are shoulders proposed to be paved at all traffic calming points where speed breakers or rumble strips has been proposed?				
Are shoulders continuous across bridges and culverts?				
Horizontal and vertical alignment				
Will horizontal and vertical alignments be consistent with "safe" visibility requirements?				
Are vertical alignments suitably safe for all road users?				
Is there adequate provision for "safe" Overtaking Sight Distance?				
If Overtaking site distance cannot be provided at least Intermediate sight distance should be ensured at all Horizontal and vertical curve.				
Is there adequate provision for "safe" Intermediate Sight Distance?				
Is the design of horizontal and transition curves done properly as per the design speed?				
Is the provision of visibility criteria / sight distance at the curves correct?				
Whether the speed warning sign on the curves having radius less than the standard are put in place?				
Whether the provision of speed calming measures and warning and caution sign board on the curves having radius less than the standard are made?				
Will sight distances be satisfactory - especially at intersections and property accesses?				

Issue	Y	N	N/A	Comments
Whether railway crossings, CD structures and other hazards are conspicuous?				
Cross fall and super elevations				
Whether the cross-fall/camber on road and at junction has been provided correctly in design?				
Whether super elevation and extra width provided at curves adequately where the same is required?				
Junction / intersection				
Is the type of intersection (cross roads, T, roundabout, signals) appropriate and safe?				
Whether proper flaring have been provided at the junction				
Will the design be free of sight obstructions due to structures, fences, trees, parking etc.?				
Junction visibility should be as per IRC 66,1976				
Whether the appropriate warning and cautionary boards at the junctions are provided?				
Is the signing scheme for each Inter section clear and will it be easily understood by road users?				
Are all roadside hazards in the intersection treated properly and any conflict with clear zone has been resolved?				
Whether the starting point junction with the major road has been properly designed from visibility criteria?				
Is there provision of speed calming measures at the junction?				
Traffic calming measures at potential black spots				
Whether speed breaker or rumble strip has been provided as traffic calming device before and end of all sensitive locations and at all compromised geometric design locations? <i>Locations like Market place-School- Hospital- Religious places-cremation places-Government offices abutting the roadway should be considered as sensitive location</i>				
Whether the design and locations of the speed breaker are correct? Design of speed breaker should be as per IRC99- 1988 Speed breaker should be provided at all possible conflict points with traffic and other road users				

Issue	Y	N	N/A	Comments
Whether the speed breaker is constructed till the end of the shoulder, covering the entire roadway?				
Whether too many speed breakers are provided at any particular zone?				
Treatment to road side hazards-vehicle restraint system				
Whether provision of guard posts at all hazardous locations on road has been kept adequately?				
<i>High embankment(>1.5m), water body adjacent to roadway, outer edge of sharp turn, approaches to Bridges and Culverts on high embankment, shall be considered as hazardous location on road</i>				
Do the hazards within the road way identified and treated properly?				
<i>Hand pump, Electric pole or any hazard on shoulder that cannot be shifted shall be painted to increase the night visibility</i>				
Is correct type of Safety barrier proposed, where necessary?				
<i>Barriers mainly of three types-Flexible-semi rigid- Rigid, and each has different distance for safe lateral placement-offset from the road edge and hazard</i>				
Do the provision of wheel guards on submersible type of CDs made?				
Whether parapet wall at all CD/Bridge structures proposed?				
Protection to steep cut and valley section on Hill				
Whether provision of retaining wall and breast wall has been made on hill road adequately?				
Whether parapet wall has been proposed over retaining wall on hill road to safe guard running vehicle?				
Road sign, marking, delineators				
Do all signs (regulatory, warning and direction) shown in the DPR				
Is good delineation (curve warning signs, advisory speed signs, guide posts and chevron alignment markers) provided where required?				
Are the markings consistent along the road alignment?				

Issue	Y	N	N/A	Comments
Is the information clear?				
Are there enough signs?				
Are there too many signs?				
Are the signs correctly positioned without obstructing driver's visibility?				
Is the provision of citizen charted board, PMGSY logo boards and citizen information boards in place?				
Whether the provisions of warning signs, cautionary boards, and informative sign boards and their numbers in the design are sufficient?				
Whether hazard markers are provided on the CD locations?				
If the CD is submersible type, then proper warning sign before the CD to alert the driver during rainy season is in place?				
Drainage				
Does the design provide adequate drainage?				
Will drains be lined and covered at habitation area, or located outside the clear zone at rural area?				
Vulnerable road users and habitation abutting roadway				
Do all vulnerable road users have connectivity along their route, with suitable lateral clearance to running traffic?				
Is the design free of "squeeze" points where vulnerable road users may be exposed to traffic?				
Will pedestrians be able to cross the road safely?				
Whether proper information board is provided to alert the driver about the habitation ahead?				
Whether proper speed breaker is provided along with speed limit board for both up and down traffic?				
Whether proper warning sign board, speed breaker is provided before the school hospitals or any kind of similar establishment				
Whether a physical separation between road way and property line has been provided at places				

Issue	Y	N	N/A	Comments
where heavy footfall is expected. <i>Locations like Market place-School- Hospital- Religious places-cremation places-Government offices abutting the roadway should be considered as sensitive location</i>				
Whether intersections and junctions have been provided with pedestrian crossings?				
Whether the junctions with village roads have been provided with proper slopes from PMGSY concrete cement roads.				
Whether the provision of speed breakers at regular interval has been kept (at 250 m) if the length of habitation is more than 300m?				
Miscellaneous Issues				
Whether the height of electrical transmission line over the road has proper vertical clearances?				
Have sealed and marked areas been provided for parking? Will the parking be adequate and safe?				

Check List-2: Construction Stage

Issue	Y	N	N/A	Comments
Traffic management plan				
Has a traffic management plan (TMP) been prepared for the road work site? Has the TMP been approved by the PIU?				
Does the Contractor have an appointed Safety Supervisor who is responsible for road safety at the worksite, including checking the condition of the installed TMP every day?				
Does the TMP provide adequate and correct signage, delineation and worksite protection (barriers) for all road users under all traffic conditions?				
Has the TMP been installed correctly at the road work site?				
Is the advanced warning zone adequately signed to alert approaching road users of the presence of the road works?				
Is the transition zone correctly and adequately signed and delineated to guide approaching road users in to their correct path?				

Issue	Y	N	N/A	Comments
Has the safety buffer zone been provided as per IRC standard?				
Is the termination zone adequately signed to advise road users that they are past the road works and may return to normal road/highway speeds?				
Are the flagmen highly conspicuous and placed where they can give clear instructions to approaching drivers/riders in advance of the work site?				
Traffic calming measures at working zone				
Are the speed limit signs conspicuous?				
Are there sufficient numbers of repeater speed restriction signs through the length of the work site?				
Is the signed speed appropriate for safe traffic movement through the work site?				
Are speeds managed (through signs, enforcement and if necessary road humps) so that vehicle operating speeds that pass within one traffic lane width of any workers are 40km/hour lower?				
Road sign, marking, delineators				
Are all necessary warning, direction and regulatory signs in place as shown in the TMP?				
Are all existing road signs (those that are unnecessary during the works) covered to avoid distraction or misinformation?				
Are all "Men At Work" signs removed or covered when work is finished for the day? (NOTE: Signs must be credible and it brings other signs into disrepute to leave "Men At Work" signs in place if no workers are present).				
Is the transition zone well delineated (with plastic cones and other for giving devices) to reduce the number of traffic lanes well before the carriageway / lane ends?				
Is the carriageway/ lane (on which the work is to take place) fully and clearly closed off to all traffic?				
Are drivers/riders from the side roads given adequate warning of the two way traffic operation on the sole carriageway/lane open on the main road?				
Are all drivers/riders in both directions on the other carriageway/ lane adequate lyre minded they are on a two way section of road (such as with "Two				

Issue	Y	N	N/A	Comments
Way" warning signs)?				
Is the management of all two way traffic sections through the road worksite safe for all road users both day and night?				
Treatment at working site access points				
Are work site access points located with adequate sight distances for entering and exiting work vehicles?				
Are all site access points closed off to unauthorized traffic?				
Are appropriate traffic controls in place where works traffic and public traffic interact?				
Safety of workers				
Are all workers and supervisors at the works site wearing good quality reflective vests/jackets and other safety gears at all times?				
Is there a suitable safety zone in advance of and beside the work site?				
Night visibility and safety at night				
Are the road works conspicuous to all road users after dark?				
Are travel paths obvious to all road users after dark?				
In particular, do carriageway closures have suitable advanced warning zones and transition zones that are conspicuous and clearly delineated for night time?				

Check List-3: Pre-opening / Post construction stage

Issue	Y	N	N/A	Comments
New and existing road interface, junction and intersection				
Is the interface between the new road and the old road as safe as practical?				
Whether the junction designed is proper and speed control and warning signs are in place?				
Are sight triangle lines free of obstructions at all intersections?				
Whether the area between sight triangle lines are protected adequately from any future encroachment				
Are the intersection layouts clear and visible from all approaches?				
Are correct advanced warning and suitable				

Issue	Y	N	N/A	Comments
direction signs installed on each approach to Junction?				
Are the direction signs for each intersection clear and easily understandable at the anticipated operating speeds?				
Road condition				
Is the road surface free of gravel and sand, and with good skid resistance?				
Is the road maintained in good condition and riding comfort on road is good?				
Is there any edge break, pothole on road or shoulder dropping, rain cut on shoulder or embankment?				
The width and compaction of Road Shoulder is as per standard and is in good condition?				
Whether the shoulder is free from unwanted vegetation?				
Cross sections				
Are lane widths, shoulder widths and bridge widths, "safe" for the traffic volume and mix and there is no encroachment or hazards on any part of roadway?				
Are the shoulders suitable for use by all vehicles and road users, including pedestrians, cyclists and animals?				
Whether the Shoulder is encroachment free from cattle tying or parking vehicles or keeping agriculture waste or any kind of personal use?				
Cross fall and super elevations				
Whether cross fall/ camber and super elevation on road is as per design and adequate to have proper drainage and safe traffic movement?				
Treatment to road side hazards-vehicle restraint system				
Whether guard posts at all hazardous locations on road provided adequately?				
<i>High embankment(>1.5m), water body adjacent to roadway, outer edge of sharp turn, approaches to Bridges and Culverts on high embankment, shall be considered as hazardous location on road</i>				
Do the hazards within the road way identified and treated properly?				
<i>Hand pump, Electric pole or any hazard on shoulder that cannot be shifted shall be painted to increase the night visibility</i>				

Issue	Y	N	N/A	Comments
Is Safety barrier installed, where necessary?				
Is Safety barrier correctly and safely installed? <i>Barriers mainly of three types-Flexible-semi rigid- Rigid, and each has different distance for safe lateral placement-offset from the road edge and hazard</i>				
Do the wheel guards on submersible type of CDs provided?				
Is parapet wall at all CD/Bridge structures provided?				
Protection to steep cut and valley section on Hill				
Whether retaining wall and breast wall has been provided on hill road adequately?				
Whether parapet wall has been constructed over retaining wall on hill road to safe guard running vehicle?				
Traffic calming measures at potential black spots				
Whether speed breaker or rumble strip has been provided as traffic calming device before and end of all sensitive locations and at all compromised geometric design locations? <i>Locations like Market place-School- Hospital- Religious places-cremation places-Government offices abutting the roadway should be considered as sensitive location</i>				
Whether the design and locations of the speed breaker are correct? <i>Design of speed breaker should be as per IRC99- 1988 Speed breaker should be provided at all possible conflict points with traffic and other road users</i>				
Whether the speed breaker is constructed till the end of the shoulder, covering the entire roadway?				
Whether too many speed breakers are provided at any particular zone?				
Whether the speed breakers are functional and serving the purpose for which they are built?				
Road sign, marking, delineators (Condition and Function)				
Do all signs are correct, clearly convey message for which they are installed for, as per IRC standard, clearly visible to drivers and consistent throughout the road?				

Issue	Y	N	N/A	Comments
Is there a need for any more signs to warn, inform, guide, control or delineate?				
Are the constraint zones clearly signed with speed restriction signs of a suitable value?				
Do the condition of signage / boards are good?				
Do the condition of Km stones, guard stones and 0.2 km stones are good?				
Are all bridge abutments and culverts safely treated and hazard markers are in place?				
If the CD is submersible type, then proper warning sign before the CD to alert the driver during rainy season is provided?				
Drainage				
Are all drains safe (covered, underground or outside the clear zone)?				
Whether the drains are clean and functional?				
Vulnerable road users and habitation abutting roadway				
Do all vulnerable road users have connectivity along their route, with suitable lateral clearance to running traffic?				
Do all vulnerable road users have connectivity along their route, with suitable lateral clearance to running traffic?				
Is the design free of "squeeze" points where vulnerable road users may be exposed to traffic?				
Will pedestrians be able to cross the road safely?				
Whether proper information board is given to alert the driver about the habitation ahead?				
Whether proper speed breaker is provided along with speed limit board for both up and down traffic?				
Whether proper warning sign board, speed breaker is provided before the school hospitals or any kind of similar establishment?				
Whether a physical separation between road way and property line has been provided at places where heavy footfall is expected. <i>Locations like Market place-School- Hospital- Religious places-cremation places-Government offices abutting the roadway should be considered as sensitive location</i>				

Issue	Y	N	N/A	Comments
Whether intersections and junctions have been provided with pedestrian crossings?				
Whether the junctions with village roads have been provided with proper slopes from PMGSY CC roads?				
If length of habitation is more than 300 m then speed breakers have been provided at regular interval?				
Miscellaneous issues				
Is the project free of all “visual deceit”?				
<i>Series of fixed object alongside of the roadway like a long row of trees, or power lines, can give an impression that the road continues straight. Then, if the road takes a bend, some drivers will be misled by the trees or the power poles and may proceed in the wrong direction. This can occur regardless of the number of warning or guide signs telling them otherwise. This “visual deceit” needs to be addressed by auditor and suggest measures to rectify the same</i>				
Is all lighting adequate and safe? Are they located outside the clear zone?				
Have the batter slopes of cuttings been treated to minimize the risk of rocks falling onto the new road especially at hilly area?				
Are all accesses to/from adjoining properties conspicuous and as “safe” as practical?				
If the electrical transmission line over the road does not have proper vertical clearances, then whether adequate measure has been taken to warn the running traffic before entering into that zone?				

Check List 4: Periodic Road Asset Maintenance:

SN.	Issues	Yes	No	Remarks
	Cross drainage (CD)			
1	Check the CD parapet wall is in good condition.			
2	Check the inlet and outlet of the CD is clear.			
3	Check the CD pipes are in good condition.			
4	Check whether CD is in serviceable condition.			
5	Check whether the wheel guards are intact.			
6	Check whether CD parapet walls need painting.			
	Road Shoulder			
1	Check the width and compaction of road shoulder.			

2	Check whether the shoulder is free from unwanted vegetation.			
3	Check whether shoulder is free from any type of encroachments.			If No, note the chainages
4	Check the shoulders for the rain cuts.			
Road Carriageway – BT and CC				
1	BT - Check the carriage way is free from potholes, cracks, raveling or any kind of distress.			If No, note the chainages
2	BT - Check the edge break of the carriageway.			If No, note the chainages
3	BT - Check the condition of edge marking on the carriageway.			
4	CC – Check the condition of CC portion for any distress, cracks, raveling or any kind of failure.			
5	Check the condition of CC drains in the habitation zones.			
Side Slopes				
1	Check whether side slopes are in 1:2 ratio.			
2	Check whether cultivators have damaged/cut the side slopes for farming.			
3	Check the side slopes for the rain cuts.			
Road Furniture				
1	Check whether caution boards, warning sign boards and Information sign boards are displaying the message clearly or it needs painting.			
2	Check the condition of signage / boards against damage.			
3	Check the condition of km stones, guard stones and 0.2 km stones.			
4	Check whether km stones, 0.2 km stones and guard stones need repainting.			
5	Is road sign board and furniture's having proper visibility during night times.			

Check List 5: Safety Requirements for Rural Roads in Habitations:

SN	Issues	Yes	No	Remarks
1	Check whether proper information board is given to alert the driver about the habitation ahead.			
2	Check whether proper speed breaker is provided along with speed limit board.			
3	Check whether proper school/hospital warning sign board, speed breaker is provided before the school and hospitals.			
4	Check whether intersections and junctions have been provided with pedestrian crossings.			
5	Check the junctions with village roads have been provided with proper slopes from PMGSY CC roads.			
6	Check the provision of CC drains and its functionality in the habitation area.			
7	Check that the provision of CC drains do not isolate individual households.			

8	Check the shoulder encroachment for cattle tying or parking vehicles or keeping agriculture waste.			
9	Check the side drains cleanliness.			
10	Check if length of habitation is more than 300 m then provide speed breakers at regular interval.			
11	Any hand pump/electric pole or any encroachment on shoulder that cannot be shifted should be painted to increase the night visibility.			
12	Check the height of electric crossings in habitation area should have proper vertical clearances.			

Check List 6: Checklist for Pedestrian and non-motorized transport facilities:

1. The pedestrian volume has to be assessed specially on the market days.
2. Community consultation needs to be conducted to assess the facilities requested/required by the villagers.
3. Demarcate the land for mandy/market on the open ground little away from road.
4. Suitable pedestrian crossing points need to be developed at the specific locations near the market and schools.
5. Design suitable parking facility for non-motorized vehicles at a place away from the road on the market side to reduce the pressure of community members occupying the space on the road section.
6. Develop the facility of parking within the school premises.
7. If possible provide the boundary wall for the school.
8. Suitable cattle crossing points need to be developed with community consultation.
9. Awareness sessions on road safety need to be conducted in the school for children and for the community members also to make them aware about the road safety rules regulations and signage.

Check List 7: Procedure for Clearing of Roadside Hazard-Trees, Encroachments

1. Identify the encroachments affecting visibility and or reducing the capacity of road thus obstructing traffic flow.
2. In case of tree, if it is only reducing the visibility or sight distance, pruning of branches to be done to enhance the sight distances.
3. If the tree is on shoulder/alignment and it is obstructing traffic flow, establish the ownership- owned by community/individual/forest department.
4. Discuss with individual/community about safety hazard, take them into confidence and then tree is to be cut. At the same time new plantation is to be done in 1:3 ratio.
5. If the trees belong to forest department, the procedure of cutting and planting new trees to be initiated through the road agency.
6. In case of other encroachments-community platforms, tying of animals, collection of agriculture waste or product on shoulder, they need to be shifted by taking community into confidence and explaining about safety hazards due to these encroachments.

Check List 8: Safety Requirements during Construction Stage:

During Construction stage is most difficult stage from road safety point of view in Rural roads. Following points should be considered at this stage from safety aspects:

1. The community needs to be informed in advance about the construction work to be started.
2. No night work should be allowed without prior permission of the relevant authority and without informing the community.
3. The work zone should be concentrated at one or two locations at a time, it should not be spread over the whole length of PMGSY roads.
4. The labors working on the road with contractors should be provided with the Personal Protective Equipment's such as helmet, safety jackets, gloves, boots etc. A First Aid Box should be kept within the site.
5. Proper training programs should be made for the labors and site supervisors to follow the occupational health and safety program as outlined in the standard bidding document.
6. Awareness program on HIV/AIDS should be conducted for labors and community members.
7. Traffic management plan should be prepared and it should be approved by the relevant authority.
8. If possible, bypasses should be provided so that the normal traffic flow is not disturbed. If the bypass is passing through the private land then a MoU should be signed with the affected persons.
9. The route to bypass should be properly marked using lime lines/empty cement sand bags/traffic cones/empty drums.
10. Proper informative / caution sign boards like diversions, Men at Work, should be placed to alert the drivers in advance.
11. Check for the sight distances at the site of works and at intersections.
12. Proper care should be taken in construction material stacking so that part of the lane is free for traffic movement.
13. The construction zone of bridges and culverts should be properly demarcated and protected. Proper speed calming measures and warning sign boards should be in place.

4.3 Incorporating RSA Outputs

107. The finding and recommendations from the RSA in each stage of the project should be discussed to the appropriate agency for incorporation. Appendix 1 and Appendix 2 present the RSA form and example of filled RSA forms, respectively. Below is the recommended follow up actions on RSA finding and recommendations.

- a) *Design and cost estimation stage.* Findings and recommendations made by the RSA team should be discussed with the PIU, State Technical Agency (STA) and SRRDA for incorporation into road design. Final decision for amendments in the design and the bill of quantity (BOQ) is the responsibility of SRRDA. SRRDA should keep NRRDA informed of such decisions.
- b) *Construction and pre-opening stage.* Findings and recommendations should be discussed with the PIU, STA and SRRDA for inclusion in the road construction. Final decision on measures recommended rests with SRRDA. SRRDA should keep NRRDA informed of such decisions.
- c) *Project completion.* The RSA team needs to determine if the safety requirements of all types of road users including pedestrians, cyclists, animals and animal drawn carts are met. Findings and recommendations should be discussed with the SRRDA. Final decision on additional measures recommended rests with SRRDA. SRRDA should keep NRRDA informed of such decisions.

5. SAFER RURAL COMMUNITY

5.1 Public Advocacy Campaign - Targeting User Behavior

108. Road safety is not merely a technical issue but is also directly linked to safe behavior of the road users. In a way it is everyone's responsibility. Safe road using habits and small gestures can save precious lives and reduce the severity of injuries in case of accidents.

"Safe behavior on road is an attitude, please inculcate."

109. Behavior of road users that are conducive to their own safety and that of others on the road however, always needs targeted intervention and reinforcement through behavior change interventions and campaigns. This is more so important in case of rural roads in India where road connectivity has reached to the communities for the first time.

110. This chapter is about understanding the basics of designing and organizing a public advocacy campaign, which targets road user behavior change leading to safer roads for all. It provides basic understanding on the concept of advocacy and designing awareness campaigns targeted towards behavior change.

5.1.1 Choosing the Appropriate Approach

111. There is no one-way to design a public advocacy campaign targeted at behavior change for road users. Some of the common behavior change campaign approaches based on the theories of communication and change are include the following:

- a) *Showing that unsafe road behavior is dangerous and must be stopped:* This common campaign type aims to influence behavior by making stakeholders involved aware of the fact that unsafe road user behavior is dangerous and unacceptable, and by inviting those involved to discuss and change for good.
- b) *Making road accident affected and survivors aware of solutions and encouraging them to take action:* This approach, often inspired by the health belief model and social cognitive theory, is essential in secondary prevention.
- c) *Showing that unsafe road usage puts entire community to risk and must be stopped:* This approach, aims to encourage people who consider they are not directly affected by the unsafe use of roads, to recognize it as a problem that needs to be addressed. It can be an effective element in reaching those who do not directly use roads that often and consider themselves alienated from the problem.
- d) *Making change to safe road usage behavior appear attractive and rewarding:* This approach of designing the campaign seeks to convince the community that adopting safe road usage behavior is good for them and appropriate within their society. The concepts of safety champions and safety volunteers explained further in this part of the module originates from this concept. It is considered a highly effective tool in disseminating messages and bringing about desired change in behaviors.
- e) *Guiding the target audience through a personal development process:* A relatively complex campaign approach it consists in provoking and supporting personal development processes for the target audiences to "unlearn" unsafe behavior over an extended period of time. Such campaigns require a mix of mass communication and person-to-person contact and are more time taking and resource intensive. They may however be very useful in high accident prone zones and areas.

5.1.2 Building a Successful Campaign

112. When designing the behavior change campaign it's important to be intentional in the design. It is highly recommended that appropriate time be spent in developing these key elements of the campaign which will make

implementing it easier and enhance its effectiveness. The order of stages for road safety messages to be delivered in a campaign to change the road user's behavior can be seen in the 'question-and-answer' below.

Stage 1: Identifying the specific road usage behaviour to change	
Why is it required?	It is not enough and effective to simply announce "We want you to use the roads safely." The targeted community will need simple, clear and direct actions that they can take to achieve enhanced road safety.
Stage 2: Select a specific audience	
Why is it required?	The open for all approach to a behavior change campaign dilutes the message and ultimately affects the achievement of the results. If the desired change is towards the behavior of bullock cart user focus only on it rather than making it a broad campaign targeting all road users in rural areas
How can you do it?	Pick a specific target audience you want to influence and set a boundary around that. It may be the bullock cart users, the parents of school going young children or any other road user group. The key is in being specific and focused
Stage 3: Set a clearly defined goal	
Why is it required	We all need to know in which direction we are headed. Setting a big goal for the campaign will make individual actions feel like a part of something bigger and can engage a sense of collective work. A good example of such goal setting for the campaign may be like 'Making the district free of deaths due to road accidents'
How can you do it?	Make your goal clear and concise: "75% of all bullock carts in the district with reflectors..." or "500 new road singes in 2 months." A good goal provides clear direction, making it easier to measure progress.
Stage 4: Creating short and easy success cycles	
Why is it required	Research studies have found that once someone has agreed to and achieved a simple action, they are far more likely to maintain that change, and then accomplish a larger or more difficult request. It is therefore necessary to design and implement short cycles of success and continue spiralling outwards towards the larger goal.
How can you do it	Spell it out clearly and boldly. Pick a manageable change to make and then show step by step how to make it.

Stage 5: Define clear indicators
Why is it required?
How will we know that we have succeeded in bringing about the desired behaviour change? In order to show progress, we need to know what outcomes we expect and exactly what we are going to measure on the way there.
How can you do it?
Clear indicators depend on having a clear goal. If your goal is a reduction in road accident related deaths, consider all the different direct and indirect indicators that can be used to measure it such as number of accident cases reported in which first aid was provided, number of serious cases referred to other medical facilities on time, number of speed breakers constructed etc.
Stage 6: Create a communications plan
Why is it required?
The communication plan enables us to identify overlapping messages, messages with no clear audience or developer, overlapping mediums, mediums that have been overlooked and potential timing issues or opportunities to take advantage of.
How can you do it?
With your target audience in mind, decided which media you will use for outreach and the message you want to convey. Make it specific, attention getting and if possible set near the location where the action should take place.
Stage 7: Create an evaluation plan
Why is it required?
This is required to set a clear path as to how you will plan and document progress and results from the campaign, using the indicators that have been developed, resulting in a complete success story.
How can you do it?
Ask "how will we know we were successful?" Then list your indicators, identifying any others that may be affected by the efforts of the campaign, and list exactly how and when information will be collected and results will be tracked for each.

113. Regular campaigns are needed to make the general public aware of road safety. While most initiatives would be undertaken by the government departments, civil society can also play a role in organizing these campaigns. Private sector companies, such as insurance companies, often participate actively in organizing and funding road safety information campaigns and with their enhanced reach in rural areas they can be involved effectively.

114. Campaigns should preferably focus on one risk factor at a time. Campaigns attempting to cover too broad a range of topics are neither understood nor remembered by the public. Campaigns should be organized on a large scale, if possible (though not necessarily) in different forms (using radio and TV spots on local TV channels, posters or leaflets) and should be carried by all the main media, including the vernacular press, radio channels, television and, increasingly, the internet if the targeted area has good internet reach and penetration.

115. Some of the common 'Do's' and 'Don'ts' of a behavior change campaign that always come handy while organizing such campaigns are as follows.

Do

- a) *Plan:* As part of the overall strategic planning process, carry out a deliberate strategic communication planning process to devise and write down an explicit communication strategy. Ensure all campaigners know and support the communication strategy and its different elements.
- b) *Understand your audience:* Undertake some background work to define and understand target audiences precisely and choose the communication channels, techniques and tools most likely to reach them. Adapt your message, techniques and tools to the target audiences, diversifying methods so as to speak to all the segments of the audience that need to be reached.
- c) *Combine channels and tactics:* Combine different communication channels, techniques and tools to reach target audiences in a range of settings and situations. Broadcasting messages via mass media is more likely to prompt lasting behavior- change when combined with interpersonal interventions, in partnership with, for example, community organizations, schools and health service providers like ANM and ASHA These can include engaging audiences in direct ways such as through media interviews or profiles, listener call-in radio segments or TV talk show formats, among others.
- d) *Pre-test:* Plan for ample time to check and re-check all messaging and communication materials with stakeholders, partners and members of your target audiences, through consultations, focus groups, feedback sessions, etc. Find out about other campaigns and how they have reached similar target audiences.
- e) *Call for action in a straightforward way:* One simple message that calls for clear action has a better chance of being understood than complex, multiple messages.
- f) *Respect ethics:* Ensure messages and their delivery, are gender-sensitive and consistent with human rights, and do not reinforce negative stereotypes about women and men, and their roles. Address concerns of those experiencing multiple discriminations (e.g. because of disability or age) by involving them in planning your communication strategy, and facilitate their participation in campaign events.

Don't

- a) Sacrifice principles of gender-sensitivity and ethics for the sake of getting more attention (e.g. by displaying sensationalist images)
- b) Exclude people affected by multiple discriminations from campaign activities, whether deliberately or by unintended omission.
- c) Adopt a negative or confrontational stance (e.g. by blaming all pedestrians for road accidents), or belittle or disparage the work of others even if their efforts have reaped little success. Instead, build on experience accumulated by others, and explore constructive ways in which existing efforts can be improved and errors corrected.
- d) Get distracted by fads or gimmicks: Just because a communication channel or tool appears attractive this does not mean that it is appropriate for your road safety campaign. Gimmicky communications activities can sometimes backfire, distracting or turning your target audience away from your core message. It is important to research the benefit and consequences of using different types of channels or tools to see if these will work in your context and to your advantage.

5.2 Educational Requisite for Local Authorities

116. Local authorities and institutions play a critical role in educating communities on road safety issues. The local authorities and institutions includes a large range of government departments and service-providing

institutions who will have direct interaction with communities, which creates opportunities to inform and influence the community's behaviour towards safe use of roads.

117. For these authorities and institutions to implement this critical responsibility, it is however very critical that they have a clear idea and understanding on road safety issues, and how they can further carry out the task of educating the community. The following sections describe the aspect of community education on road safety, and how local authorities and institutions can play a critical role in educating communities on road safety issues.

5.2.1 Understanding Road Safety as a System

118. Helping community, especially children and young people to stay safe on roads is a high priority issue for all those involved in implementation of rural road programs, and preventing death and serious injury on the roads is an important part of this initiative.

119. Road safety and road safety education in rural areas have started finding traction within the government machinery only recently and is yet to evolve and become an integral part of the administration and education system.

120. The key belief and approach adopted for this module recognizes that people make mistakes but should not have to die or be seriously injured as a result. Rather, the road system should be able to accommodate mistakes and keep road users safe. This does not mean that all road accidents must be prevented, but that no one should be seriously injured in the event of an accident or crash.

121. This approach hinges upon the three critical aspects including **safe roads**, **safe vehicles** and **safe road users** requiring **safe speeds** and **safe policy and management**. These aspects are explained as:

- a) '**Safe roads**' is referred to as safe roads and roadsides or more broadly as *safe infrastructure*, therefore, representing the environment in which road users interact.
- b) '**Safe vehicles**' includes all vehicles in the road system, including passenger vehicles and heavy vehicles such as buses, trucks and tractors for example.
- c) '**Safe road users**' includes all of those that access the road system, including drivers, passengers, motorcyclists, cyclists, bullock cart users and pedestrians.
- d) '**Safe speeds**' is essential to all of these components, not only decided speed limits, but also speeding-related policies and enforcement.
- e) These elements all require **safe policy and management** to ensure they mutually create a "**Safe Road System**", requiring continued monitoring, evaluation and improvements.

122. Therefore, the "Safe Road System" is a "forgiving" system that recognizes that human error can occur but safety must be shared by the system designers. This is a radical shift from the concept of pitting the responsibility of road safety on road users. The road safety education of community therefore needs to keep this systems approach in center in order to have effective results.

5.2.2 Understanding Road Safety Education Issues for Communities

123. Most government departments and almost all of the local authorities and service providers have some arrangements for reaching out to the communities they interact with in context of their specific domain or work. Utilising these inroads it is important to understand the prevalent practice, issues and understanding of the situation first. Various institutions like schools and health centres can be specifically assessed to gather an in-depth understanding on the processes, practices and policies that are prevalent in these institutions. Based upon this wisdom the following needs to be reflected upon:

- a) How well do these plans and policies meet the needs of the communities?

- b) Are any of the community groups are particularly vulnerable, because of their social circumstances, because of where they live, the usual commuting route they take or for some other reason?
- c) What kinds of accidents happen on the roads with the community under consideration?
- d) What does community think about the causes of road accidents?
- e) What do they think would help reduce road casualties?

124. The second and critical step is to ask the community itself. It is important to know what the community already knows and understand and are able to say or do about staying safer on the road. In any group there will be a wide range of understanding and capability. Based on the responses one can assess how many of the community members have included something about road safety in their responses.

125. This will give an idea of their awareness of road safety. What kinds of things are they keeping safer from? Most important of all, what strategies do they have for keeping themselves safe on roads as drivers, as pedestrians or cyclists? Do they think they have some responsibility for keeping themselves safer, or do they see this as the responsibility of the government?

126. This kind of 'quick action research' can help to build a concrete understanding on what the community already knows and understand, identify what they may have misunderstood or half understood and carefully challenge their misunderstandings.

5.2.3 Designing and Delivering Road Safety Education for Communities

127. Road safety is a long-term issue and would need long-term investment in community education and working with them to ensure effective road safety results. Once the road safety issues are identified for the local communities, the next stage is to develop priorities for a long term education and perspective plan. This will form the basis for development, delivery and evaluation of the effective community road safety education plan. This perspective and education plan outlines the road safety issues and priorities for the specific community under consideration. The following steps are advised:

- a) Through the use of information and understanding gathered in the previous step one will now have a strategic view of the road safety problems that need addressing.
- b) Having specified the issues and priorities one is now ready to identify the affected communities to target for the education intervention.
- c) With the long term perspective plan in mind develop a detailed short term education plan. Although there may be several issues facing the community it is important to identify the top priorities and focus on these.
- d) Deliver the plan using the standard road safety material and resources available with the concerned government departments. One needs to be innovative in the pedagogy and sharing of responsibility for doing so.

5.2.4 What Makes Road Safety Education for Communities Effective?

128. Experience shows that road safety education is effective if apart from being taught in an interesting and practical way becomes a common concern for the community as a whole. Many of the aspects community explores in road safety education can apply to other aspects of staying safer. For example, understanding simple rules, recognising what can cause harm, knowing who and how to ask for help. Following ways makes road safety education more effective and engaging:

- a) Involving communities in real decision making processes increases stakes and ownership of the process. The more communities are involved in making decisions to help them to stay safer, the more likely they are to act on their decisions.

- b) Road safety education is more effective for communities when it is based on an understanding of their needs and concerns. Some well-intentioned safety education can add nothing to communities' understanding or skills, while others may be too advanced or too early for them to put into practice. Communities may also have other more pressing concerns, such as cutting short the travel time, which can override their prior learning about road safety.
- c) Road safety education is more effective for communities when it is realistic and relevant to the lives of the communities. Some activities and resources may seem irrelevant to communities, if they do not reflect their neighbourhood and lifestyles.
- d) Road safety education is more effective for communities when it recognises what might make individuals particularly at risk whether as an individual or as part of a particular community or peer group. For example, Children from the most deprived sections of the community are more likely to be injured than other children. They may be more exposed to traffic on a day-to-day basis. If they are first generation learners and their parents' do not have literacy skills it can be more difficult for them to understand safety rules.
- e) Road safety education is more effective for communities when it is a partnership. Schools, Anganwadi Centres and children's centres should work with other agencies such as local authority road safety teams, the police and hospitals, local NGOs as well as parents by seeking their views, providing information and guidance and involving them.
- f) Road safety education is more effective for communities when it is positive and rewards safer behaviour. Modelling, praising and rewarding safer behaviour not only reinforces safety messages, but encourages communities to ask for help when they feel unsafe. Criticism and indifference may make communities avert to positive changes.

5.3 "Safe Route to School" Program for Teachers and Students

129. Most children in private schools travel by private vehicles such as school buses/vans, auto rickshaws, parents' vehicles, etc. While some others take city buses, those living nearby simply walk to school. Children in public schools and in rural areas mostly walk the distance and some of them ride bicycles. Children, however, face problems in whichever mode of transport they take. Private buses/vans are driven by negligent drivers, autos are overcrowded, and parents struggle to find parking space near schools. Bus stops are far from school and walking on busy roads can be too dangerous. In certain areas railway tracks even without a barricade intercept the school routes. The fact that many popular schools are located in densely populated localities makes matters worse. The issue is multi-layered. For parents, safety does not just mean that their children travel or walk to school without meeting with an accident. They must also not face any harassment, sexual or otherwise, parents assert.

130. Today more than ever, there is a need to provide options that allow all children, including those with disabilities, to walk and bicycle to school safely. These problems may appear as separate issues in isolation but Safe Route to School (SRTS) can address all these challenges through an integrated action plan. SRTS is an international movement to create safe schools. The program has been designed to reverse the decline in children walking and bicycling to schools. SRTS can also play a critical role in reversing the alarming trend toward childhood obesity and inactivity. Each school faces unique road safety issues based on location and the surrounding environment and therefore may require unique intervention. This manual attempts to provide certain common guidelines to be practiced for making routes to the school safer.

5.3.1 Safe Route to School Approaches

131. SRTS provides three proven approaches for communities in creating a safe and welcoming environment for children to go to school, as described below.

Education and Awareness

132. The first approach is to incorporate a curriculum that teaches students about important safety skills to be acquired. Unfortunately, majority of the Indian schools do not have road safety curriculum but the parents or the guardians must play an important role in helping them stay safe on roads. Children follow adults and copy their behavior, if they see their guardians taking risk on roads, chances of them taking risk on road are high.

133. The road safety education has various levels depending upon the age group or the school level of the children. These can be broadly categorized into education at pre-school, primary, and secondary schools, as described below:

- a) *Pre-school education:* The learning's of the children at this stage is largely influenced by what they observe. The way adults parents and teachers behave while using roads and following road rules will influence children even after the time they stop holding their hands to cross roads. Hence it is necessary for parents and teachers to be aware of their own behavior and follow all traffic rules set for our own safety and lead by example. Children of this age are too young to be responsible for their own safety, but they should be trained at this early age to instill good habits in them in these formative years.
- b) *Primary education:* Children in this age will be on roads more frequently either as pedestrians, passengers in school buses, public transports, cars etc. They should be taught the basics of the road safety. It is also recommended they should not cross roads at their own unless accompanied by someone older at the time of crossing roads. Children at the stage of upper primary school should be taught to judge between do's and don'ts of road usage. They should be able to demonstrate knowledge of traffic rules related to them and other users.
- c) *Secondary education:* Road safety becomes even more essential for children at this stage as students may start travelling long distances at their own. They may walk, bicycle or use public transport. It is essential and important to empower them to become a responsible road user.

Engineering

134. The second approach focuses on promoting walking and cycling environment in the surrounding schools and inhabitants. This development focuses on reducing speeds of motorized vehicles and providing safe crossings facilities for walking or cycling. Roads and localities near the school areas should be declared as school zones with specific traffic guidelines for the motorists and school going children and teachers. For instance, motorists should drive no faster than 40 km/h through school zones, most of which operate from 8-9.30 am and from 2.30-4 pm on most of the school days.

Enforcement

135. The third approach focuses on the utilization of enforcement component of SRTS to ensure the safety of children.

5.3.2 Designing Safe Route to School

136. SRTS program is a way to improve the safety of children who walk or cycle to school and to promote active transportation options. SRTS program brings together parents and authorities to work with the community to build new sidewalks, improve pedestrian crossings, teach children safer bicycling and walking skills, and promote healthier, more active lifestyles. The key steps involved in planning a SRTS program would typically involve:

Step 1: Forming a SRTS committee and organize a meeting

137. The first step is to prepare a list of potential stakeholders and bring them on board in planning a safe

route to school. It is important to sensitize them on the importance of safe route to school in creating a safe and welcoming environment for commuting to school. There may be potential stakeholders or partners for a SRTS Committee, including individuals who might not be directly involved with the school but may be interested in helping (such as nearby business owners). The potential list of stakeholders or the committee members may include the Principal, parents, PTA/SMC members, community members from the neighborhood, representative from the local police, traffic police, representative from local self-governance institution such as Gram Panchayat's or Urban Local Bodies and the children.

138. Children who often commute to schools usually take the same route. By understanding their ideas and opinions, the SRTS committee will be able to obtain valuable insights. The committee should ideally have 10-12 members. Larger groups tend to be more difficult to manage and attendance of members on regular basis also becomes difficult.

139. The first meeting held with the SRTS committee members should aim at:

- a) *Explaining the purpose:* Explain about the problems and issues specific to the context and importance of making the school routes safer and welcoming for the children.
- b) *Benefits:* Explain how the Safe Routes to School Program will work and the likely benefit children, parents/guardians, staff and the community.
- c) *Sharing and feedback:* Give participants opportunity to talk about their safety concerns. It is advised to prepare a running list of problems and ideas for solutions.
- d) *Action plan:* Draw an action plan with specific roles and responsibilities for different stakeholders. Develop a timeline and sequence of activities/events to be undertaken. Ask for support and involvement from the members, assign some responsibilities to be completed prior to the next meeting.
- e) *Next meeting:* Agree on the date for the next meeting before concluding the meeting.

Step 2: Analyse existing condition and identify issues

140. The first task of the SRTS committee should be to analyze the existing situation to gather information and identify issues relevant to SRTS planning. This can be explained as below:

- a) *Gather information:* The most effective SRTS Programs take full advantage of the first-hand experience of students, parents/guardians and teachers at the school. These are the people who witness safety problems on a daily basis, and their opinions are important. It is also essential that input be gathered from the broader neighbourhood community. They will want a say in anything that happens in their neighbourhood. These tasks should be assigned to several people on your SRTS committee or to an outreach subcommittee.
- b) *Conduct student and parent surveys:* Specific survey can be designed and administered to the students and their parents/guardians to gain a better understanding of the current situation, which will also help in planning effectively for the future improvements. The Student Tally will generate information on what types of transportation are used at the school i.e., how many children walk, ride the bus, are driven by their parents/guardians, or use some other mode of transportation. The Parent Survey will collect vital information on parents/guardians perceptions and opinions of conditions near the school, as well as what types of improvements would be needed in order for them to feel comfortable about allowing their children to walk/bike to school.

141. The results of these surveys can help determine goals and priorities. For example, one may find a large percentage of children already walk to school, but parents/guardians are worried about safety and lack of sidewalks.

- c) *Ask the community:* It is important to get input from community on what they perceive as the key issues in SRTS and their suggestions for possible improvements. It will also engage them in the process of designing participatory SRTS.
- d) *Preparing base maps through transect walk:* A route safety audit can be done for popular routes to school through transect walk³ to understand the threats and risks associated with walking, biking or commuting by other means such as bus to schools. The entire route can be marked as green, yellow and red zone depending upon the associated threats and vulnerabilities involved in commuting by different means to school. One would observe major hot spots such as difficult intersections that are difficult to cross or are high risk. For instance, an intersecting railway track on the school route may be high risk for walking and biking and therefore fall under red zone. However, the same will fall under yellow zone for a commuter travelling by bus.

142. It is very important to watch the traffic patterns and observe students' movements. It should be repeated several times to make sure that we talk to parents/guardians, teachers (especially those with outside duty in the morning and afternoon), students and traffic officials and community about the problems. A list of the problems that people tell and one observes should be prepared.

Step 3: Identify solutions

143. The findings of Step 2 should be presented to SRTS committee, inviting their suggestions, comments, feedback on making these routes safer for the school especially for those who commute by walking or cycling. This activity is followed by developing the plan and the subsequent implementation.

5.4 Training Program on First Aid for Local Community and Schools

144. First aid is the initial care provided to someone who has suddenly fallen ill, or who has been injured, until more advanced care is provided or the person recovers. Immediate and effective first aid may reduce the severity of the injury or illness and promote recovery. Knowledge of first aid is important for everyday life, be at home, work or in the community. Not every incident requiring first aid is lives threatening, however, the chances of survival are higher with better knowledge of first aid.

5.4.1 First Aid and Road Safety

145. One of the most common causes of death for victims of a road crash is anoxia - a lack of oxygen supply - caused by a blocked airway. On average, it takes less than four minutes for a blocked airway to be fatal. Even in areas with highly structured emergency care, the ambulance response takes a significant time to reach. Many people will die if nothing is done to correct the slow response time to anoxia. The application of first aid techniques, in particular the proper positioning of the victim prior to the arrival of the emergency response teams, can mean the difference between life and death in a road crash. Delivery of effective first aid is one of the activities in the management of the casualty which is a crucial determinant of the severity of injury eventually received and the chance of survival.

146. Anyone trained in first aid can provide assistance at the scene of a road crash; either because they are in one of the vehicles involved, live close by or are in a passing vehicle. Frequently they can transport the injured person to health professionals, if an ambulance is not available. The quality of this assistance is strongly dependent on the individuals having received adequate training in first aid.

³ A transect walk is a tool for describing and showing the location and distribution of resources, features, landscape, main land uses along a given transect.

147. Most deaths occur outside healthcare facilities. Some of them are unavoidable on account of the severity of the initial injuries. Among the remainder, a considerable proportion could be avoided, as is apparent from a comparison of the differences in mortality rates from trauma in different countries.

148. First aid consists of methods and techniques that enhance practices related to the prevention, the preparedness and the immediate response to health emergencies. First aid can be provided not only in relation to road safety, but also in the household, workplace, and recreational areas. Beyond health matters, first aid knowledge also increases the social responsibility of the society and strengthens humanitarian values.

149. In rural areas, a batch of 30 persons can be selected from the different PRIs and trained on accident response mechanisms and on First Aid tools and techniques. Refresher training is recommended for every 3 months.

5.4.2 Rural Road Accident Response Mechanism

150. Accident Response Mechanism is recommended to reduce the severity of accidents. The emergency management does not avert or eliminate the accidents; instead it focuses on creating plans to decrease the effect of accident. Lack of such mechanism could lead to damage to assets, human mortality and lost revenue. In rural India, presently no such system is in place. Communication is one of the key factors during an accident as miscommunication can easily result in emergency events escalating unnecessarily.

151. In case of rural roads, the accident response system is mostly based on community involvement. Any community member, on being at the accident location should know whom to contact and inform about the incident. Following are most accessible numbers and persons to be contacted:

- a) Immediately inform the persons trained in the First Aid. Health department has posted at least one ASHA (Accredited Social Health Activist) worker in each village and one CHV (community Health Volunteers) under National Rural Health Mission (NRHM) for village having population 1000. These workers are based in the village itself and they are trained in the First Aid by the health department.
- b) Inform the police by dialing 100. Patrolling police vans are mostly available at the nearby junctions of roads connecting to towns.
- c) In the case where the accident is not major and the informer is having two/four wheeler then he should carry the injured person to the nearest habitation where ASHA worker or CHV is available. Information regarding which habitations have ASHA worker or CHV should be published and regularly updated.

152. The CHV or the ASHA worker should give the First Aid and assess the condition of the injured persons. The Emergency Ambulance should be called by dialing 108, in case the condition of the injured requires to be shifted to hospital.

5.5 'Safety Champions' and 'Safety Volunteers'

153. For community change processes to be long lasting and sustainable they need to be driven and led by individuals from within the community itself. 'Safety Champions' or 'Safety Volunteers' are visualized as community level facilitators chosen from the local community who are trained extensively on enabling the community enhancing their understanding and practice for safer road usage. There is a potential for these 'Safety Champions' or 'Safety Volunteers' to act as facilitators and one point contact for the community to get access to information and necessary support on road safety.

154. Adopting a locally accepted term like 'Sadak Mitra', translating to 'friend of roads', these individuals are envisaged as cadre of informed and trained members from excluded communities who can work on road safety issues and strengthen the situation of road safety in the communities in which they work. In this way, the Road

Safety Champions will be able to partner with the authorities and help in raising the awareness of road safety and advocating the importance of being road safety conscious among the road users.

155. It is very critical therefore that the 'Sadak Mitra' is selected in order to harness the complete potential of this concept. A simple list of selection criteria can be devised for their selection in consultation with the local communities. A sample list of criteria is given as follows which can be contextualized based upon the local context:

- a) From the local community/village so as to be acceptable by the community;
- b) An active member in the community and has non-controversial image;
- c) Have a core belief in safe usage of roads and is willing to volunteer her/ his candidature as the Sadak Mitra;
- d) Literate and well versed in local language spoken in the area in addition of having a sound knowledge of Hindi, the language in which most of the resources on road safety are available;
- e) Good with record keeping and maintenance of basic data and information in digital or manual format;
- f) Preferably between the age group of 18 to 35;
- g) Willing to undergo basic training on safe road usage and is capable of translating it back to the communities;
- h) Have good communication and facilitation skills or have a potential to develop communication skills with some basic training;
- i) Interested and confident in holding public meetings, in small groups and in relatively larger gatherings; and
- j) Comfortable in interacting with a range of stakeholders including government functionaries and officials and local authorities.

5.6 Guidelines for Annual Awards for Road Safety Achievements in PMGSY

156. Roads are a public good with a perceived ownership of everybody and in some sense nobody. This in itself is an issue as well as an opportunity to create mechanisms for incentivizing the process of ensuring critical issues like road safety. The rural India context, especially for rural roads under PMGSY, poses an additional challenge of lack of awareness, community exposure and a close association with the safety issues and their importance. At the same time incentives driven by public recognition and appreciation are likely to work towards a greater involvement of various stakeholders including the communities.

157. The agenda of rural road safety needs to be broad-based and made an issue of concern for a much wider set of stakeholders rather than being limited to those sitting in the high echelons of the government. For roads to be safer an inclusive approach of creating multiple stakeholder stakes and making safer roads an agenda for everybody needs to be embedded at every step in the conceptualization, design, implementation and management of the rural roads.

158. The Annual Awards for Road Safety Achievements for rural roads under PMGSY is intended to give public recognition to those who have improved road safety throughout the country on rural roads developed under scheme. The awards recognize outstanding initiatives, achievements and innovations that improve road safety on the rural roads. Following are the specific objectives for the award:

- a) To promote safe commuting and safe use of rural roads as a way of life for rural populace in India;
- b) To incentivize Panchayati Raj Institutions (PRIs), Safety Volunteers, PIUs and STAs to make road safety a visible and broad-based agenda; and

- c) To encourage different stakeholders to play an active role in ensuring rural road safety and mobilizing community towards it.

159. This section details the proposed architecture for an Annual Road Safety Awards for Rural Roads. Various other precedence of the Government of India and state governments including the 'Nirmal Gram Puraskar' under the Total Sanitation Campaign, 'Sustha Gaon Puraskar' under National Rural Health Mission in Odisha, guide the spirit of this award.

5.6.1 Proposed Categories for the Award

160. Considering various road safety aspects it is proposed that the road safety awards are divided into four major categories. Applications should be invited for each of these award categories separately with the possibility of one applicant applying for more than one category. Few categories by virtue of their nature will limit the applicants.

Category 1 : Road Safety Management

Features

This category of awards will include innovative and effective systems for road safety management which include multi-stakeholder partnerships to implement road safety strategies, plans and targets backed by data collection and research to assess the impact of the measures undertaken on road safety and their implementation and effectiveness.

Eligibility

Eligibility for applying in this category of wards will include the following:

- Local authorities like such as police, fire department etc.
- Relevant government departments
- Gram panchayats and urban local bodies
- Community collectives and groups, whether registered or unregistered
- School administration

Category 2 : Safe Roads

Features

This category of awards will be given for bringing in engineering and design improvements, improved road signage and layout and innovative traffic management systems leading to enhanced safety and protective quality of rural roads constructed under PMGSY. The safety and protective quality of the roads will be with special reference to the vulnerable groups of rural road users including pedestrians, cycle and motorcycle users and others.

Eligibility

Eligibility for applying in this category of wards will include the following:

- Local authorities such as police, fire department etc.
- Relevant government departments
- Gram panchayats and urban local bodies

Category 3: Awards for Ensuring Safe Usage of Roads

Features

Awareness and education leading to enhanced safety in road using behaviors is an essential component of road safety on rural roads. This category of awards will be given for exemplary work and innovations in drivers, riders and user education, carrying out school and community campaigns on road safety issues and awareness, strengthening enforcement initiatives by concerned authorities, media innovations in highlighting the road safety issues in rural roads, innovating and prorogating measures for enhancing safety of vehicles including cycles, bullock carts, trucks, tractors etc.

Eligibility

Eligibility for applying in this category of wards will include the following:

- Local authorities such as police, fire department etc.
- Relevant government departments
- Gram panchayats and urban local bodies
- Community collectives and groups, whether registered or unregistered
- School administration

Category 4: Crash / Accident Response

Features

This category of awards is for measures that increase responsiveness in case of accidents and crash and the ability of these measures to provide emergency treatment and save lives of the accident or crash victims.

Eligibility

Eligibility for applying in this category of wards will include the following:

- Local authorities such as police, fire department and hospitals
- Relevant government departments
- Gram panchayats and urban local bodies

5.6.2 Evaluation Criteria

161. The broad criteria for evaluation of these awards will look for and consider the following cross cutting parameters:

- a) *Innovation.* Being innovative does not necessarily imply that the particular activity must never have been practised previously. Innovation can simply refer to a local initiative as well as to a brand new project.
- b) *Achievement and evaluation.* Only those interventions will be considered for an award where either its impacts has been evaluated and there is clear evidence of it having had a beneficial effect on road safety or it is of such a nature that no reasonable evaluation could be made of its impact. This is an important qualification because certain admirable schemes (schools based and community based), are not capable of being translated into local accident reduction, but can nonetheless clearly have a significant benefit.
- c) *Commitment.* It is invariably the case that no initiative is likely to have a positive effect unless it is a committed initiative over a period of time. Thus, there should be an evidence of long-term commitment, durability, and willingness to be involved over a longer period. This is important

because certain interventions may be very innovative but have not yet been fully rolled out, or where there is no clear evidence of a willingness to commit for the long term.

- d) *Replicability.* The interventions should be clear to understand and should have a larger replicability. The importance of an intervention in terms of being capable of being reproduced by would be critical to show how particular initiatives have worked towards enhanced road safety.

6. ROAD SAFETY MANAGEMENT AND TRAINING PROGRAM

6.1 Annual Road Safety Plan and Rural Road Safety Improvement Program

162. Ensuring road safety is a continuous process. It does not stop even when there is no accident occurs in the network or when the statistical analysis shows there is no increase in the number of accident. In other words, road safety is a proactive process, instead of reactive process, therefore initiative to manage and improve road safety should be ensured by the authority. One of the most effective ways in improving road safety on rural roads is by setting out accident reduction targets. It is recommended that a realistic target should be set based on experience, which has proved achievable in other countries and states within India. An example to this accident reduction target is 'reduction of 30% in fatalities is achievable over a period of 15 years'. Under this initiative, called Annual Road Safety Plan (ARSP), will be a national target which needs to be disaggregated into state and local targets for implementation by PIU.

163. It is recommended that NRRDA produces the ARSP at national level in consultation with SRRDAs. The plan should be a comprehensive document complete with photographs, graphs and figures and should be made available to the public. It is most important to set a series of achievable casualty reduction targets (short and long-term) that can be monitored and can help boost the morale of staff working in the safety improvement team when treatments are shown to have a direct effect on accidents. It will be necessary to provide the increased resources that will inevitably be required. **Figure 11** describes the factors affecting accident reduction schemes.



Figure 11: Factors Affecting Accident Reduction Schemes

164. In order to achieve the target set out in accordance with the ARSP, a rural road safety improvement program (RRSIP) is recommended to be established at state level by the respective SRRDAs. This improvement program involves not only infrastructure development and purchase of equipment but also soft measures such as road safety campaign and training to the rural communities. Implementation and monitoring against baseline of the implementation should be done through an information system and supported by sufficient funding.

165. With this objective in focus, it is proposed that a Road Safety Cell (RSC) should be constituted at a state level to implement the improvement program. There should be an organizational framework, which is responsible for the road safety and the activities of the RRSIP. The constituents of RSC and its mandate are described below.

6.2 Road Safety Cell (RSC)

166. It is proposed to have a two-tier system in the setting up of the Road Safety Cell (**Figure 12**). It shall consist of a top tier, namely the National Rural Road Safety Cell headed by a Director and consisting of professionals from Road Safety related departments for providing technical and administrative support. Similarly in the states also, State Rural Road Safety Cell shall be constituted headed by Chief Engineer with sufficient technical and administrative staff.

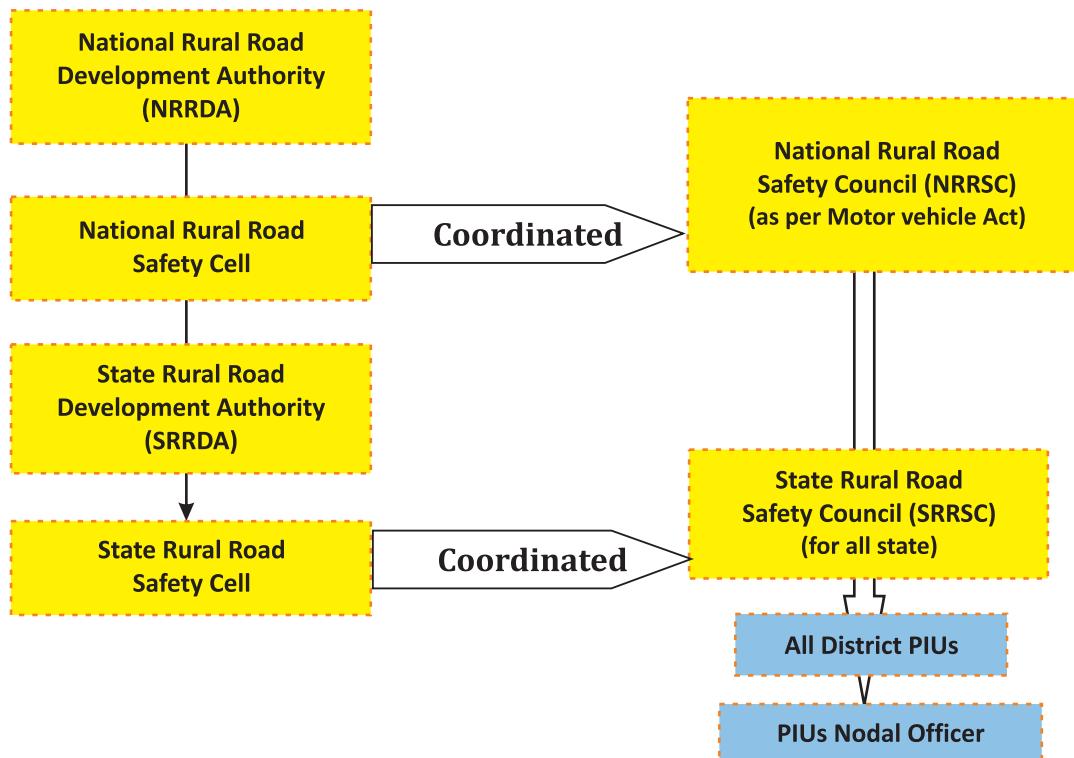


Figure 12: Rural Road Safety Cell Institutional Arrangement

167. National/ state Rural Road Safety Cell will be the coordinating body on Road Safety of rural roads. The vision of the Rural Road Safety Cell will be to generate, develop and sustain a movement on rural road safety at the national / state level aimed at educating and influencing society to adopt appropriate policies, practices and procedures that prevent and mitigate human suffering and economic loss arising from all types of accidents.

168. The following are the strategic roles and responsibilities of the cell as envisaged, to coordinate the road safety activities of different organizations.

- a) To act as the main think-tank of the state on all matters relating to road safety
- b) To formulate policies, set goals, and objectives and indicate strategies and actions on road safety to be implemented in the state
- c) To provide definitive inter-departmental/agency coordination in respect of road safety
- d) To forge close collaboration with the NRSC/ SRSC (to be setup at state and national level under Motor Vehicle Act) and road safety coordination mechanisms in other states of the Indian Union in regard to road safety measures
- e) To advise on the activities of the different stake holders, to undertake review activities
- f) To monitor effective implementation of all measures suggested and to take corrective measures if any of the concerned departments is found wanting in executing decided steps
- g) To approve action plans relating to road safety
- h) To allocate resources for the formulation, execution, evaluation and monitoring of the road safety programs.

169. The RSC will play the leading role in accident analysis, RSA, and in the educational and awareness. The detailed technical tasks of this cell in these activities are as follows:

Accident data analysis
To assess current needs of road safety data management system by making a need analysis to define the system architecture of Road Accident Analysis System and specify the details of data collection, data entry, data management and quality control, data security, data analysis, frequency and types of standard reports, report distribution, and access conditions
To help in devising an accident report format, identifying a location coding system and necessary supporting information for coding location and assist in designing a training course for accident investigation and data collection, and monitor progress to ensure quality control of data collection
To arrange training to concerned staff in the use and maintenance of accident data recording and analysis system
Accident data management, accident data analysis and statistical analysis
Identification and treatment of accident black spots
Road safety audit
To help identify and select agencies that can carry out competent and unbiased road safety audit of rural roads in a phased manner and to suggest mitigating measures for each single road safety audit.
To oversee the technical appropriateness of the exercise of road safety audit of roads by the farmed/contracted agencies.
To liaise with the concerned road maintenance cell to prepare action plans and implement the mitigating recommendations made in the specific road safety audit reports and in case these are not implemented to review their non-acceptance by the concerned agencies.
To monitor the implementation of the recommended mitigating measures and to ensure their compliance if monitoring indicates any deviations from the set of steps recommended in road safety audit report.

To help organize road safety audit training to the engineering officials of all the agencies engaged in the formulation, planning, construction and maintenance of roads in the state and to act as source of advanced/newer information for them on road safety audit.
Road Safety Education and Awareness
To oversee and coordinate the implementation of road safety education and awareness in rural areas
Newspaper, television and other media should be effectively used for public safety awareness.
To promote road safety day/road safety week or other awareness program for schools..
To promote 'road safety' to be a mandatory topic for school projects.

6.3 Training Program on Rural Road Safety Manual

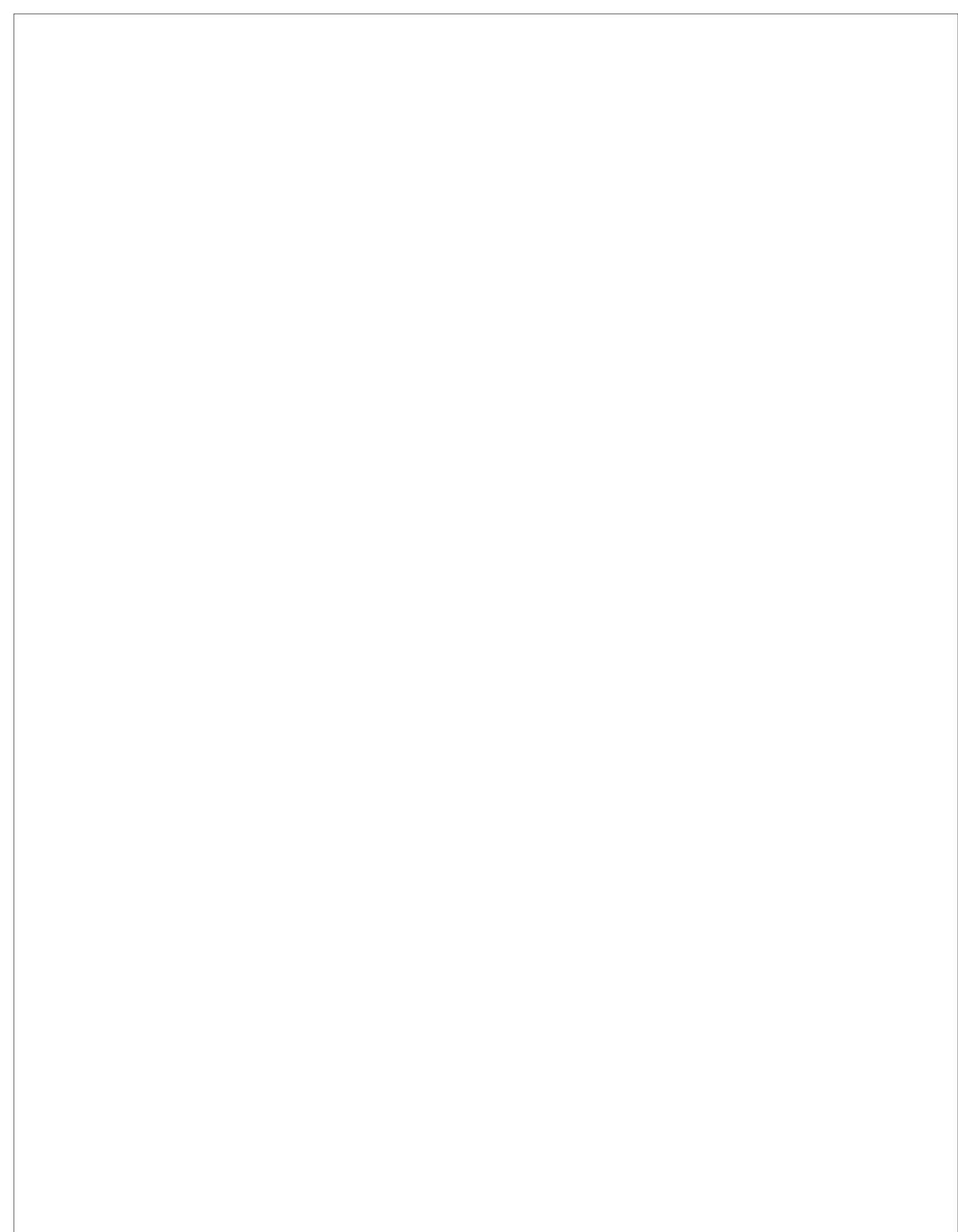
170. All the SRRDAs prepare their yearly training calendars on various topics such as construction technology, Quality Control, Material Testing, Road safety, Design principles, Social and Environmental Safeguards, etc and tie up with institutes such as IIMs, NICMAR, IITs, etc. Training on road safety aspects have also been conducted by CRRI. Under the ADB assisted Rural Connectivity Investment Program (RCIP) in Assam, Chhattisgarh, Madhya Pradesh, Odisha and West Bengal, Rural Connectivity Training Research Center (RCTRC) are established to conduct training for PMGSY engineers and practitioner in rural roads.

171. The training programs proposed in **Appendix 3** can be used as a guidance and reference for preparing training on road safety for rural road based on the content of this manual. **Table 16** below listed the target groups which can benefit from the training program.

Table 17: Training Programs on Road Safety

SN	Target Group	Type	Days
1.	STA	Technical	2 days
2.	PIU & design consultant	Technical & Awareness	3 days (1 day field visit)
3.	PIU and SQC/Contractor	Technical & Awareness	3 days (1 day field visit)
4.	PRI and NGOs	Safety awareness	1 days (awareness)

APPENDIX



Appendix 1: Example Road Safety Audit Form

Road Safety Audit (RSA) Sample Report

(PART 1: ROAD INFORMATION)

State:	
District:	
Block:	
Road Number (Core Network):	
Road Name:	
RSA Stage:	DPR/ Construction/ Maintenance

(PART 2: AUDIT INFORMATION)

Date of Audit:		
Inspection Team and Participants		
Name:	Role:	Organisation:
Road Safety Audit (RSA) Process		
PIC Consultant reviewed DPR collected from PIU Office		
Date –		
Weather –		
Time –		
Traffic - motor cycles, tractors, animal carts, were found on project road during audit		

(PART 3: ROAD SAFETY AUDIT FINDINGS)

Safety Issue No 1	
Location	
Description of Road Issue	
Road Safety Risk	
Exposure to Safety Issue: (2) <i>Estimated as potential for traffic conflicts (e.g. braking, swerving, etc) caused by the issue</i>	
Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high	
Probability to Cause Accident: (3) <i>Estimated as probability of traffic conflict resulting in an accident Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high</i>	
Consequence of Accident: (2) <i>Estimated likelihood of personal injury or death caused by accident. Involvement of pedestrians/bicyclists versus vehicle would have severe consequence. If trucks are involved, the consequence would be even more severe. High speed of potential impact would have severe consequence.</i>	
Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high	
Resulting Road Safety Risk: (2.33) <i>Combined rating equals sum of exposure rating plus probability rating plus consequence rating divided by 3. Higher the combined rating, greater the urgency of attending to the road safety issue.</i>	
Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high	
Recommendation to Address the Issue	
Safety Issue No 2	
Location	
Description of Road Issue	
Road Safety Risk	
Exposure to Safety Issue: (2) <i>Estimated as potential for traffic conflicts (e.g. braking, swerving, etc) caused by the issue</i>	
Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high	
Probability to Cause Accident: (3) <i>Estimated as probability of traffic conflict resulting in an accident Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high</i>	
Consequence of Accident: (3) <i>Estimated likelihood of personal injury or death caused by accident. Involvement of pedestrians/bicyclists versus vehicle would have severe consequence. If trucks are involved, the consequence would be even more severe. High speed of potential impact would have severe consequence.</i>	
Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high	

Recommendation to Address the Issue
Safety Issue No 3
Location
Description of Road Issue
Road Safety Risk
<p>Exposure to Safety Issue: (2)</p> <p><i>Estimated as potential for traffic conflicts (e.g. braking, swerving, etc) caused by the issue</i></p> <p><i>Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high</i></p>
<p>Probability to Cause Accident: (2)</p> <p><i>Estimated as probability of traffic conflict resulting in an accident Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high</i></p>
<p>Consequence of Accident: (3)</p> <p><i>Estimated likelihood of personal injury or death caused by accident. Involvement of pedestrians/bicyclists versus vehicle would have severe consequence. If trucks are involved, the consequence would be even more severe. High speed of potential impact would have severe consequence.</i></p> <p><i>Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high</i></p>
<p>Resulting Road Safety Risk: (2.33)</p> <p><i>Combined rating equals sum of exposure rating plus probability rating plus consequence rating divided by 3. Higher the combined rating, greater the urgency of attending to the road safety issue.</i></p> <p><i>Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high</i></p>
Recommendation to Address the Issue
Safety Issue No 4
Location
Description of Road Issue
Road Safety Risk
<p>Exposure to Safety Issue: (3)</p> <p><i>Estimated as potential for traffic conflicts (e.g. braking, swerving, etc) caused by the issue</i></p> <p><i>Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high</i></p>
<p>Probability to Cause Accident: (2)</p> <p><i>Estimated as probability of traffic conflict resulting in an accident Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high</i></p>
<p>Consequence of Accident: (3)</p> <p><i>Estimated likelihood of personal injury or death caused by accident. Involvement of pedestrians/bicyclists versus vehicle would have severe consequence. If trucks are involved, the consequence would be even more severe. High speed of potential impact would have severe consequence.</i></p> <p><i>Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high</i></p>

Recommendation to Address the Issue
Safety Issue No 5
Location
Description of Road Issue
Road Safety Risk
<p>Exposure to Safety Issue: (3)</p> <p><i>Estimated as potential for traffic conflicts (e.g. braking, swerving, etc) caused by the issue</i></p> <p><i>Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high</i></p>
<p>Probability to Cause Accident: (2)</p> <p><i>Estimated as probability of traffic conflict resulting in an accident</i> <i>Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high</i></p>
<p>Consequence of Accident: (3)</p> <p><i>Estimated likelihood of personal injury or death caused by accident. Involvement of pedestrians/bicyclists versus vehicle would have severe consequence. If trucks are involved, the consequence would be even more severe. High speed of potential impact would have severe consequence.</i></p> <p><i>Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high</i></p>
<p>Resulting Road Safety Risk: (2.67)</p> <p><i>Combined rating equals sum of exposure rating plus probability rating plus consequence rating divided by 3. Higher the combined rating, greater the urgency of attending to the road safety issue.</i></p> <p><i>Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high</i></p>
Recommendation to Address the Issue

(FORM A: EMPLOYER'S RESPONSE TO RSA FINDINGS)

State:
District:
Block:
Road Number (Core Network):
Construction Package Number or DPR reference number:
Road Name:
Date of Audit:

1	2	3	4	5	6	7	8
S No	PIC Details of issue	PIU Agree? Yes/No	PIU If disagree, explain why	PIC RSA suggestion(s)	PIU To be implemented? yes, no, partial (elaborate)	PIU If yes or partial: arrangements for implementation and timeline	PIU If no, describe an alternative action to be taken and arrangements for implementation
1.	Intersection with SH as T junction			Provide speed breaker on PM/GSY Road before intersection to			
2.	Curve on RHS			Provide painted guard stones on outside edge of the curve Provide curve warning signs.			
3.	Tree on LHS			Ensure tree is painted so they are visible at night.			
4.	Curve on LHS, Vegetation			Provide curve warning signs. Provide guard stones on outer edge of the shoulder Clear the vegetation			

1	2	3	4	5	6	7	8
S No	PIC Details of issue	PIU Agree? Yes/No	PIU If disagree, explain why	PIC RSA suggestion(s)	PIU To be implemented? yes, no, partial (elaborate)	PIU If yes or partial: arrangements for implementation and timeline	PIU If no, describe an alternative action to be taken and arrangements for implementation
5.	Curve on LHS			Provide suggestive measures to be provided curve warning signs. Provide painted guard stones on outside edge of the curve			
6.	Safety issue to be noted			Junction warning signs required on both sides of the road. Electric lines need to be raised to safe level.			
7.	"S" Curve			Provide Curve warning signs. Provide painted guard stones on outside edge of the curve			
8.	Habitation starts			Provide speed breakers before start of the village Provide advance informative sign about the village ahead followed by speed limit sign board			

Appendix 2: Example of Completed Road Safety Audit Form

(PART 1: ROAD INFORMATION)

State: Madhya Pradesh
District: Shore
Block: Ichhavar
Road Number (Core Network):
Construction Package Number or DPR reference number:
Road Name: Dhamda-Golukhedi Road to Chhapari Taluk village
RSA Stage: DPR Final Design

(PART 2: AUDIT INFORMATION)

Date of Audit: 2nd December 2011

Inspection Team and Participants

Name:	Role:	Organisation:
Abhai K Khare	Road Safety Expert	PIC
Subhash Nigam	Maintenance Expert/Project Coordinator	PIC
Bhavna Nagar	Social Expert	PIC
Dr Deepak Tripathi	Environment Expert	PIC

Background to Inspection

Link road from Dhamda-Golukhedi Road to Chhapari Taluk village. Dhamda-Golukhedi Road originates from Bhopal-Dewas 4 lane road.

Road Safety Audit (RSA) Process

PIC Consultant collected and reviewed DPR before the visit

Date - Friday, 2nd December 2011

Weather - sunny

Time - 3.30am to 5.30pm

Traffic - LCVs, cars/vans, motor cycles, tractors, animal carts, cycles were observed during the visit

Road is a link to one habitations with an PMGSY at the start point

(PART 3: ROAD SAFETY AUDIT FINDINGS)

Safety Issue No 1

Intersection with PMGSY Road as a Y junction

School very close to start point

Location

Chainage 0.00 at beginning point

Description of Road Issue

Possible collision with through traffic on Main Road.

Low visibility because of vegetation/trees on left side and school building on right side of the road.

Because of the virtue of existing geometry of the junction, the traffic coming from right side (Golukhedi Village) and entering PMGSY Road, will not get proper turning radius

School playground area abuts road shoulder without any fence/boundary wall. High risk of uncontrolled child running onto or across road with consequent vehicle/child collision.



Road Safety Risk

Exposure to Safety Issue: (5)

Estimated as potential for traffic conflicts (e.g. braking, swerving, etc) caused by the issue Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Probability to Cause Accident: (5)

Estimated as probability of traffic conflict resulting in an accident Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Consequence of Accident: (5)

Estimated likelihood of personal injury or death caused by accident. Involvement of pedestrians/bicyclists versus vehicle would have severe consequence. If trucks are involved, the consequence would be even more severe. High speed of potential impact would have severe consequence.

Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high

Resulting Road Safety Risk: (5)

Combined rating equals sum of exposure rating plus probability rating plus consequence rating divided by 3. Higher the combined rating, greater the urgency of attending to the road safety issue.

Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high

Recommendation to Address the Issue

Junction needs to be properly designed, providing sufficient turning radius to traffic from Right Side (Golukhedi side). Road needs to be widened/flared at junction to accommodate smooth traffic flow from all legs of the junction. Keep the angle at approach clear to give drivers the best line of site by clearing the vegetation/trees close to the junction

Provide speed breaker before intersection to alert drivers. Another speed breaker just after the school. Advance warning sign about the junction ahead needs to be installed.

Safety Issue No 2

Trees

Location

Chainage 200.00 metres on left side of road

Description of Road Issue

Trees immediately adjacent to road shoulder.

Risk of vehicle hitting the trees particularly at night.



Road Safety Risk

Exposure to Safety Issue: (2)

Estimated as potential for traffic conflicts (e.g. braking, swerving, etc) caused by the issue Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Probability to Cause Accident: (2)

Estimated as probability of traffic conflict resulting in an accident Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Consequence of Accident: (3)

Estimated likelihood of personal injury or death caused by accident. Involvement of pedestrians/bicyclists versus vehicle would have severe consequence. If trucks are involved, the consequence would be even more severe. High speed of potential impact would have severe consequence.

Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Resulting Road Safety Risk: (2.33)

Combined rating equals sum of exposure rating plus probability rating plus consequence rating divided by 3. Higher the combined rating, greater the urgency of attending to the road safety issue.

Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Recommendation to Address the Issue

Trees need to be painted so as to clearly visible during night

Safety Issue No 3

Low level electric lines crossing the roads

Location

Chainage 250.00 metres.

Description of Road Issue

Risk of vehicles particularly loaded commercial vehicles getting entangled with electric line.



Road Safety Risk

Exposure to Safety Issue: (3)

Estimated as potential for traffic conflicts (e.g. braking, swerving, etc) caused by the issue Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Probability to Cause Accident: (2)

Estimated as probability of traffic conflict resulting in an accident Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Consequence of Accident: (4)

Estimated likelihood of personal injury or death caused by accident. Involvement of pedestrians/bicyclists versus vehicle would have severe consequence. If trucks are involved, the consequence would be even more severe. High speed of potential impact would have severe consequence.

Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Resulting Road Safety Risk: (3)

Combined rating equals sum of exposure rating plus probability rating plus consequence rating divided by 3. Higher the combined rating, greater the urgency of attending to the road safety issue.

Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Recommendation to Address the Issue

Electric lines need to be raised to safe level.

Safety Issue No 4

T Junction

Location

Chainage 600.00 metres,

Description of Road Issue

Risk of accident at junction after road is constructed.



Road Safety Risk

Exposure to Safety Issue: (3)

Estimated as potential for traffic conflicts (e.g. braking, swerving, etc) caused by the issue Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Probability to Cause Accident: (2)

Estimated as probability of traffic conflict resulting in an accident Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Consequence of Accident: (3)

Estimated likelihood of personal injury or death caused by accident. Involvement of pedestrians/bicyclists versus vehicle would have severe consequence. If trucks are involved, the consequence would be even more severe. High speed of potential impact would have severe consequence.

Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Resulting Road Safety Risk: (2.67)

Combined rating equals sum of exposure rating plus probability rating plus consequence rating divided by 3. Higher the combined rating, greater the urgency of attending to the road safety issue.

Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Recommendation to Address the Issue

Provide junction warning signs on both sides of the junction

Safety Issue No 5

Electric Pole close to the shoulder

Location

Chainage 1000.00 metres and at other places

Description of Road Issue

Risk of vehicles hitting electric pole particularly at night.



Road Safety Risk

Exposure to Safety Issue: (2)

Estimated as potential for traffic conflicts (e.g. braking, swerving, etc) caused by the issue Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Probability to Cause Accident: (3)

Estimated as probability of traffic conflict resulting in an accident Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Consequence of Accident: (3)

Estimated likelihood of personal injury or death caused by accident. Involvement of pedestrians/bicyclists versus vehicle would have severe consequence. If trucks are involved, the consequence would be even more severe. High speed of potential impact would have severe consequence.

Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Resulting Road Safety Risk: (2.67)

Combined rating equals sum of exposure rating plus probability rating plus consequence rating divided by 3. Higher the combined rating, greater the urgency of attending to the road safety issue.

Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Recommendation to Address the Issue

Electric Pole needs to be shifted/painted

Safety Issue No 6

Tree close to shoulder

Location

Chainage 1800.00 metres

Description of Road Issue

Trees immediately adjacent to road shoulder.

Risk of vehicle hitting the trees particularly at night.



Road Safety Risk

Exposure to Safety Issue: (2)

Estimated as potential for traffic conflicts (e.g. braking, swerving, etc) caused by the issue Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Probability to Cause Accident: (2)

Estimated as probability of traffic conflict resulting in an accident Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Consequence of Accident: (3)

Estimated likelihood of personal injury or death caused by accident. Involvement of pedestrians/bicyclists versus vehicle would have severe consequence. If trucks are involved, the consequence would be even more severe. High speed of potential impact would have severe consequence.

Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Resulting Road Safety Risk: (5)

Combined rating equals sum of exposure rating plus probability rating plus consequence rating divided by 3. Higher the combined rating, greater the urgency of attending to the road safety issue.

Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Recommendation to Address the Issue

Trees need to be painted so as to clearly visible during night

Safety Issue No 7

Alignment passes through Curves. Well without wall close to road and on the curve. Trees right on edge of the road

Location

Chainage 2,100.00 meters to 2,400.00 metres.

Description of Road Issue

Well located close to sharp curve, high risk of vehicles falling into the well if they get uncontrolled.

Poor sight distance at curve, risk of head on collision and overturning if speed is not controlled.



Road Safety Risk

Exposure to Safety Issue: (4)

Estimated as potential for traffic conflicts (e.g. braking, swerving, etc) caused by the issue Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Probability to Cause Accident: (4)

Estimated as probability of traffic conflict resulting in an accident Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Consequence of Accident: (5)

Estimated likelihood of personal injury or death caused by accident. Involvement of pedestrians/bicyclists versus vehicle would have severe consequence. If trucks are involved, the consequence would be even more severe. High speed of potential impact would have severe consequence.

Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Resulting Road Safety Risk: (4.13)

Combined rating equals sum of exposure rating plus probability rating plus consequence rating divided by 3. Higher the combined rating, greater the urgency of attending to the road safety issue.

Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Recommendation to Address the Issue

Provide painted guard stones on outside shoulder to delineate the curve for both day and night driving throughout this section

Provide curve warning signs

Construct concrete wall towards the well

Trees need to be painted. Vegetation needs to be cleared

Safety Issue No 8

Habitation starts

Location

Chainage 3,000.00 metres.

Description of Road Issue

Presence of Pedestrians on new roadway. Frequent conflict between vehicles, pedestrians particularly children and high risk of vehicle/pedestrian collision.



Road Safety Risk

Exposure to Safety Issue: (5)

Estimated as potential for traffic conflicts (e.g. braking, swerving, etc) caused by the issue Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high

Probability to Cause Accident: (5)

Estimated as probability of traffic conflict resulting in an accident Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high

Consequence of Accident: (5)

Estimated likelihood of personal injury or death caused by accident. Involvement of pedestrians/bicyclists versus vehicle would have severe consequence. If trucks are involved, the consequence would be even more severe. High speed of potential impact would have severe consequence.

Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high

Resulting Road Safety Risk: (5)

Combined rating equals sum of exposure rating plus probability rating plus consequence rating divided by 3. Higher the combined rating, greater the urgency of attending to the road safety issue.

Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high

Recommendation to Address the Issue

Provide speed breakers before start of the village

Provide advance informative sign about the village ahead followed by speed limit sign board

Safety Issue No 9

Presence of Electric Poles

Location

Chainage 3,000.00 metres, just before start of the village and low level electric lines crossing the road at many places within the village portion

Description of Road Issue

Uncontrolled vehicles hitting the electric poles, danger of vehicles particularly commercial vehicles getting entangled with electric lines.



Road Safety Risk

Exposure to Safety Issue: (3)

Estimated as potential for traffic conflicts (e.g. braking, swerving, etc) caused by the issue Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high

Probability to Cause Accident: (3)

Estimated as probability of traffic conflict resulting in an accident Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high

Consequence of Accident: (3)

Estimated likelihood of personal injury or death caused by accident. Involvement of pedestrians/bicyclists versus vehicle would have severe consequence. If trucks are involved, the consequence would be even more severe. High speed of potential impact would have severe consequence.

Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high

Resulting Road Safety Risk: (3)

Combined rating equals sum of exposure rating plus probability rating plus consequence rating divided by 3. Higher the combined rating, greater the urgency of attending to the road safety issue.

Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high

Recommendation to Address the Issue

Electric poles need to be shifted/painted

Electric lines need to be raised upto safe level

Safety Issue No 10

Narrow road on curve, low visibility because of the presence of structures, Electric Pole

Location

Chainage 3,100.00 metres

Description of Road Issue

Risk of head on collision, insufficient width for turning of vehicles particularly commercial vehicles once road is constructed



Road Safety Risk

Exposure to Safety Issue: (3)

Estimated as potential for traffic conflicts (e.g. braking, swerving, etc) caused by the issue Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Probability to Cause Accident: (3)

Estimated as probability of traffic conflict resulting in an accident Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high

Consequence of Accident: (3)

Estimated likelihood of personal injury or death caused by accident. Involvement of pedestrians/bicyclists versus vehicle would have severe consequence. If trucks are involved, the consequence would be even more severe. High speed of potential impact would have severe consequence.

Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high

Resulting Road Safety Risk: (3)

Combined rating equals sum of exposure rating plus probability rating plus consequence rating divided by 3. Higher the combined rating, greater the urgency of attending to the road safety issue.

Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high

Recommendation to Address the Issue

Some portion of the structures needs to be demolished for widening the road and making curve smooth. This will also improve the sight distance at the curve Speed breaker required at this place to slow down vehicular speed

Electric Pole needs to be shifted

Safety Issue No 11

T Junction within habitation area

Location

Chainage 3,200.00 metres

Description of Road Issue

Risk of accident at junction



Road Safety Risk

Exposure to Safety Issue: (2)

Estimated as potential for traffic conflicts (e.g. braking, swerving, etc) caused by the issue Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Probability to Cause Accident: (3)

Estimated as probability of traffic conflict resulting in an accident Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Consequence of Accident: (2)

Estimated likelihood of personal injury or death caused by accident. Involvement of pedestrians/bicyclists versus vehicle would have severe consequence. If trucks are involved, the consequence would be even more severe. High speed of potential impact would have severe consequence.

Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Resulting Road Safety Risk: (2.33)

Combined rating equals sum of exposure rating plus probability rating plus consequence rating divided by 3. Higher the combined rating, greater the urgency of attending to the road safety issue.

Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Recommendation to Address the Issue

Junction sign required before and after the junction

Safety Issue No 12

Electric Pole, low level electric lines, well close to road width

Location

Chainage 3,300.00 metres

Description of Road Issue

Risk of accident at junction



Road Safety Risk

Exposure to Safety Issue: (2)

Estimated as potential for traffic conflicts (e.g. braking, swerving, etc) caused by the issue Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Probability to Cause Accident: (3)

Estimated as probability of traffic conflict resulting in an accident Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Consequence of Accident: (3)

Estimated likelihood of personal injury or death caused by accident. Involvement of pedestrians/bicyclists versus vehicle would have severe consequence. If trucks are involved, the consequence would be even more severe. High speed of potential impact would have severe consequence.

Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Resulting Road Safety Risk: (2.67)

Combined rating equals sum of exposure rating plus probability rating plus consequence rating divided by 3. Higher the combined rating, greater the urgency of attending to the road safety issue.

Scale: 1 - very low, 2 - low, 3 medium, 4 high, 5 very high

Recommendation to Address the Issue

Pole needs to be shifted/painted, electric lines need to be raised upto safe level Well wall needs to b e painted

Safety Issue No 13

School

Location

At the end of the road

Description of Road Issue

Risk of accident at junction



Road Safety Risk

Exposure to Safety Issue: (5)

Estimated as potential for traffic conflicts (e.g. braking, swerving, etc) caused by the issue Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high

Probability to Cause Accident: (5)

Estimated as probability of traffic conflict resulting in an accident Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high

Consequence of Accident: (5)

Estimated likelihood of personal injury or death caused by accident. Involvement of pedestrians/bicyclists versus vehicle would have severe consequence. If trucks are involved, the consequence would be even more severe. High speed of potential impact would have severe consequence.

Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high

Resulting Road Safety Risk: (5)

Combined rating equals sum of exposure rating plus probability rating plus consequence rating divided by 3. Higher the combined rating, greater the urgency of attending to the road safety issue.

Scale: 1 - very low, 2- low, 3 medium, 4 high, 5 very high

Recommendation to Address the Issue

Speed breakers and school warning signs are required

(FORM A: EMPLOYER'S RESPONSE TO RSA FINDINGS)

State: Madhya Pradesh
District: Sehore
Block: Ichhavar
Road Number (Core Network): DPR Final Design
Construction Package Number or DPR reference number: Dhamda-Golukhedi Road to Chhapari Taluk village
Road Name: Dhamda-Golukhedi Road to Chhapari Taluk village
Date of Audit: 2nd December 2011

S No	PIC Details of issue	PIU Agree? Yes/No	PIU If disagree, explain why	PIC RSA suggestion(s)	PIU To be implemented? yes, no, partial (elaborate)	PIU If yes or partial: arrangements for implementation and timeline	PIU If no, describe an alternative action to be taken and arrangements for implementation
1.	Intersection with PWD Road as a Y junction School very close to start point	Agree	{To be filled by PIU}	Junction needs to be properly designed, providing sufficient turning radius to traffic from Right Side (Golukhedi side). Road needs to be widened/flared at junction to accommodate smooth traffic flow from all legs of the junction.	Yes	Provisions made in DPR, Implementation of suggestions during construction.	{To be filled by PIU}
2.	Trees, 200m	Agree	{To be filled by PIU}	Trees need to be painted so as to clearly visible during night	Yes	Provisions made in DPR, Implementation of suggestions during construction.	{To be filled by PIU}

S No	PIC Details of issue	PIU Agree? Yes/No	PIU If disagree, explain why	PIU {To be filled by PIU}	RSA suggestion(s)	PIC	PIU To be implemented? yes, no, partial (elaborate)	PIU If yes or partial: arrangements for implementation and timeline	PIU {To be filled by PIU}	PIU If no, describe an alternative action to be taken and arrangements for implementation
3.	Low level electric lines crossing the roads, 250 m	Agree	{To be filled by PIU}		Electric lines need to be raised to safe level.		Yes	Provisions made in DPR, Implementation of suggestions during construction.	{To be filled by PIU}	
4.	T Junction, 600m.	Agree	{To be filled by PIU}		Provide junction warning signs on both sides of the junction		Yes	Provisions made in DPR, Implementation of suggestions during construction.	{To be filled by PIU}	
5.	Electric Pole close to the shoulder, 1000 m	Agree	{To be filled by PIU}		Poles need to be shifted/painted		Yes	Provisions made in DPR, Implementation of suggestions during construction.	{To be filled by PIU}	
6.	Tree close to shoulder, 1600m .	Agree	{To be filled by PIU}		Tree needs to be painted		Yes	Provisions made in DPR, Implementation of suggestions during construction.	{To be filled by PIU}	
7.	Alignment passes through Curves. Well without wall close to road and on the curve. Trees right on edge of the road, 2.1-2.5 km	Agree	{To be filled by PIU}		Provide painted guard stones on outside shoulder to delineate the curve for both day and night driving throughout this section Provide curve warning signs Construct concrete wall towards the well Trees need to be painted. Vegetation needs to be cleared		Yes	Provisions made in DPR, Implementation of suggestions during construction.	{To be filled by PIU}	
8.	Habitation, 3.0 km	Agree	{To be filled by PIU}		Provide speed breakers before start of the village Provide advance information sign about the village ahead followed by speed limit sign board		Yes	Provisions made in DPR, Implementation of suggestions during construction.	{To be filled by PIU}	
9.	Presence of Electric Poles, 3.0 km	Agree	{To be filled by PIU}		Poles need to be shifted/painted		Yes	Provisions made in DPR, Implementation of suggestions during construction.	{To be filled by PIU}	
10.	Narrow road on curve, low visibility because of the presence of structures, Electric Pole, 3.1 km	Agree	{To be filled by PIU}		Some portion of the structures needs to be demolished for widening the road and making curve smooth. Speed breaker required at this place Electric Pole needs to be shifted		Yes	Provisions made in DPR (for Electric pole shifting) Implementation of suggestions during	{To be filled by PIU}	

S No	PIC Details of issue	PIU Agree? Yes/No	PIU If disagree, explain why	PIC RSA suggestion(s)	PIU To be implemented? yes, no, partial (elaborate)	PIU If yes or partial: arrangements for implementation and timeline	PIU If no, describe an alternative action to be taken and arrangements for implementation
11	T Junction within habitation area, 3.2 km	Agree	{To be filled by PIU}	Provide junction warning signs on both sides of the junction	Yes	Provisions made in DPR, Implementation of suggestions during construction.	{To be filled by PIU}
12	Electric Pole, low level electric lines, well close to road width, km 3.3	Agree	{To be filled by PIU}	Pole needs to be shifted/painted, electric lines need to be raised upto safe level Well wall needs to be painted	Yes	Provisions made in DPR, Implementation of suggestions during construction.	{To be filled by PIU}
13	School, end point	Agree	{To be filled by PIU}	Speed breakers and school warning signs are required	Yes	Provisions made in DPR, Implementation of suggestions during construction.	{To be filled by PIU}

Appendix 3: Proposed Training Program on Road Safety

Training Program for Road Safety challenges and Mitigation Measures in Rural Road for STA & PIUs				
DAY 1				
Objectives of the Training Program				
1) To introduce the rural road safety manuals. 2) To understand the crash data collection and analysis formats and process 3) To understand cost effective mitigation measures 4) To discuss technical solutions for implementing safety issue.				
Session no.	Theme of the session	Objective of the session	Time	Method
Session -I	Welcome, Introduction and sharing Objective	Set the Theme for the Day	10:00 am to 11:00 am	Open Sharing
Session –II	Crash data Management – Crash data Collection	To Sensitize about the importance of Crash data Collection To familiarise with the Crash data Collection format	11:15 am to 12:00 am	Presentation
High Tea Break 15 minutes				
Session-III	Crash Data Management – Crash Data Analysis	To develop common understanding on facts and challenges to collect and analyze the Accident data. Understanding the analysis Formats	12:15 am to 1:30 pm	Presentation
Lunch Break 45 minutes				
Session-IV	Crash data Management – Black Spot Analysis and treatment	What is Black Spot and How it is identified and Analysed, traffic control devices and interchange design. Black spot investigations discussion on Mitigation measures	2:15 pm to 3:30 pm	Presentation
Session-V	Common Hazards on rural roads – Design Stage	Common Hazards / conflict at design stage Discussion on mitigation measures	3:30 pm to 4:30 PM	Presentation

Session-VI	Interaction session	Open discussion on all the sessions of the day	4.30Pm to 5.30 Pm	Open
Tea Break 15 minutes and valedictory				
DAY 2				
Objectives of the Training Program				
1)	To introduce the common road safety hazards – during construction and post construction stage			
2)	To discuss the Traffic Claiming measures, Traffic Flow during construction and Road furniture's			
3)	To discuss Road safety Audit Process at different stages and forms			
4)	To Understand different Checklist			
5)	Introduce Road safety Awareness Program			
6)	Road safety Management			
Session no.	Theme of the session	Objective of the session	Time	Method
Session -I	Welcome and Review of Day 1 Session and sharing Objective	1. Set the Theme for the Day	10:00 am to 11:00 am	Open Sharing
Session –II	Common Hazards on rural roads – During Construction and Post Construction Stage	1. Common Hazards / conflict at different stage 2. Discussion on mitigation measures	11:15 am to 12:00 am	Presentation
High Tea Break 15 minutes				
Session-III	Traffic Flow During Construction and Traffic Claiming Measures	1. Traffic management during construction stage 2. Intersection design and Guide for posting road furniture's	12:15 am to 1:30 pm	Presentation
Lunch Break 45 minutes				
Session-IV	Road safety Audit	1. Objective and purpose of road safety Audits. 2. RSA Forms 3. Discussion on	2:15 pm to 3:30 pm	Presentation
Session-V	Checklist and Road safety Management	1. Discuss Various Checklist developed in the RRS Manual 2. Discussion on Road safety Management	3:30 pm to 4:30 PM	Presentation

Session-VI	Interaction session	Open discussion on all the sessions of the day	4.30Pm to 5.30 Pm	Open
Tea Break 15 minutes and valedictory				

For PIU Engineers and Design Consultants

Training Program for Rural Road Safety Manual for PIUs and Design Consultants				
DAY 1				
Objectives of the Training program				
1) To introduce the rural road safety Manuals. 2) To Understand the Crash Data Collection and Analysis formats and Process 3) To understand cost effective Mitigation measures 4) To discuss technical solutions for implementing safety issue.				
Session no.	Theme of the session	Objective of the session	Time	Method
Session -I	Welcome, Introduction and sharing Objective	1. Set the Theme for the Day	10:00 am to 11:00 am	Open Sharing
Session -II	Crash data Management – Crash data Collection and Analysis Formats	1. To Sensitize about the importance of Crash data Collection 2. To familiarise with the Crash data Collection and Analysis format	11:15 am to 12:00 am	Presentation
High Tea Break 15 minutes				
Session -III	Crash data Management – Black Spot Analysis and treatment	1. What is Black Spot and How it is identified and Analysed 2. Black spot investigations 3. discussion on Mitigation measures	12:15 am to 1:30 pm	Presentation
Lunch Break 45 minutes				
Session -IV	Common Hazards on rural roads – Design Stage	1. Common Hazards / conflict at design stage 2. Discussion on mitigation measures	2:15 pm to 3:30 pm	Presentation
Session -V	Common Hazards on rural roads – Design Stage	1. Common Hazards / conflict at design stage 2. Discussion on mitigation measures	3:30 pm to 4:30 PM	Presentation

Session -VI	Interaction session	Open discussion on all the sessions of the day	4.30Pm to 5.30 Pm	Open
Tea Break 15 minutes and valedictory				
DAY 2				
Objectives of the Training Program				
1)	To introduce the Common road safety Hazards – During Construction and Post construction stage			
2)	To discuss the Traffic Claiming measures, Traffic Flow during construction and Road furniture's			
3)	To discuss Road safety Audit Process at different stages and forms			
4)	To Understand different Checklist			
5)	Introduce Road safety Awareness Program			
6)	Road safety Management			
Session no.	Theme of the session	Objective of the session	Time	Method
Session -I	Welcome and Review of Day 1 Session and sharing Objective	1. Set the Theme for the Day	10:00 am to 11:00 am	Open Sharing
Session -II	Common Hazards on rural roads – During Construction and Post Construction Stage	1. Common Hazards / conflict at different stage 2. Discussion on mitigation measures	11:15 am to 12:00 am	Presentation
High Tea Break 15 minutes				
Session -III	Road safety Audit	1. Objective and purpose of road safety Audits. 2. RSA Forms 3. discussion on Mitigation measures	12:15 am to 1:30 pm	Presentation
Lunch Break 45 minutes				
Session -IV	Road safety Audit	1. Objective and purpose of road safety Audits. 2. RSA Forms 3. Discussion on Mitigation measures	2:15 pm to 3:30 pm	Presentation
Session -V	Checklist and Road safety Management	1. Discuss Various Checklist developed in the RRS Manual 2. Discussion on Road safety Management	3:30 pm to 4:30 PM	Presentation
Session -VI	Interaction session	3. Open discussion on all the sessions of the day	4.30 pm to 5.30 pm	Open

Tea Break 15 minutes				
DAY 3				
Objectives of the Training Program				
1. Site Visit to Proposed Road Alignment 2. Group Activity on RSA				
Session no.	Theme of the session	Objective of the session	Time	Method
Session -I	Site Visit	4. Site Visit to the Proposed Rural Road Alignment	10:00 am to 1:30 am	Open Sharing
Session - II	Preparation of RSA	1. Preparation of RSA and Discussion on Mitigation measures	2:30 to 5:30	Group Activity – Break the Participants in two group and initiate Discussion
Tea Break 15 minutes and valedictory				

Training Program for Rural Road Safety Manual for PIUs and Supervision and Consultants and Contractors				
DAY 1				
Objectives of the Training Program				
1) To introduce the rural road safety Manuals. 2) To Understand the Crash Data Collection and Analysis formats and Process 3) To understand cost effective Mitigation measures 4) To discuss technical solutions for implementing safety issue.				
Session no.	Theme of the session	Objective of the session	Time	Method
Session -I	Welcome, Introduction and sharing Objective	1. Set the Theme for the Day	10:00 am to 11:00 am	Open Sharing
Session -II	Crash data Management – Crash data Collection and Analysis Formats	1. To Sensitize about the importance of Crash data Collection 2. To familiarise with the Crash data Collection and Analysis format	11:15 am to 12:00 am	Presentation
High Tea Break 15 minutes				

Session -III	Crash data Management – Black Spot Analysis and treatment	1. What is Black Spot and How it is identified and Analysed 2. Black spot investigations 3. Discussion on Mitigation measures	12:15 am to 1:30 pm	Presentation
Lunch Break 45 minutes				
Session -IV	Common Hazards on rural roads – Design Stage	1. Common Hazards / conflict at design stage 2. Discussion on mitigation measures	2:15 pm to 3:30 pm	Presentation
Session -V	Common Hazards on rural roads – During Construction Stage	1. Common Hazards / conflict at during construction stage 2. Discussion on mitigation measures	3:30 pm to 4:30 PM	Presentation
Session -VI	Interaction session	Open discussion on all the sessions of the day	4.30Pm to 5.30 Pm	Open
Tea Break 15 minutes and valedictory				
DAY 2				
Objectives of the Training Program				
1) To introduce the Common road safety Hazards – During Construction and Post construction stage 2) To discuss the Traffic Claiming measures, Traffic Flow during construction and Road furniture's 3) To discuss Road safety Audit Process at different stages and forms 4) To Understand different Checklist 5) Introduce Road safety Awareness Program 6) Road safety Management				
Session no.	Theme of the session	Objective of the session	Time	Method
Session -I	Welcome and Review of Day 1 Session and sharing Objective	1. Set the Theme for the Day	10:00 am to 11:00 am	Open Sharing
Session -II	Common Hazards on rural roads – Post Construction	1. Common Hazards / conflict at different stage 2. Discussion on mitigation measures	11:15 am to 12:00 am	Presentation
High Tea Break 15 minutes				

Session -III	Work Zone Management and Traffic Layouts	1. Work zone Traffic Management. 2. Use of Cautionary Signs Boards and Locations	12:15 am to 1:30 pm	Presentation
Lunch Break 45 minutes				
Session -IV	Road safety Audit – During Construction stage	1. Objective and purpose of road safety Audits. 2. RSA Forms 3. discussion on Mitigation measures	2:15 pm to 3:30 pm	Presentation
Session -V	Checklist and Road safety Awareness	1. Discuss Various Checklist developed in the RRS Manual 2. Discussion on Road safety Awareness	3:30 pm to 4:30 PM	Presentation
Session -VI	Interaction session	Open discussion on all the sessions of the day	4.30 pm to 5.30 pm	Open
Tea Break 15 minutes				
DAY 3				
Objectives of the Training Program				
1) Site Visit to Proposed Road Alignment 2) Group Activity on RSA				
Session no.	Theme of the session	Objective of the session	Time	Method
Session -I	Site Visit	1. Site Visit to the ongoing Rural Road	10:00 am to 1:30 am	Open Sharing
Session - II	Preparation of RSA and Traffic Layout Management	1. Preparation of RSA and Discussion on Mitigation measures and Traffic Layout Managements	2:30 to 5:30	Group Activity – Break the Participants in two group and initiate Discussion
Tea Break 15 minutes and valedictory				

Training Program for Road Safety challenges and Mitigation Measures in Rural Road for PRI and NGOs				
Day-1				
Objectives of the Training Program				
1) To introduce the rural road safety issues. 2) Information dissemination among community. 3) Importance of Safety measures to villagers, students and drivers. 4) Role of PRI and NGOs to create awareness among community/village				
Session no.	Theme of the session	Objective of the session	Time	Method
Session -I	Welcome, Introduction and sharing Objective	1. To greet the resource person and participants	10:30 am to 11:00 am	Open Sharing
Session -II	Discussion about the potentialities of PRI and NGOs in Road Safety Awareness	1. Strength and power of PRI and NGOs to spreading RS awareness	11:15 am to 12:00 am	Presentation
High Tea Break 15 minutes				
Session -III	Techniques of communications and First Aid to Accident Victims	1. To dugout new approach of communication. 2. To aware the participants about the First Aid	12:15 am to 1:30 pm	Presentation
Lunch Break 45 minutes				
Session -IV	Road safety Awards and Champions	1. Improved safetyrules, signboards. 2. Poster, pamphlet,flex and trainin g material	2:15 pm to 3:30 pm	Presentation
Session -V	Interaction session	Sharing knowledge with participants, Case studies along with the closing	3:30 pm to 4:30 PM	Open
Tea Break 15 minutes				

Training Program on Accident Response Mechanism and First Aid Tools and Techniques for PRIs and Community Members				
DAY 1				
Objectives of the Training program				
1) To introduce the rural road Accident Response Mechanism. 2) To Understand the First Aid Tools and Techniques 3) To discuss technical solutions for implementing safety issue.				
Session no.	Theme of the session	Objective of the session	Time	Method
Session - I	Welcome, Introduction and sharing Objective	Set the Theme for the Day	10:00 am to 11:00 am	Open Sharing
Session – II	Rural Road Accident response Mechanism	To Sensitize about the importance of Proper Accident Response To familiarise with the Mechanism to be followed	11:15 am to 12:00 am	Presentation
High Tea Break 15 minutes				
Session- III	Rural Road Accident response Mechanism	To develop common understanding on facts and challenges with the Mechanism to be followed	12:15 am to 1:30 pm	Presentation
Lunch Break 45 minutes				
Session- IV	First Aid Basic Tools and Techniques	<ul style="list-style-type: none"> • How to enhance road safety practices • How to act safely and protect the scene • How to summon help • How to assess the physical state of the injured person 	2:15 pm to 3:30 pm	Presentation
Session- V	First Aid Basic tools and Techniques	<ul style="list-style-type: none"> • How to respond to visible bleeding, unconsciousness, breathing problems, shock and bone trauma. • How to monitor the situation and offer psychological support • First Aid Dos and Don'ts 	3:30 pm to 4:30 PM	Presentation
Session- VI	Interaction session	Open discussion on all the sessions of the day	4.30Pm to 5.30 Pm	Open
Tea Break 15 minutes and valedictory				

References

Sr. No.	Code	Year	Title the Publication
1.		2006	Accident investigation and prevention Manual
3.	IRC: 67	2012	Code of Practice for Road Signs (Third Revision)
4.		2013	Capacity Building for Road Safety and Public-Private - Partnership (PPP) Support
5.	IRC: SP -41	1994	Guidelines For the Design of At-Grade Intersections in Rural & Urban Areas
6.	IRC: SP -55	2014	Guidelines on Traffic Management in work Zone
7.	IRC: SP -44	1996	Highway Safety Code
8.		2015	Institutional Development for Rural Roads Assets Management – Support to The Establishment of Rural Road Network Management Unit and Rural Connectivity Training and Research Centers (TA 8110 - IND)
9.	IRC: SP -88	2010	Manual on Road Safety Audit
10.			Operation Manual of PMGSY
11.	IRC: SP -20	2002	Rural Roads Manual
12.	IRC: 53	2012	Road Accident Recording Forms A-1 and 4 (Second Revision)
13.			TRL, ADB and Ross Silcock (1996) "Accident Investigation And Prevention Manual For Highway Engineers, India, TA 2001 -IND
14	IRC: 32	1969	Standard for Vertical and Horizontal clearances of Overhead Electric Power and Telecommunication lines as related to road
15	IRC: 66	1976	Recommended Practice for Sight distance on Rural Highways
16	IRC: 79	1981	Recommended Practice for Road Delineators
17	IRC: 103	1988	Guidelines for Pedestrian facilities



National Rural Roads Development Agency

Ministry of Rural Development, Government of India

5th Floor, 15 NBCC Tower, Bhikaji Cama Place, New Delhi - 110 066

Ph.: 91-11-26716930/33, Fax: 91-11-26179555, E-mail: nrrda@pmgsy.nic.in
Web: www.omms.nic.in, www.pmgsy.nic.in