Road Safety Assessment / Road Safety Audit and Study of Black Spots covering 2500 Kms of SH / MDR in Odisha State and Submission

Presented by

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Presentation outline

- Project Background
- Objectives & Scope of the Study
- Project Execution
- Road Safety Audit Findings
- Action Plan Implementation

Introduction

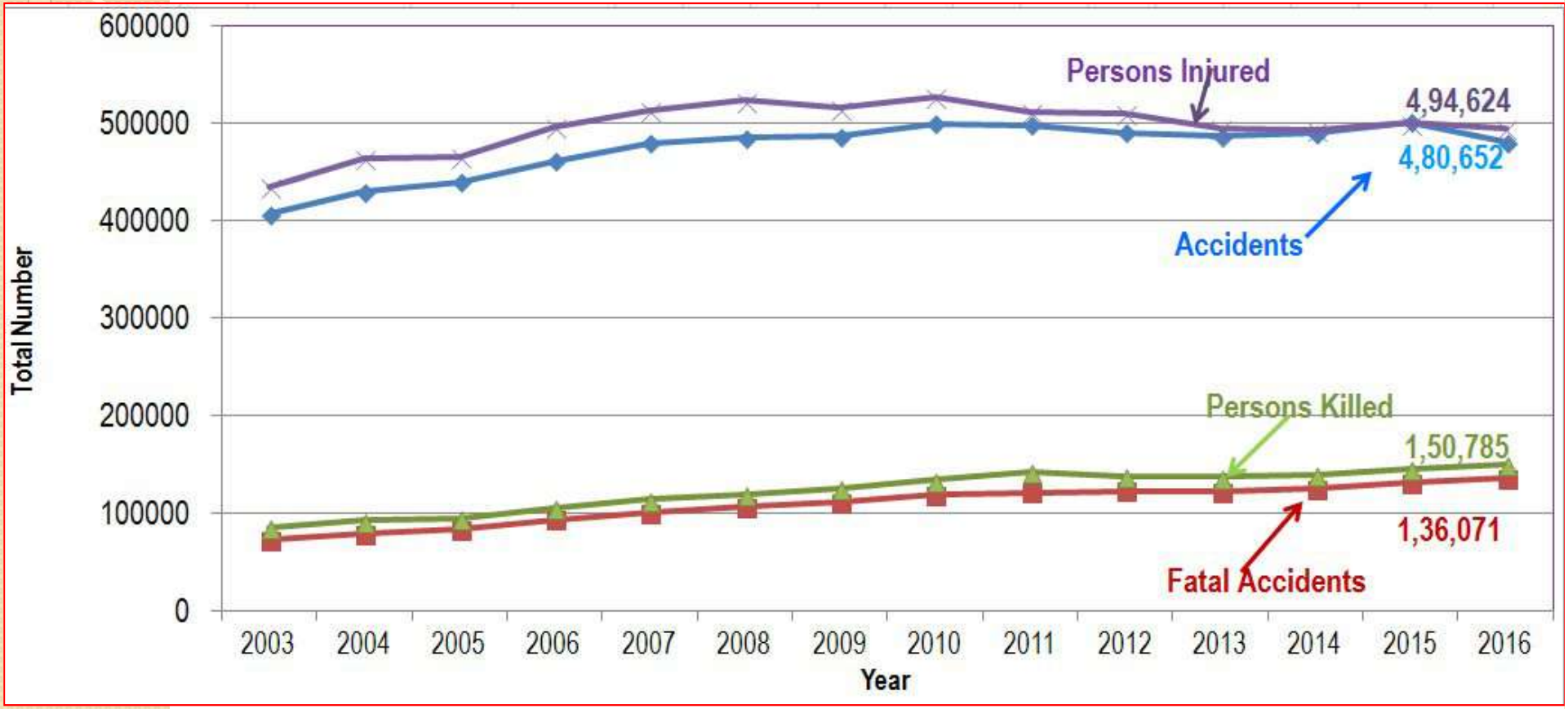
- *Unsignalised Intersection becomes major part of the Indian Roads. Various Methods have been developed to make capacity estimations for these intersections For eg Occupancy Time Method, Additive Conflict Flow method etc.*
- *To evaluate Level Of Service of urban intersections, it is inevitable to consider also the non-motorized traffic, as on one hand these road users influence the motorized traffic and on the other hand pedestrians and bicyclists suffer delay caused by motorized traffic.*

Road Safety Mission :

- Road Safety Audits (Expressways, NH, SH, MDR, ODR)
  - Design Stage Audit
  - Construction Stage Audit
  - Pre COD Stage Audit
  - Existing Road Safety Audit
- Road Safety Audits
  - Skill Development to Professionals (NHAI Engineers, Concessionaires, Consultants)
  - Recently Completed 15day program as per NHAI guidelines
  - Almost One program (Three Months)
    - Tailor made program
    - At CSIR-CRRI, New Delhi

Road Safety Scenario - INDIA

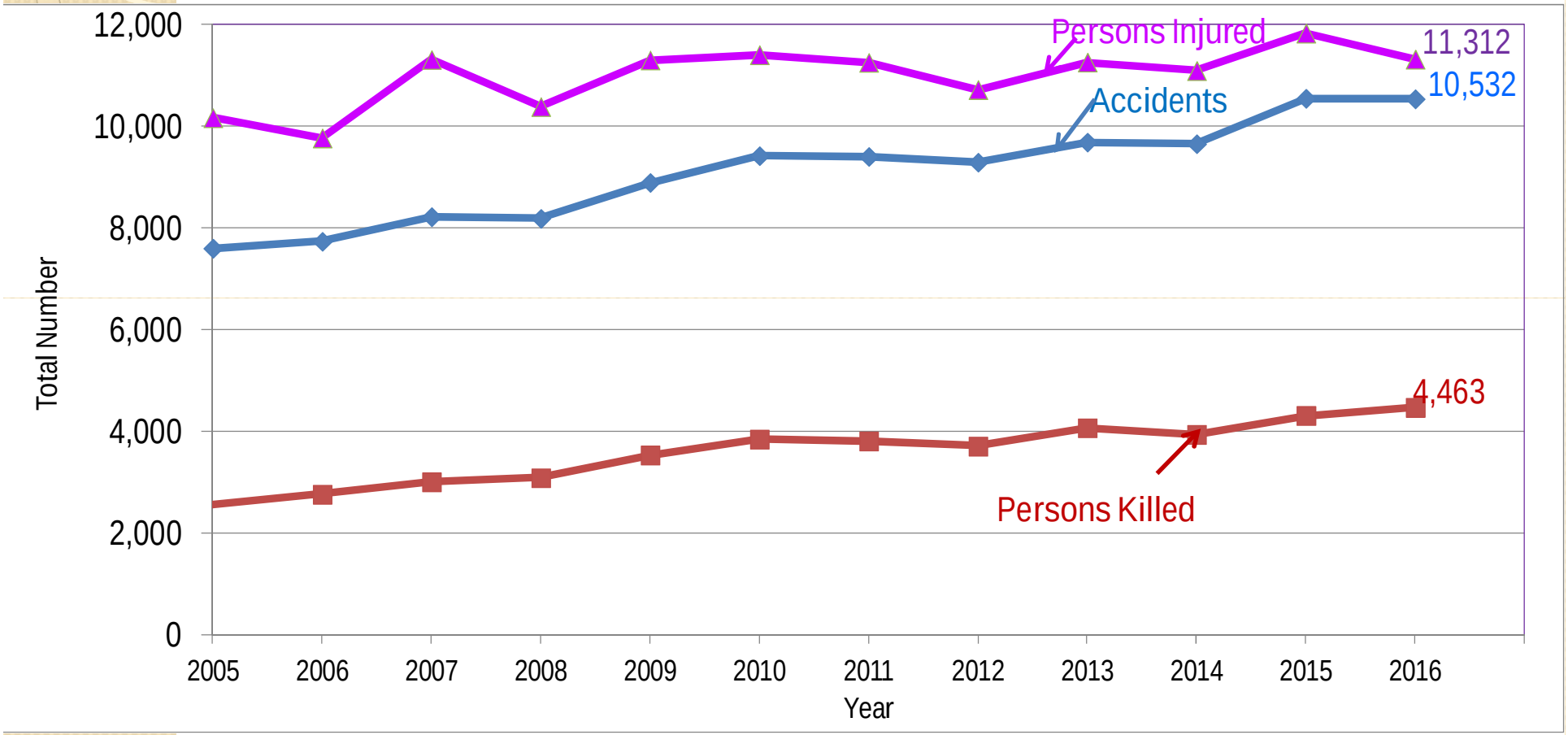
	2015	2016
Accidents	5,01,423	4,80,652
Fatal Accidents	1,31,726	1,36,071
Persons Killed	1,46,133	1,50,785
Persons Injured	5,00,279	4,94,624



2016 MoRTH Data

Road Safety Scenario - Odisha

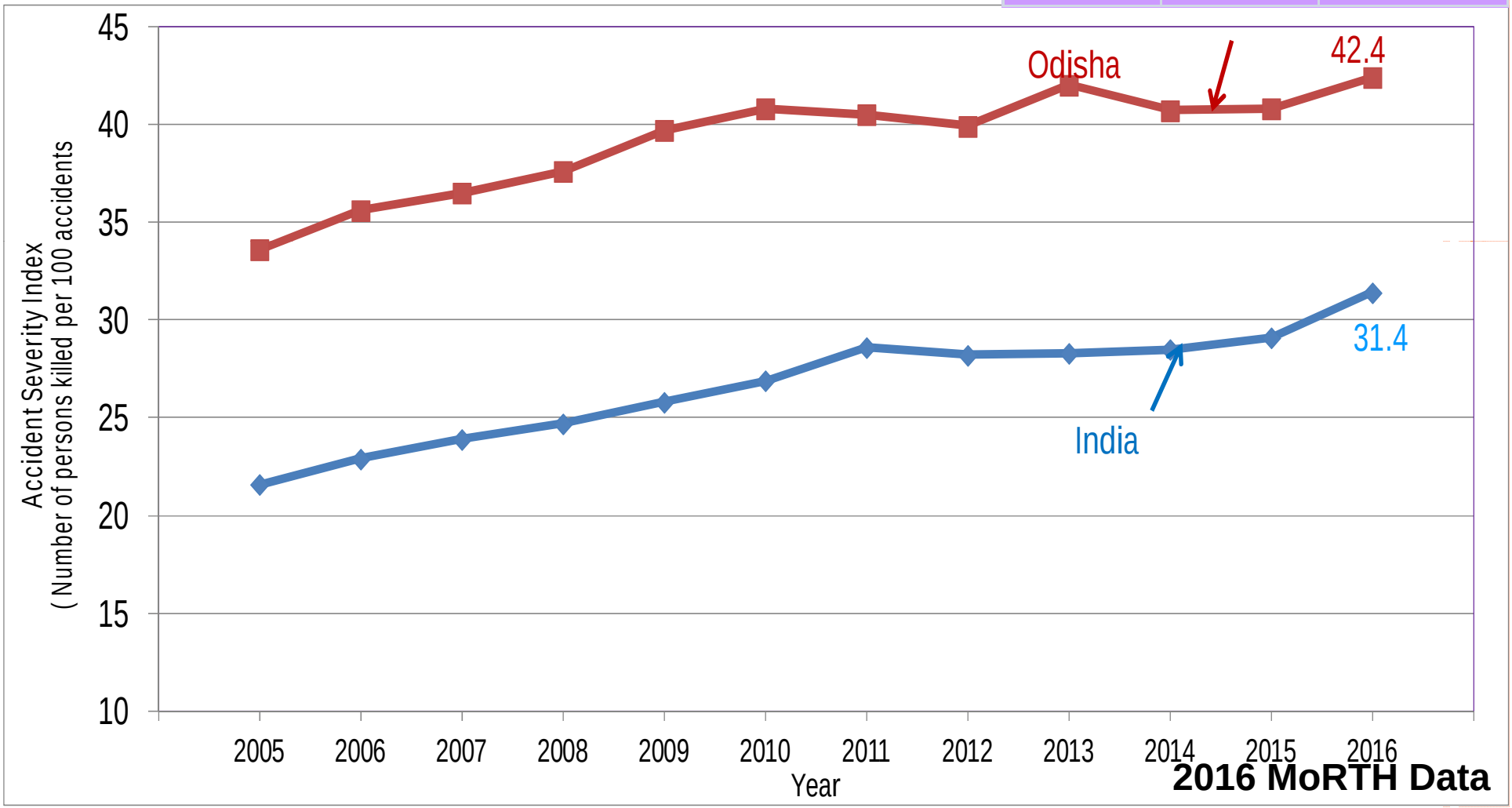
	2015	2016
Accidents	10,542	10,532
Persons Killed	4,303	4,463
Persons Injured	11,825	11,312



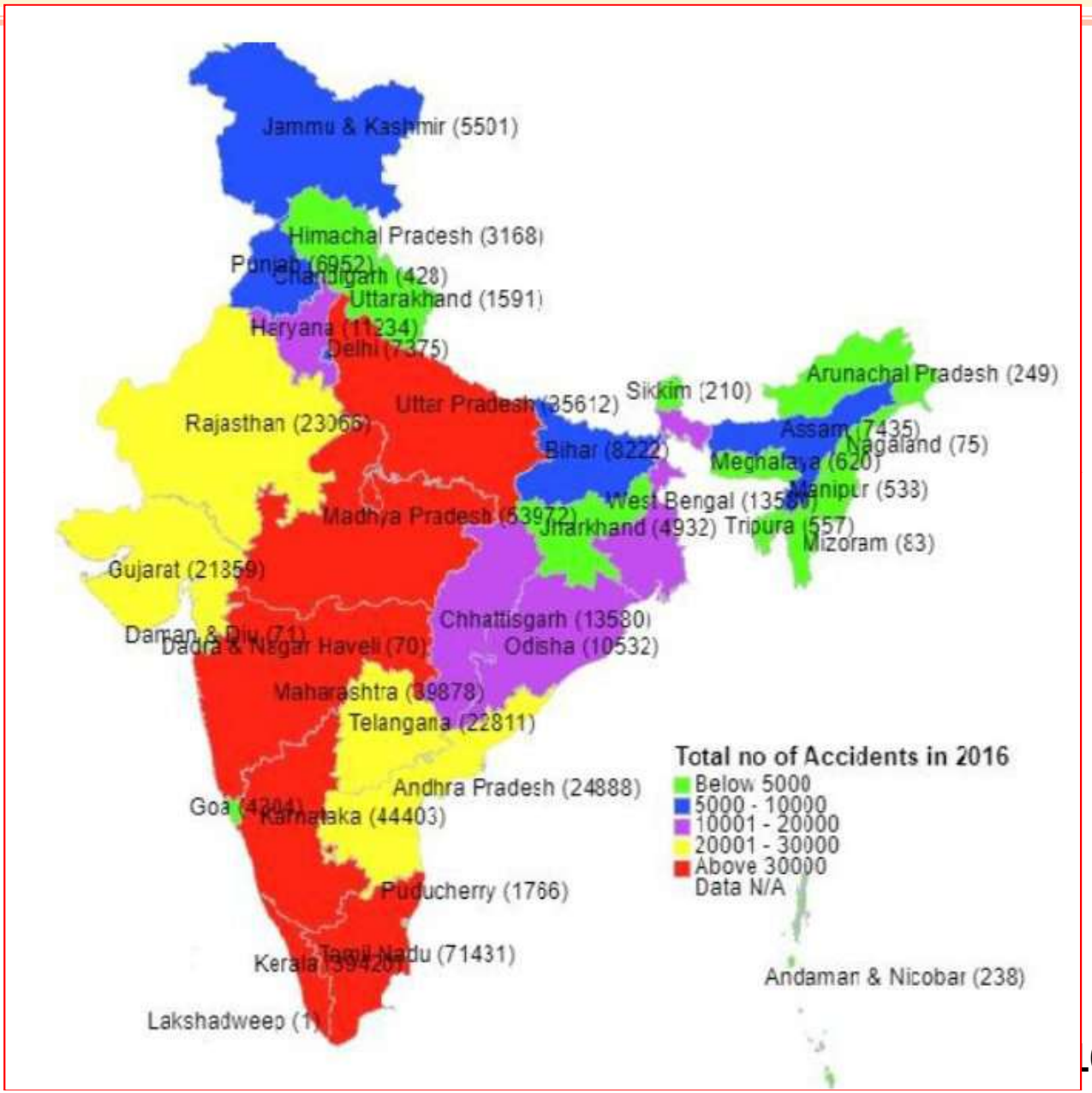
2016 MoRTH Data

ROAD SAFETY SCENARIO – ACCIDENT SEVERITY INDEX

	2015	2016
India	29.1	31.4
Odisha	40.8	42.4



ROAD SAFETY SCENARIO - INDIA (TOP STATES IN TOTAL ACCIDENTS)



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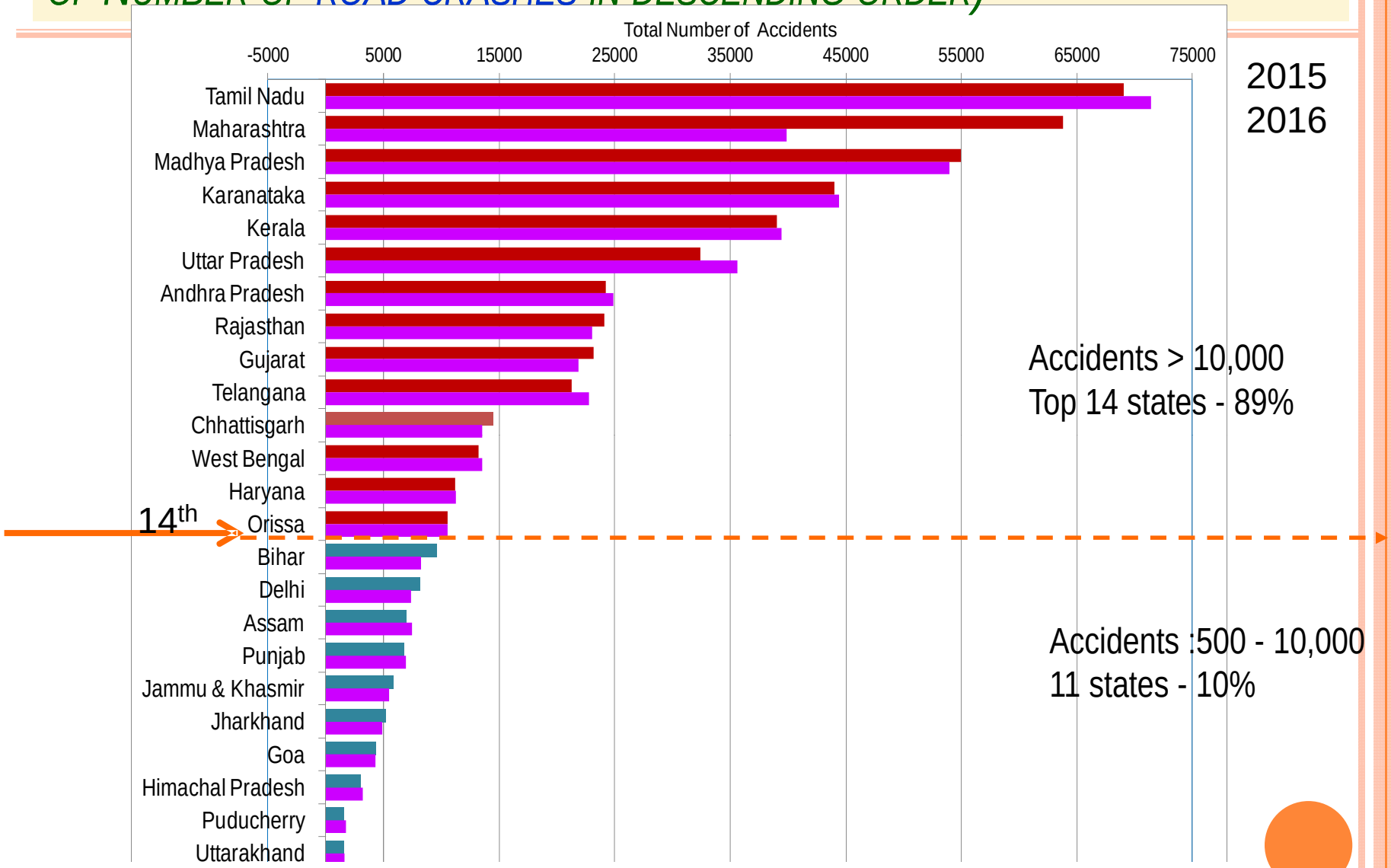
.6 MoRTH Data

ROAD SAFETY SCENARIO - INDIA *(TOP RANKED STATES IN TERMS OF NUMBER OF ROAD CRASHES IN DESCENDING ORDER)*



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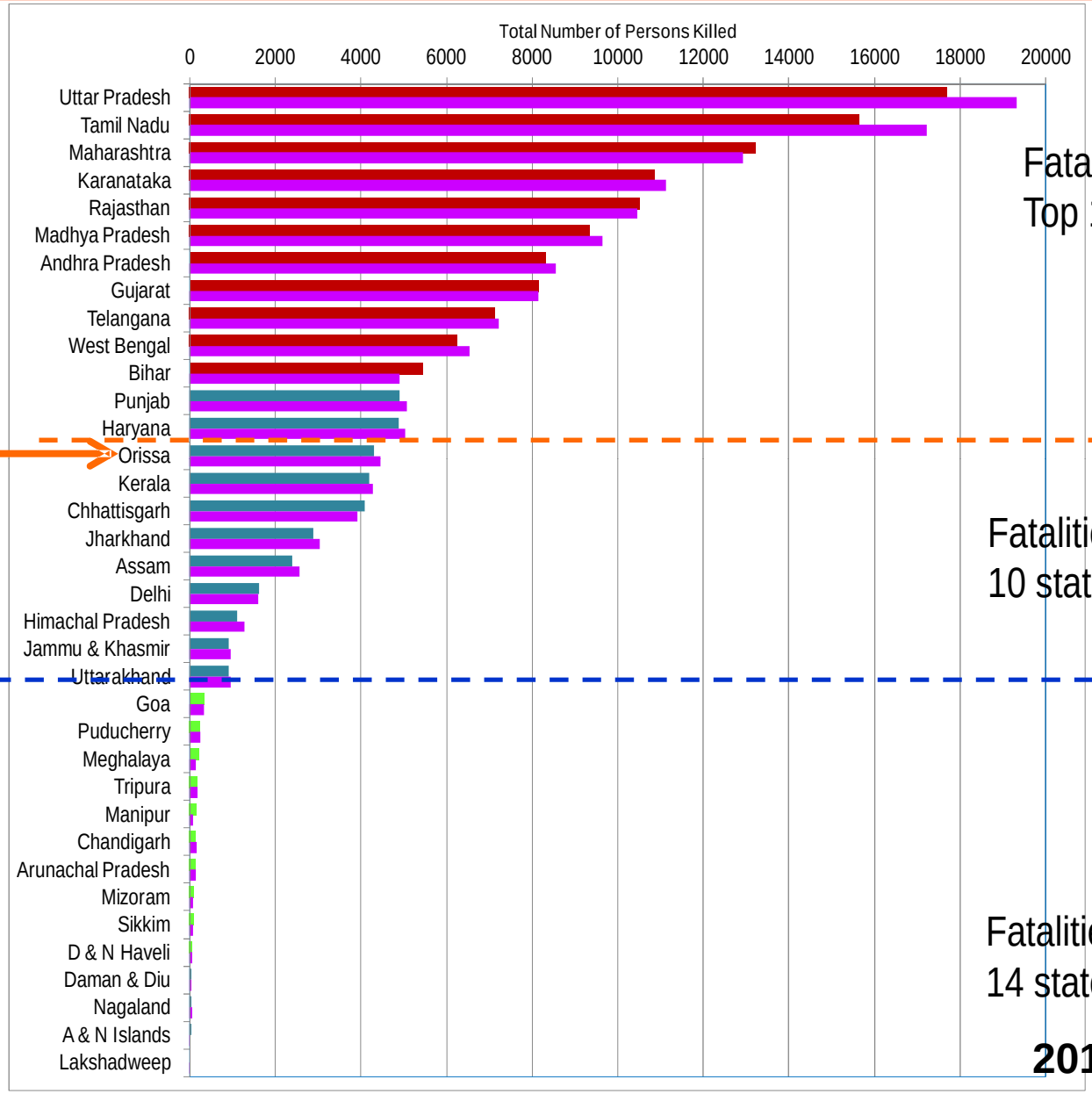
2016 MoRTH Data

ROAD SAFETY SCENARIO – INDIA *(TOP RANKED STATES IN TERMS OF NUMBER OF PERSONS KILLED IN DESCENDING ORDER)*



14th

2015
2016

Fatalities > 5,000
Top 12 states - 80%

Fatalities:500 - 5,000
10 states - 19%

Fatalities < 500
14 states / Uts <1%

2016 MoRTH Data

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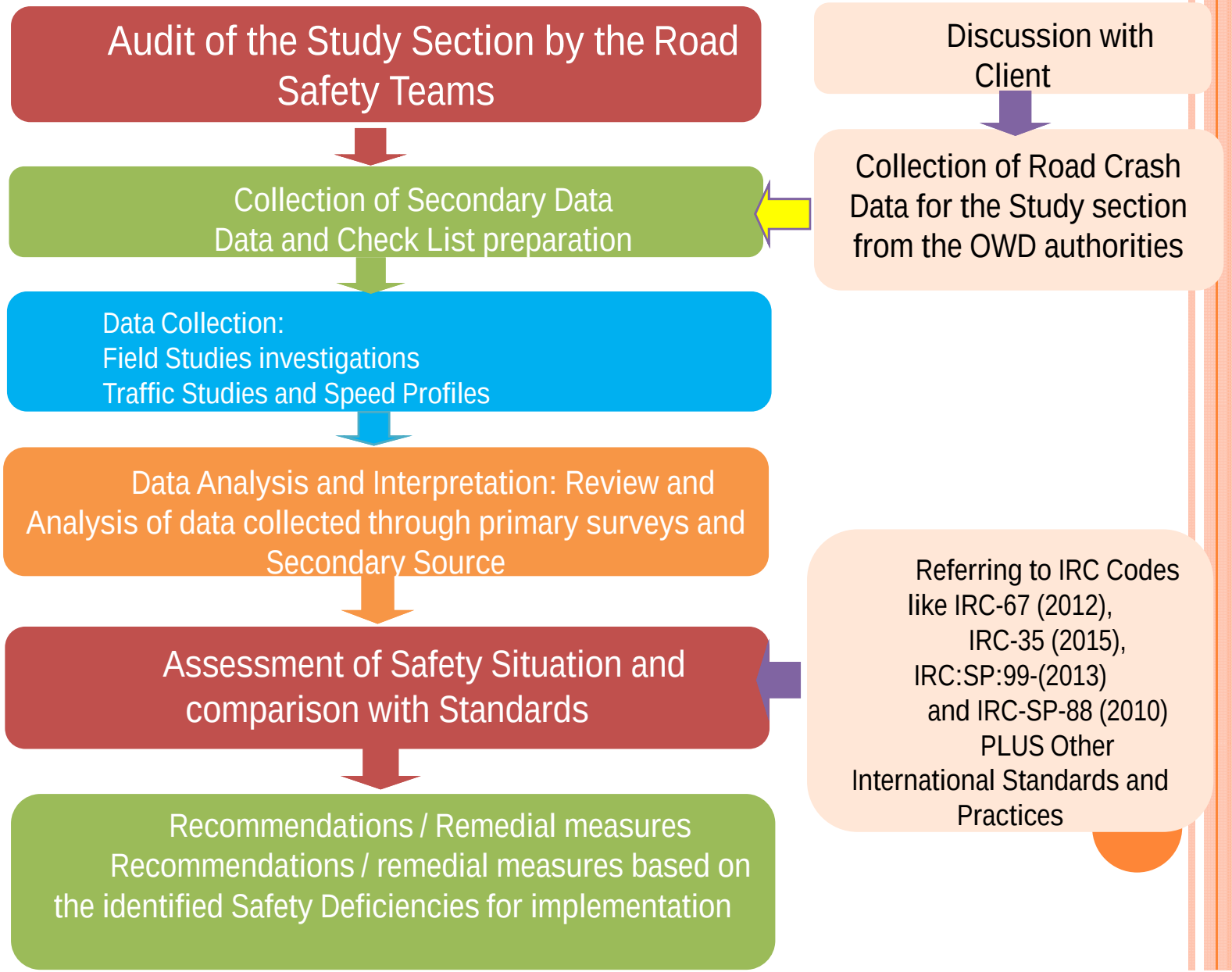
OBJECTIVES AND SCOPE OF THE STUDY

- ***Objectives:***
  - *Road Safety Audit of 2500 Kms of SHs and MDRs.*
  - *Development of Action plan for removal of the road crash prone spots*
- ***Scope of the Study:***
  - *To conduct Road Safety Audit and action plan covering a span of 2500 Kms across the Odisha Road Network.*
  - *Analysis of primary data collected on Spot Speed.*
  - *To study the Black Spots based on FIR data/ road crash data provided by the client and thus prepare the action plan for the removal of the black spots.*
  - *To analyze the secondary data relating to the classified traffic volume count (CVC) collected from OWD sources if any.*
  - *Identification of problems being faced by different category of road users during operational phase of the candidate road sections considered in the study.*
  - *Identification of shortcomings / inadequacies with a view to improve / enhance the safety of all road users.*

STUDY METHODOLOGY



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RSA FINDINGS DISCUSSIONS WITH CLIENT

Road Safety Audit Procedures

- *Road Safety Audit (RSA) is defined as the systematic checking of the safety aspects of new/ existing project road and traffic management schemes, including modifications to existing layouts.*
- *Main aim of RSA is to ensure that road schemes operate as safely as practicable right from the beginning & also further help in reducing future safety issues commensurate with the increasing traffic.*
- *Taking cognizance of the above aspects, the Indian Roads Congress document (IRC) titled, "Manual on Road Safety Audit IRC-SP-88", lists the following stages of RSA:*
  - *Safety Audit during the Feasibility Study*
  - *Safety Audit during the Preliminary Design*
  - *Safety Audit on Completion of Detailed Design*
  - *Safety Audit at the Construction Stage*
  - *Safety Audit on Completion of Construction (i.e. Pre-opening Audit)*
  - *Safety Audit on Existing Roads (Monitoring)*

ROAD SAFETY AUDIT OF EXISTING ROADS

The aspects that need to be monitored during the course of the RSA of the existing road shall be as per IRC-SP-88 (2010) listed below:

- *Does the prevailing speed correspond to the design speed?*
- *Are the visibility criteria still satisfied?*
- *Have any changes been made which could affect road safety?*
- *For carriageway and paved shoulders examine things like any breach or blockade, roughness value, pot holes, cracking, rutting, skidding, damage to pavement, edge drop at shoulders.*
- *Check the roadside furniture including road signs and markings damage to their shape or position, loss of retro-reflectivity*
- *Street lighting and telecom Road Traffic Management System*
- *Rest areas cleaning, including defects in electrical, water and sanitary installations.*

STUDY EXECUTION: MODUS OPERANDI FOR THE STUDY

- ***First time we have taken up 2500kms***
- ***Project Duration : One Year***
- ***Divided the 2500Kms into Three Teams***
  - ***(Each Team : Two Scientists,***
  - ***Dr S Velmurugan & Shri.Ashutosh Arun – (743.00 Kms)***
  - ***Dr A Mohan Rao & Dr Errampalli Madhu – (857.80 Kms)***
  - ***Dr Kayitha Ravinder & Dr J Nataraju - (895.00 Kms)***

  - ***Technical Supporting Staff:***
  - ***Shri.S.Kannan & Shri.Rajan Verma (Group –III)***
  - ***Shri.Jagdish Singh, Shri.Satbir Singh, Shri.Narendar Singh, & Shri.Sajay Kumar (Group-II)***
  - ***Virtually the Project has been executed last Six Months***
- ***69 Project Reports***

2500 Kms :
State Highways, Major District Roads & Other District Roads.

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ROAD SECTIONS ALLOTTED FOR ROAD SAFETY AUDIT

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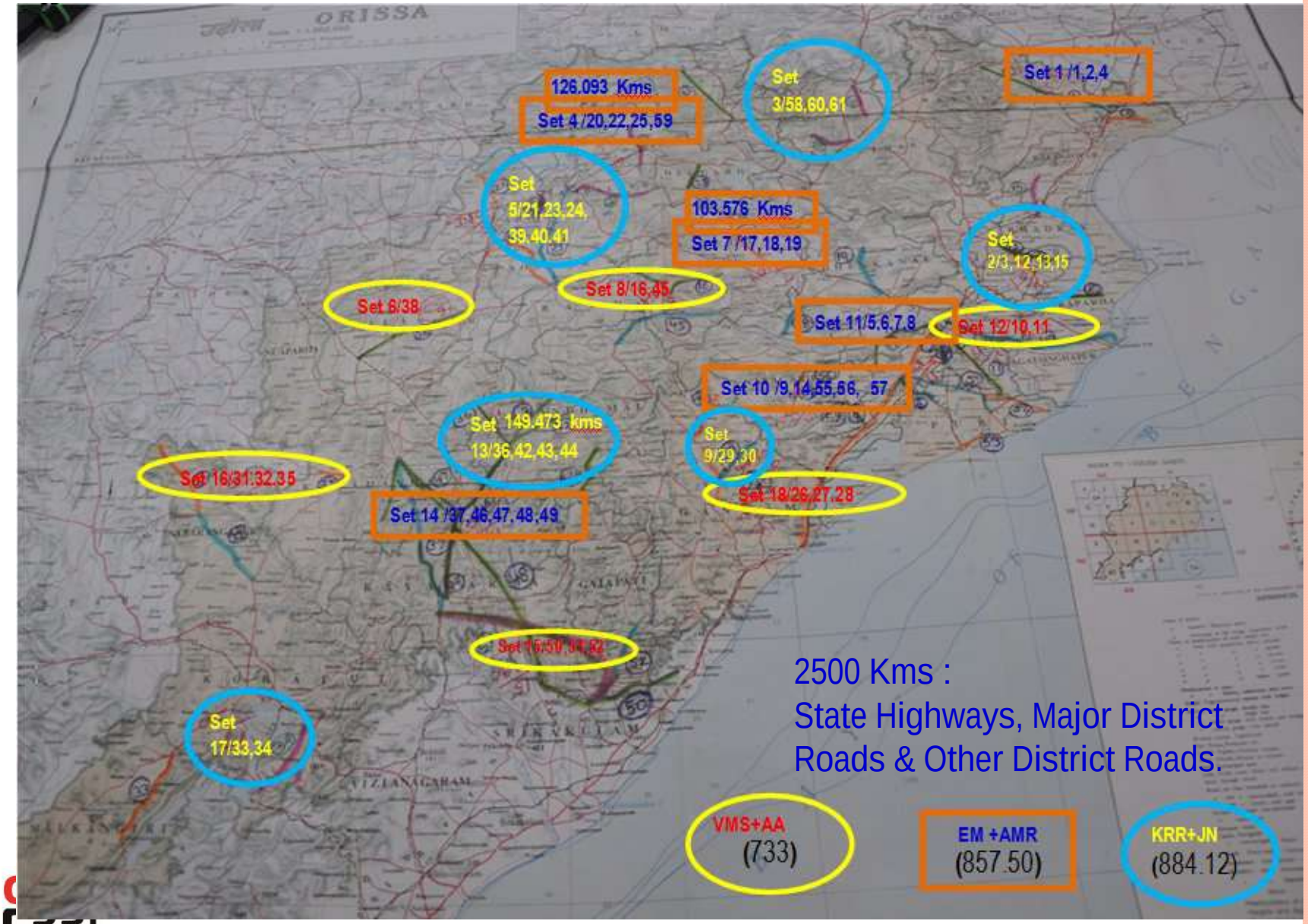

A BRIEF ON ROAD SAFETY AUDIT FINDINGS

ROAD SAFETY AUDIT FINDINGS ARE GROUPED INTO THE VARIOUS ITEMS AS GIVEN BELOW:

- *Alignment and Cross Section*
- *Intersections and Access Roads*
- *Road Surface*
- *Object Hazard Markers (OHM)*
- *Road Markings*
- *Road Studs*
- *Road Signs*
- *Crash Protection Measures*
- *Speed Characteristics*

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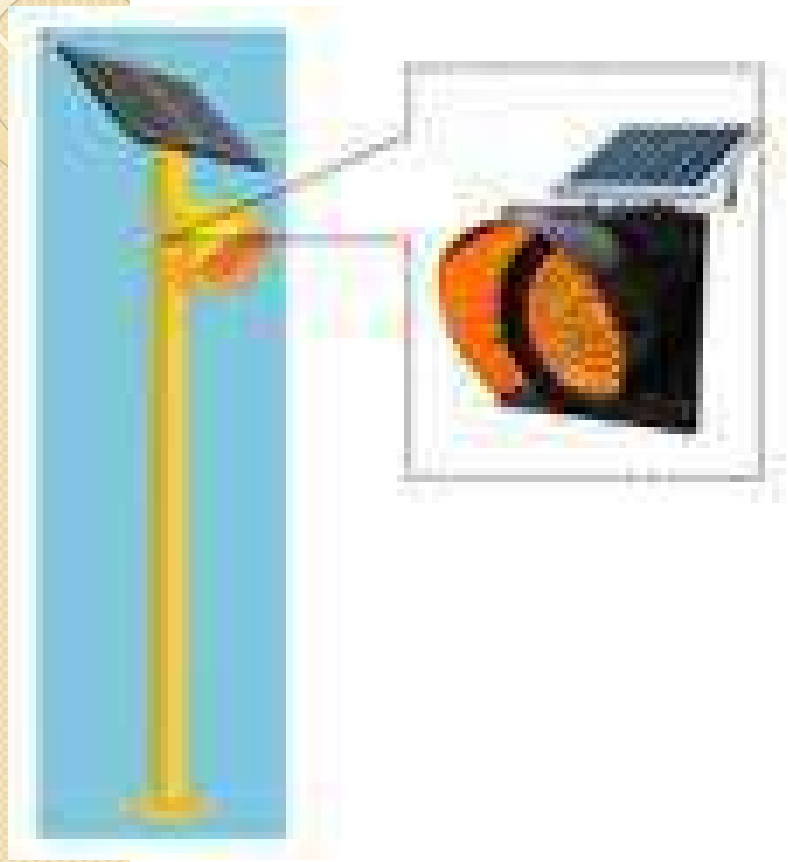
ALIGNMENT ISSUES & CROSS SECTION

Summit Curves/Valley Curves in Profile

Summit Curves/Valley Curves in Profile

Blinkers



Solar Blinkers

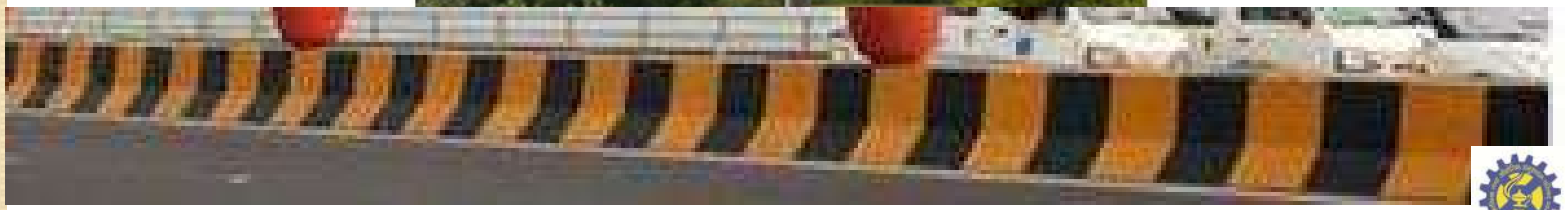
TBM

Hill Roads

Photo 6:74 @ Km.65/000, At sharp curves either side

Hilly Roads

Hill Roads



All Road Sections

Photo 6.3: At Km.2/150, Illustration of Project

All Road Sections

All Road Sections

All Road Sections

All Road Sections

Paniganda - Bamunigam - Daringibadi (MDR-60A):(Km 20/000 to 67/200)

INTERSECTIONS AND ACCESS ROADS

Redevelopment of Major Intersections

Photo 6:38 Major junction with Chitrakonda road -

Redevelopment of Major Intersections

Paniganda - Bamunigam - Daringibadi (MDR-60A):(Km 20/000 to 67/200)

Redevelopment of Major Intersections

Photo 6.47 At Km 2/500 Too many median gaps

Redevelopment of Major Intersections

Action Plan:Typical Design of a T - Intersection

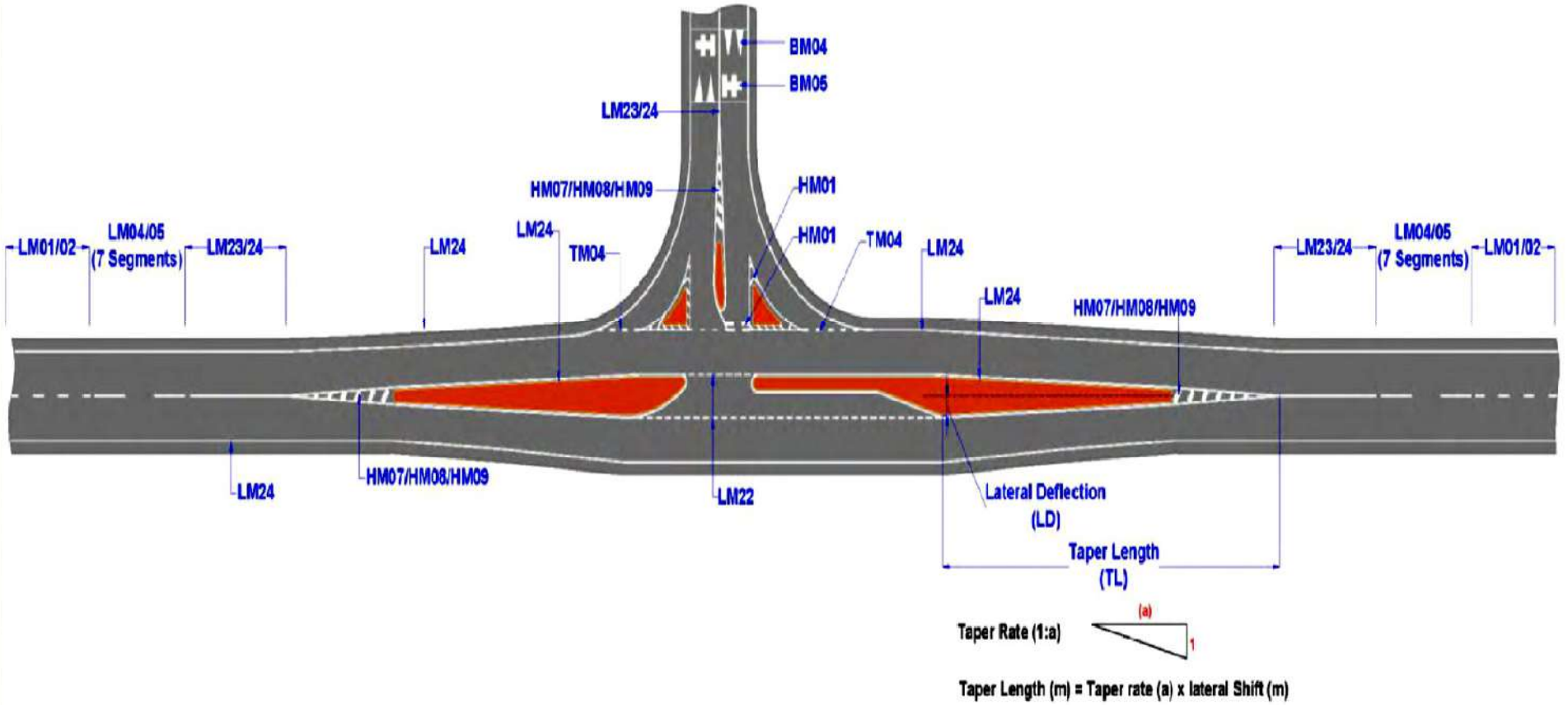
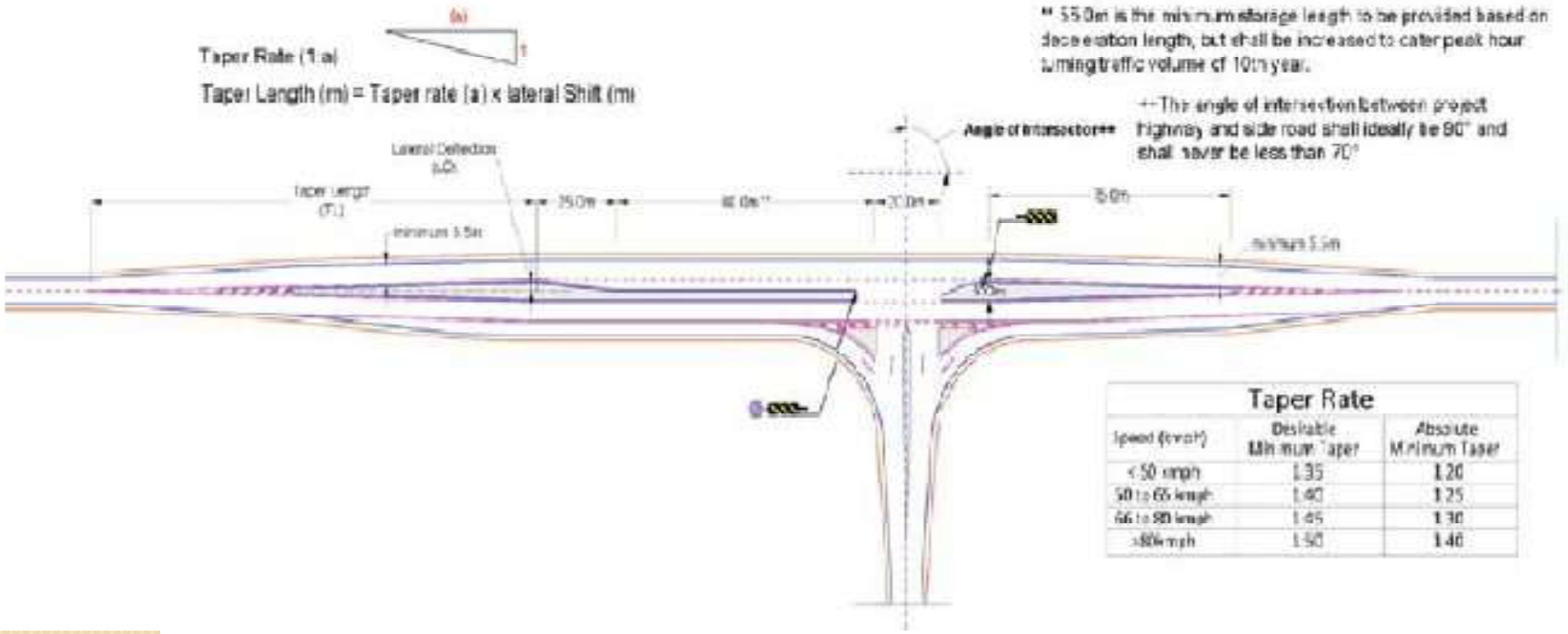


Fig 9.8 : Typical Marking T-Junction with Physical Islands

Junction Improvements



Taper Rate		
Speed (km/hr)	Desirable Minimum Taper	Absolute Minimum Taper
< 50 kmph	1:35	1:20
50 to 65 kmph	1:40	1:25
66 to 80 kmph	1:45	1:30
>80 kmph	1:50	1:40

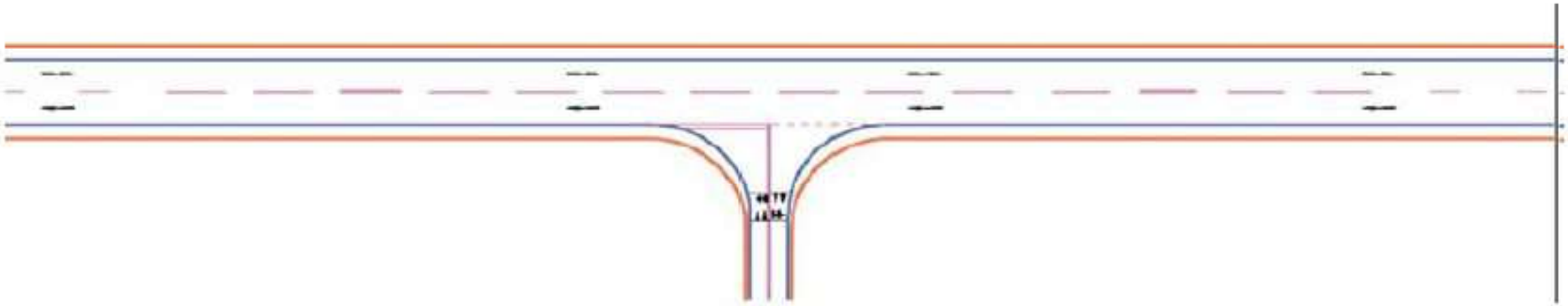


Fig. 3.5 Simple T-Junction (Minor Junction)

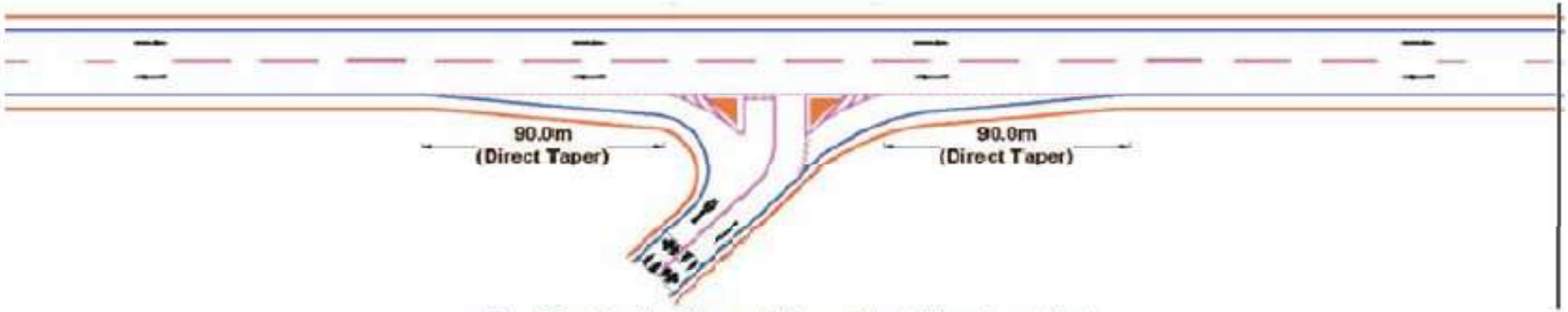
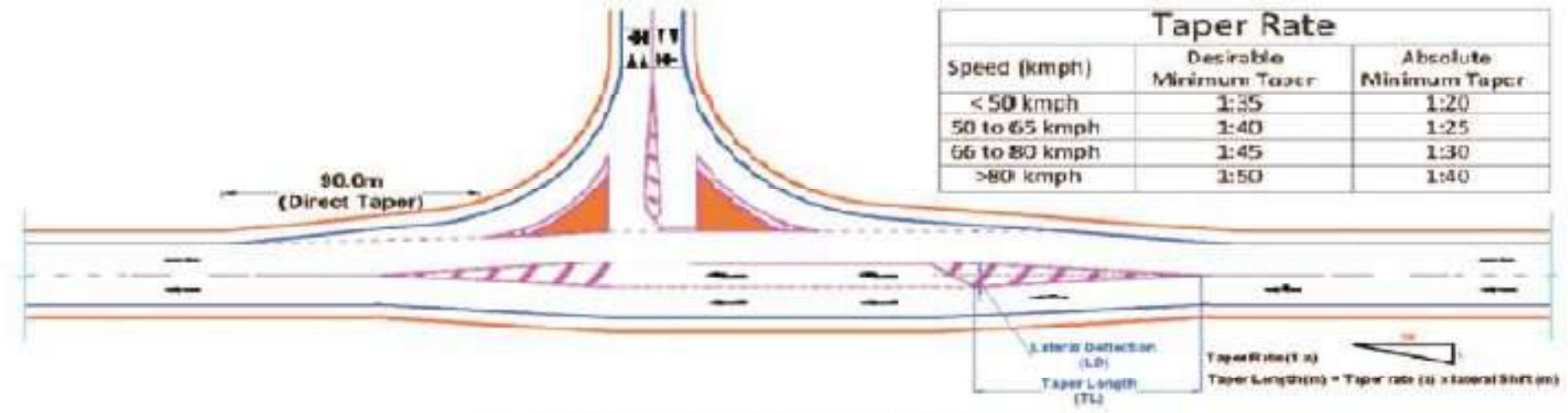


Fig. 3.6 Simple Skew or Y-Junction (Minor Junction)



Taper Rate		
Speed (kmph)	Desirable Minimum Taper	Absolute Minimum Taper
< 50 kmph	1:35	1:20
50 to 65 kmph	1:40	1:25
66 to 80 kmph	1:45	1:30
>80 kmph	1:50	1:40

Fig. 3.7 T-Junction with Ghost Islands (Minor Junction)

Safety Measures at the Intersection

Photo 6.90 Typical Illustration of Junction Markings done on Minor Junctions intersecting with Project Corridor which would caution the driver about the presence of junction; Such measure can be employed at all the Minor Junctions on the Project Corridor (a)

Photo 6.91 Typical Illustration of Junction Markings done on Minor Junctions intersecting with Project Corridor

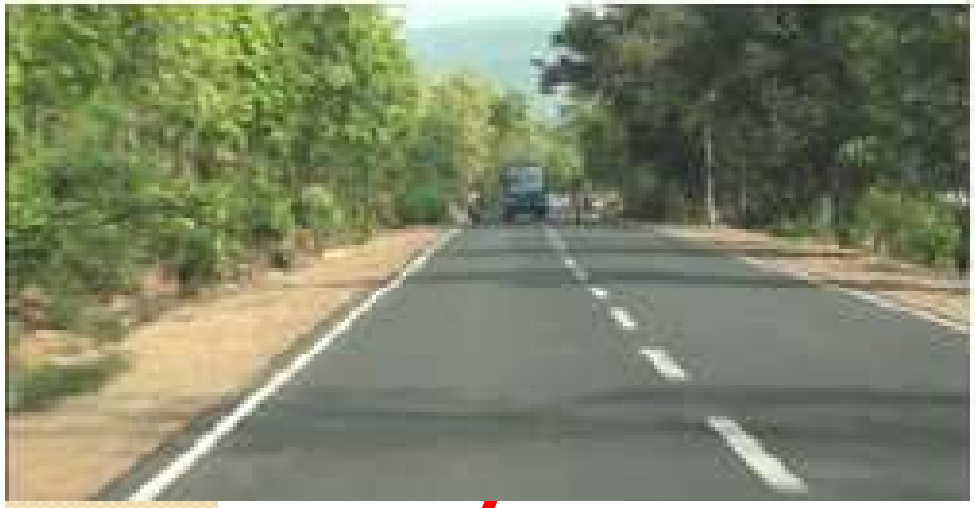
Road Safety Audit Findings - *Safety Measures at Intersections(Major/Minor/ Median Gaps)*

Illustration of RPM Placement on other Typical Roads

Pavement Surface

Pavement

Sarangada-Nuagaon-Baliguda-Tumudibandha Rampur Road (SH-1):(Km 68/000 to 92/500)



Pavement

Paniganda - Bamunigam - Daringibadi (MDR-60A):(Km 20/000 to 67/200)

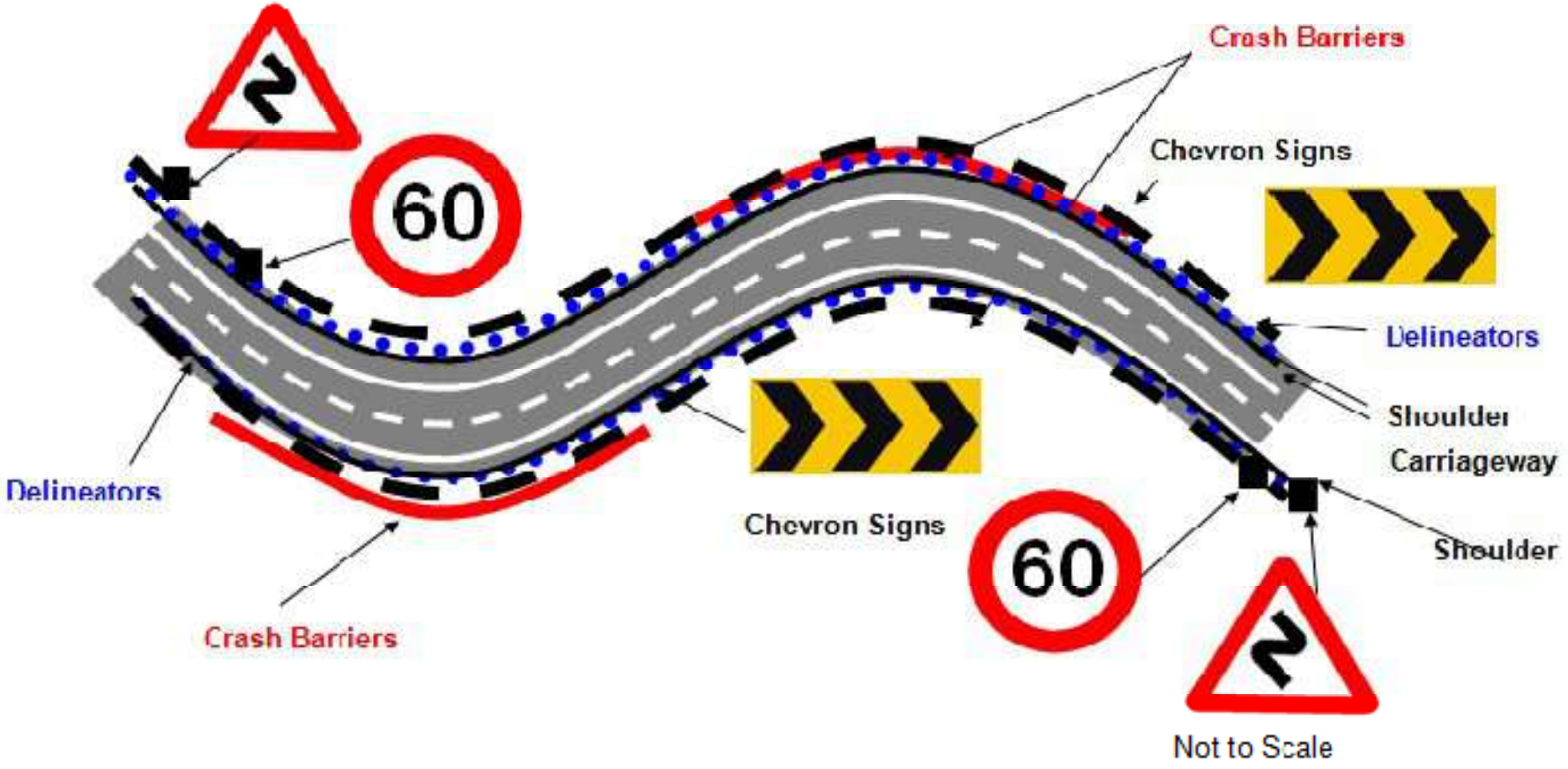
Photo 6:62 At Km 44 /000 Road Surface is not in

Deteriorated Pavement

- *Observation:*
  - *Pavement deformations / deteriorations observed at several locations*
- *Recommendation:*
  - *Consider improving the road conditions through rehabilitation measures at the mentioned locations*
- *Priority*
  - *Essential*

Visual Aids and Crash Protection Devices

Visual Aids to Improve the Safety of Road User



No Signs and Marking - Bamunigam - Daringibadi (MDR-60A):(Km 20/000 to 67/200)

Absence of Proper Signs and Markings

- *Observation:*
  - *Directional destination sign not placed at proper place*
- *Recommendation:*
  - *Place as per IRC:67 (2012)*
- *Priority*
  - *Essential*

Absence of Proper Signs and Markings

- Place as per IRC:67 (2012)

t Km 0/000 Tourist information

OHM on Fixed Objects

OHMs on CD/Minor Bridges/Major Bridges

OHMs on CD/Minor Bridges/Major Bridges

Road Safety Audit Findings – *CD Requires OHM and Painting of Parapet walls*

Safety Measures Required:

Road Safety Audit Findings – *CD Requires OHM and Painting of Parapet walls*

Safety Measures Required:

Illustration of OHM Placement and Painting of Side Parapet Wall on other Typical Roads

Road Safety Audit Findings – *CD Requires OHM and Painting of Parapet walls*

Safety Measures Required:

Photo 6.144 At Km.21/700, Reflective Stickers on Parapets of Major bridge is required, place the speed sign, no over taking sign at 500 meters distance as per IRC :65 (2012)

Photo 6.145 At Km.21/800, Reflective Stickers on Parapets of Major bridge is required, place the speed sign, no over taking sign at 500 meters distance as per IRC :65 (2012)

Reflective Strips on Bridge Parapets on other Typical Roads

Road Safety Audit Findings – *CD Requires OHM and Painting of Parapet walls*

Safety Measures Required:

Photo 6.99 At Km.21/800, road surface is in good condition due to recent construction, However surface roughness is high, road marking is faded ; regular maintenance is needed

Road Safety Audit Findings – *CD Requires OHM and Painting of Parapet walls*

Safety Measures Required:

Illustration of placement of Retro Reflective Strips on Bridge Parapets on other Typical Roads

Km 42/300 @ Boinda – Athmallik – Kiakata Road (SH-

OHMs on Fixed Objects,Trees/Electric poles etc..

MISCELLANEOUS

Miscellaneous- Reflective Stickers

Miscellaneous-

Material Stacking on Shoulders leads to Accidents

Miscellaneous-

Road Users Behaviour

Photo 6:194 Passengers are overloading the Jeep @ Km.2/750 needs sensitization along the road stretch to enhance the safety

Placement of Road Studs

Road Safety Audit Findings - *Safety Measures at Curves*

Safety Measures Required:

- Place the RPM (*Raised Pavement Markers)* at the Curve portions (As per IRC :35)
- RPM is compulsory at the Curves and Gradient sections

Road Safety Audit Findings - *Safety Measures at Curves*

Safety Measures Required:

No RPM Placed

Road Safety Audit Findings - *Safety Measures at Curves*

Safety Measures Required:

Measures to Enhance the Safety on the Curves

Radius of the Curve (m)	Spacing of Delineators/ Reflectors (m)
15	6
35	9
55	11
75	13
90	15
120	17
150	19
180	21
210	23
240	25
270	26
300	27

Road Safety Audit Findings - *Safety Measures at Curves*

Safety Measures Required:

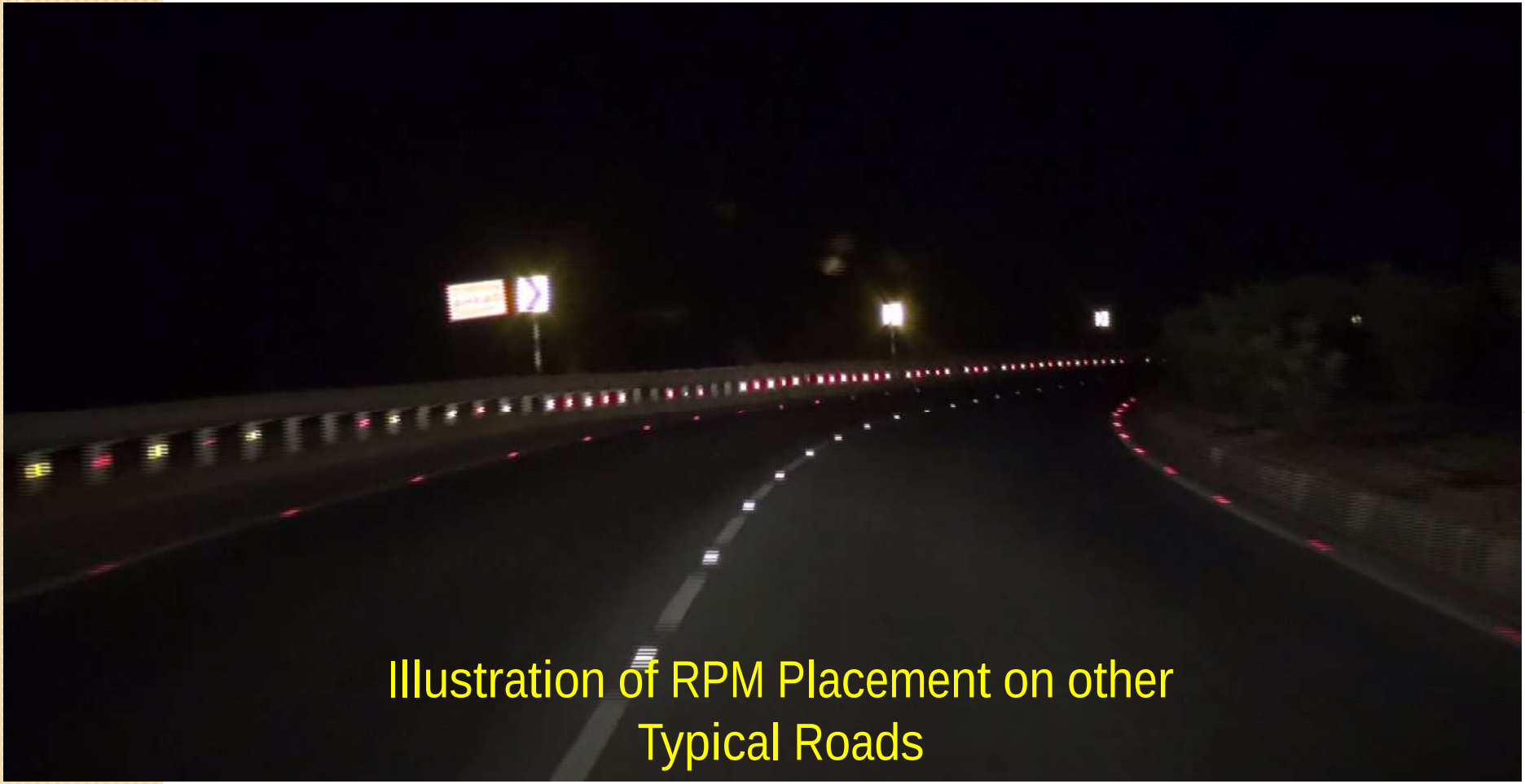


Illustration of RPM Placement on other Typical Roads

Road Safety Audit Findings - *Safety Measures at Curves*

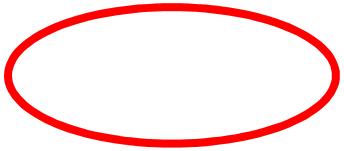
PLACEMENT OF METAL BEAM CRASH BARRIER

Road Safety Audit Findings – *Metal Beam Crash Barriers*

Road Safety Audit Findings – *Metal Beam Crash Barriers*

Safety Measures Required:

- MCB placed at some sections only
- MCB Placement is not Properly made
- Integration of MCB is not completed



Road Safety Audit Findings – *Metal Beam Crash Barriers*

Safety Measures Required:

- Need for placement of MCB on the median wherein level difference is more than 2 m.
- Need to be verified by IE and hence day-to-day basis interaction with M/s. Aarvee is envisaged leading to Pre-COD.

ACTION PLAN FOR IMPLEMENTATION

- *Road Surface*
- *Measures to Enhance the Safety on the Curves*
- *Junction Improvements*
- *Safety Measures on Bridges and Culverts*
- *Visual Aids to Improve the Safety of Road User*
- *Treatment for Safety of Vulnerable Road Users*
- *Appropriate Design of Road Humps*
- *Safety in Work Zones*
- *Control of Encroachments in Urban Areas*
- *Other Safety Measures*

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Thank You.
Any Queries Please!