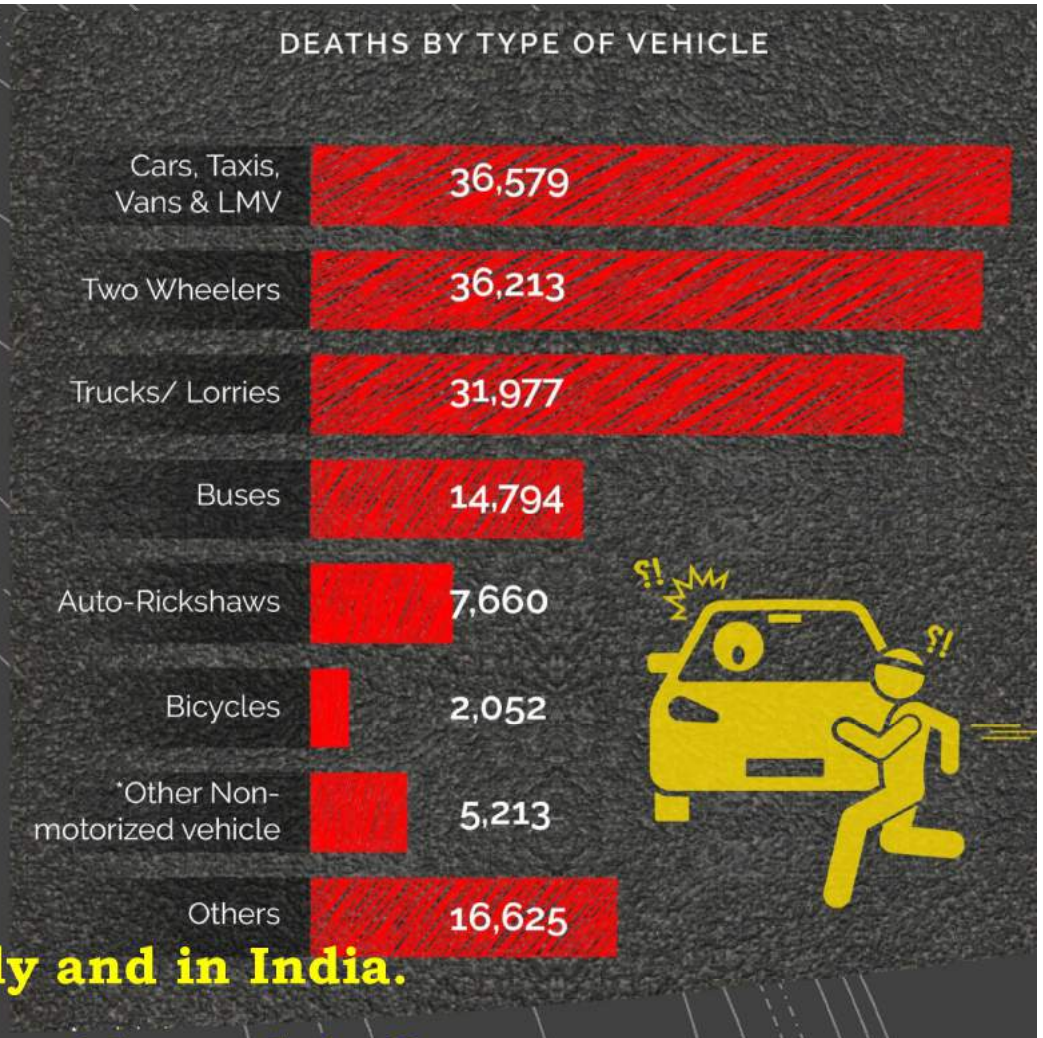

CoERSA (BRO)
ROAD SAFETY AUDIT
AND IMPLEMENTATION IN BRO



- **Accidents cause of concern globally and in India.**
- **One death every min due to road accident globally.**
- **1.5 Lac Deaths & 4.5 Lac Injured (MoRTH Report On India For Yr 2019).**
- **NH (2.03%of total rd network) but accounts for 37.5% of all rd accidents.**

Two Ways of Ensuring Road Safety.

A **Reduction**
ccident Prevention

Road Safety Audit Falls in the Purview of Accident Prevention

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AIM

To briefly cover the Importance of Road Safety and in understanding the conduct of RSA by Projects on the BRO Roads

DEFINING RSA

A systematic process for checking rd safety aspects of existing roads and carefully planning new schemes with an objective to minimise road accident occurrence and its severity.

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

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ROAD SAFETY COMPONENTS

- SPEED MANAGEMENT.
- VEH SAFETY STDS.
- INFRASTRUCTURE AND DESIGN IMPROVEMENT.
- ENFORCEMENT OF TFC LAWS.
- SURVIVAL AFTER CRASH.

SPEED MANAGEMENT

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- **Appropriate road design layout and markings.**
- **Proper trg of dvrs.**
- **Safety Campaigns.**
- **Speed enforcement.**
- **Lane Driving.**
- **Classifying rds.**

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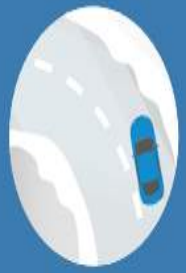
VEH SAFETY : MANUFACTURES DOMAIN

ACTIVE SAFETY SYSTEMS

- Constantly monitor the performance and surroundings of a vehicle
- Can prevent accidents from happening altogether ...or actively help the driver to reduce the impact
- Avoid or mitigate an accident pre-impact, so before it happens

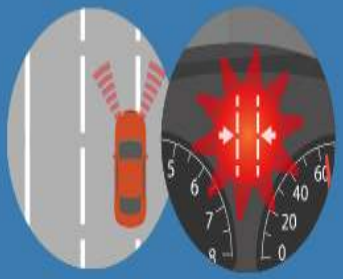
EXAMPLES OF ACTIVE SYSTEMS THAT GIVE THE DRIVER MORE CONTROL IN DANGEROUS SITUATIONS:

Anti-lock braking (ABS)



Electronic stability control (ESC)

Autonomous emergency braking (AEB)



Lane departure warning (LDW)

PASSIVE SAFETY SYSTEMS

- Protect the occupants of a vehicle and other road users if a crash occurs
- Reduce the impact of an accident or the level of injury
- Mitigate the consequences of an accident during and after impact

Pre-tensioned seatbelts

Airbags

Deformation zones

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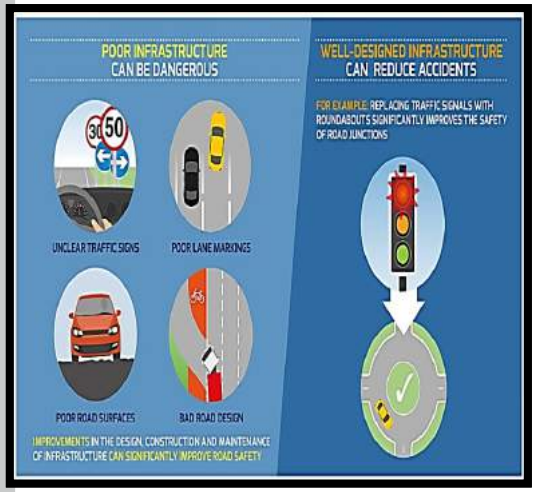
INFRASTRUTURE AND DESIGN

- **Constructional Aspects.**
  - **Rumble strips on centre lines and shoulders.**
  - **Speed Humps.**
  - **Lane Markings.**
  - **Lanes for different vehs.**
  - **Median Barrier.**
  - **Add chicanes.**
  - **Prep safety edges with proper 35-degree slope.**
  - **Plenty of signages.**



KEY TO ACCIDENT REDN

ENFORCEMENT OF TFC LAWS

- To reduce rd rule violations.
- Heavy fines or licence cancellations are imposed.
- Speeding laws.
- Drink-driving laws.
- Motorcycle helmets laws.
- Seat-belt laws.
- Child-restraint laws.

Our Role

Road Rule Awareness & Persuasive Enforcement

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SURVIVAL AFTER CRASH

- Statistic shows high death rate in rural areas vis-à-vis urban areas.
- Timely and effective emergency care.
- Promote community first responder trg.
- Trg of pers who responds to crashes in basic emergency care.

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PURPOSE OF RSA

- **Reduce the levels of risks to road users and construction workers.**
  - **Minimizes likelihood of crashes by safety conscious plg and design.**
  - **Ensure adherence of safety criteria during construction.**
  - **Minimizes likelihood of fatal injuries.**
  - **Install safety awareness among planners, designers, executive engineers and pers maintaining rds.**
  - **Reduces lifecycle cost of design (Achieved by correction at design stage).**

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CATEGORIES OF RSA

- **Structural** Safety.
- **Traffic** Management and Safety.
- **Construction** Safety.
- **E&M** Machinery Safety, Fire Safety etc.
- **Workers / Work Zone** Safety.

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RSA STAGES

ROAD DEVP PH	RD SAFETY AUDIT STG
Preconstruction	• Stage I - Feasibility Study • Stage II - Prelim Design • Stage III - Detailed Design
Construction	• Stage IV – Pre Opening
Post Construction	• Stage V – Post Opening

INCR ATTN TO MAJ ISSUES

Reducing Opportunity for substantial Change

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PRE-CONSTR AUDIT : AE/DPR PREP STG

- **Carried out by Projects.**
  - **Incl proactive actions at planning stage hence tedious and time consuming.**
  - **Aim to identify risk and potential for accidents before road is constructed.**
  - **Est tfc engg feature of a project at planning stage e.g. layout of rd , layout of carriage way, likely intersection places.**
  - **Economises effort and cost of improvement at later stage.**
- **At HQ ADGBR / DGBR**
  - ✓ **While reviewing the DPRs.**
  - ✓ **By East and West Dte.**
  - ✓ **EPC Dte**

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CONSTR AUDIT

- **Project Level.**
  - **By EEs (site engrs) on site.**
  - **Addresses maximum concerns of RSA.**
  - **Pts highlighted during AE/DPR stage ensured during execution stage.**
  - **Highlighting difference during planning & execution stage.**
  - **Visit to sites by EE inspection by walking, riding and driving.**
  - **Inspection of construction sites during day and night, during dry and wet conditions.**
- **HQ ADG / DGBR.**
  - **Centralised RSA Teams.**
  - **Coord through East and West Dte.**

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POST CONSTR AUDIT

- **Identifying potential accident prone sites or rd stretches.**
- **Iden landscape resulting in incr of accident potential of roads e.g. foliage obstructing tfc signs or sight dist.**
- **Iden places of wear and tear of roads and bridges due to tfc operations.**
- **Iden areas of natural calamities such as landslides and snow avalanches.**
- **At Project Level.**
  - **Internal Audit with own RSA Teams.**
  - **One TF of another.**
- **At HQ ADGBR / DGBR.**
  - **External audit by (RSA Teams) not involved in design or constr.**
  - **External Agencies.**

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POST CONSTR AUDIT

- **Find out contractual compliance level in quantitative terms for safety aspects.**
  - **Traffic Safety, Constr Safety, Workers Safety, Temp Structure Safety, E&M Safety etc.**
- **Iden good practices.**
- **Iden poor practices.**

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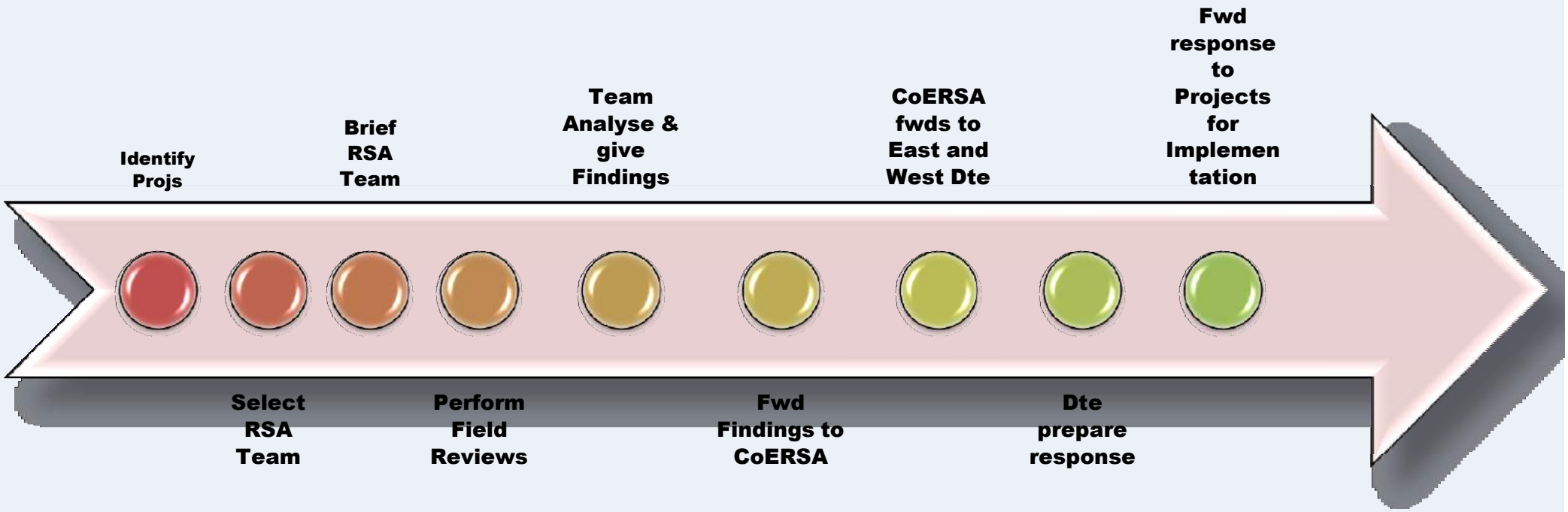
PROCESS



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ASPECTS CHECKED DURING AUDIT

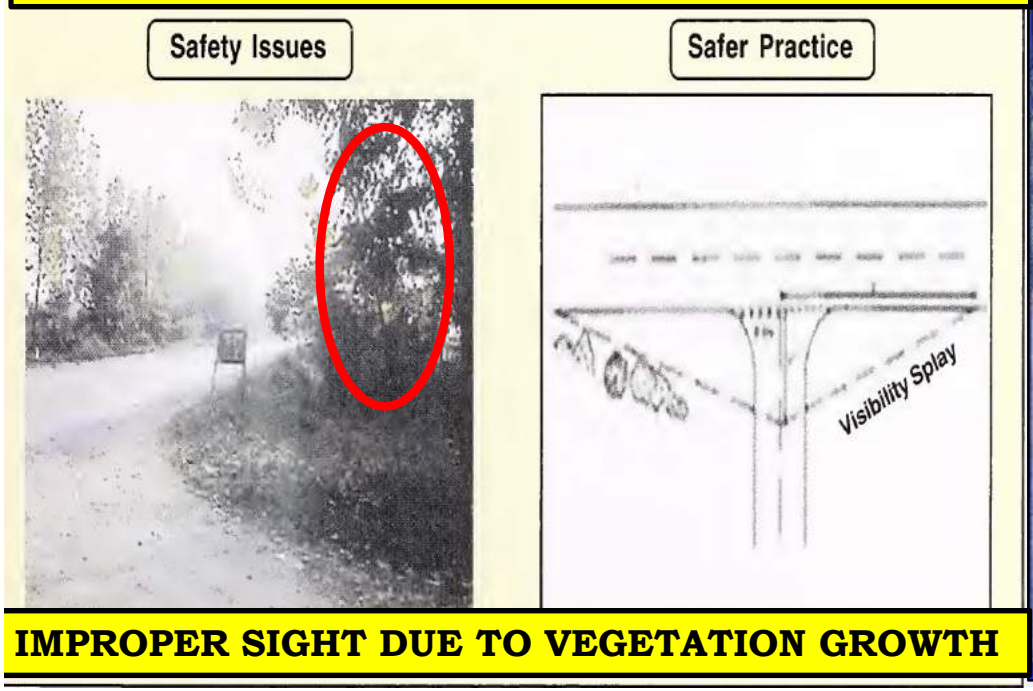
POORLY MAINT SHOULDERS INADEQ STR & WIDTH

WATER LOGGING AT SHOULDERS

WELL MARKED AND MAINT SHOULDERS

TREE ON CARRIAGWAY EDGE

VEG EATING RD SPACE



IMPROPER SIGHT DUE TO VEGETATION GROWTH

ROAD WITH NO SAFETY SIGNAGES

RUMBLES STRIPS TO ALERT DVRs

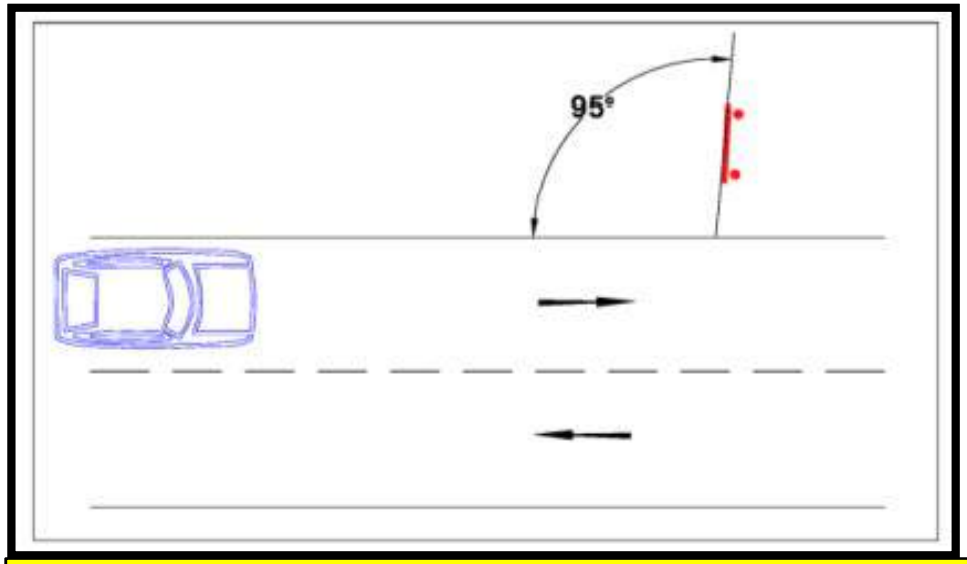
CLEARLY DEFINED CENTRE LINE AND EDGE LINE

NIGHT SIGNAGES

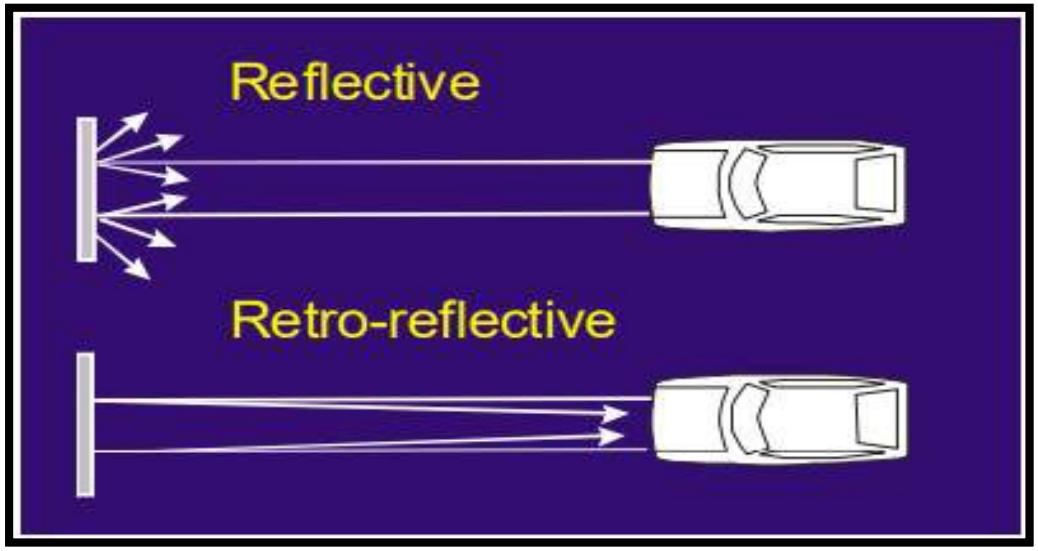
INCORRECTLY MARKED MEDIAN

VEH PARKED AT SERVICE RD

LACK OF CAUTIONARY SIGNAGES AT JUNCTION AND ACCESS PTs



CORRECT PLACING OF SIGNS



AVOID RETRO REFLECTIVE SIGNS

OBSCURED SIGNS

OBSCURED SIGN DUE TO OVER GROWTH

SIGNAGES IN LANGUAGE UNDERSTOOD BY ALL

CONSPICUOUS SIGN TO REVEAL HAZARD

CORRECT PLACING OF SIGNS

DON'T INVENT OWN SIGNS

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Road Safety