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Road Safety Audit for a stretch in Haryana: A proactive measure towards Zero Vision

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WHAT IS ROAD SAFETY AUDIT

It is formal procedure for assessing accident potential and safety performance in the provision of new schemes and schemes for the improvement and maintenance of existing road.

Need of RSA

SAFER ROADS, SAVING LIVES, SAVING MONEY

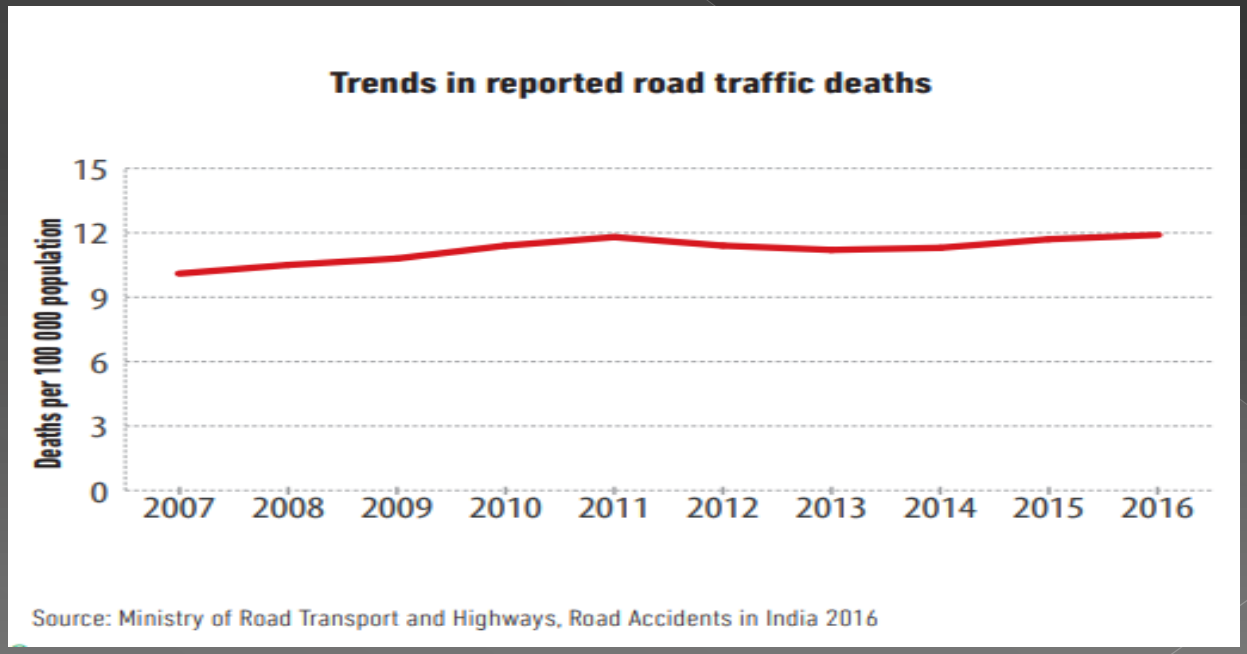
CURRENT STATE OF GLOBAL ROAD SAFETY

- The number of road traffic death reached 1.35 million in 2016
- Road accident is 8th leading cause of death for people of all ages
- It is 1st leading cause of death for children and young adults 5-29 years of age

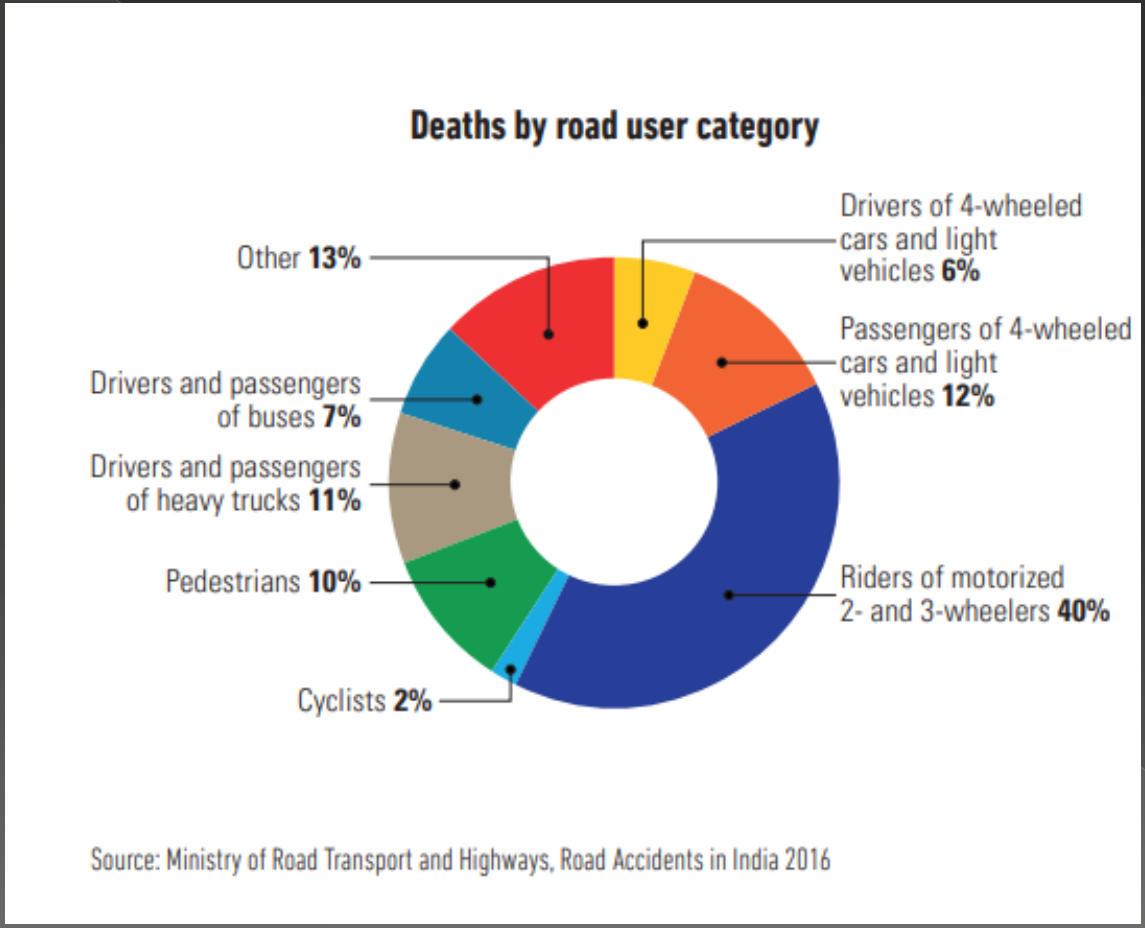
(source-global status report on road safety 2018 (WHO))

INDIA'S FACT....

- 3rd largest road network in world
- 1st in number of road fatalities (29,9091 in 2016)



DEATH BY ROAD USER CATEGORY IN INDIA



MAJOR CAUSE FOR FATALITY

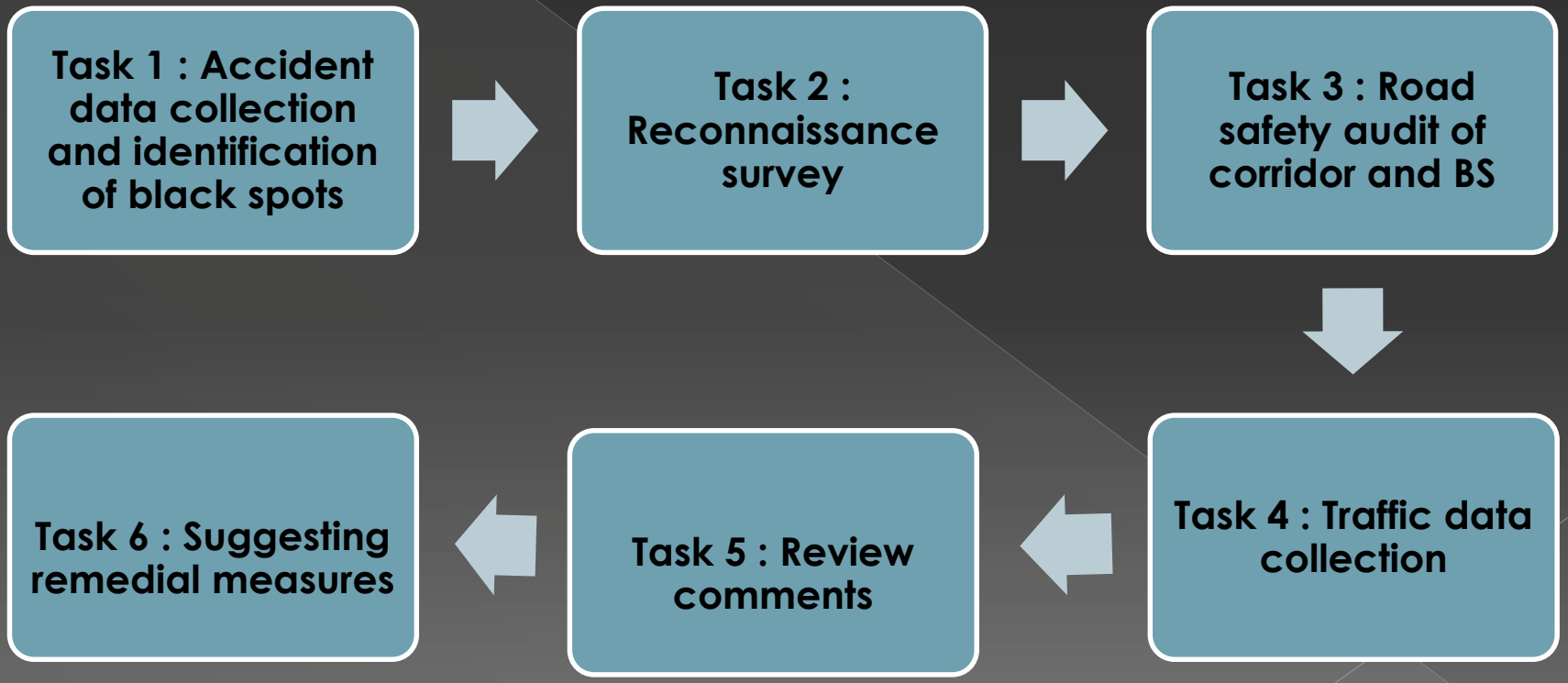
- At uncontrolled intersection
- Over Speeding
- Open area
- Overloading
- Head-on-collision
- Defective vehicle
- Drunk driving
- Speed breaker
- Potholes

OBJECTIVES OF RSA

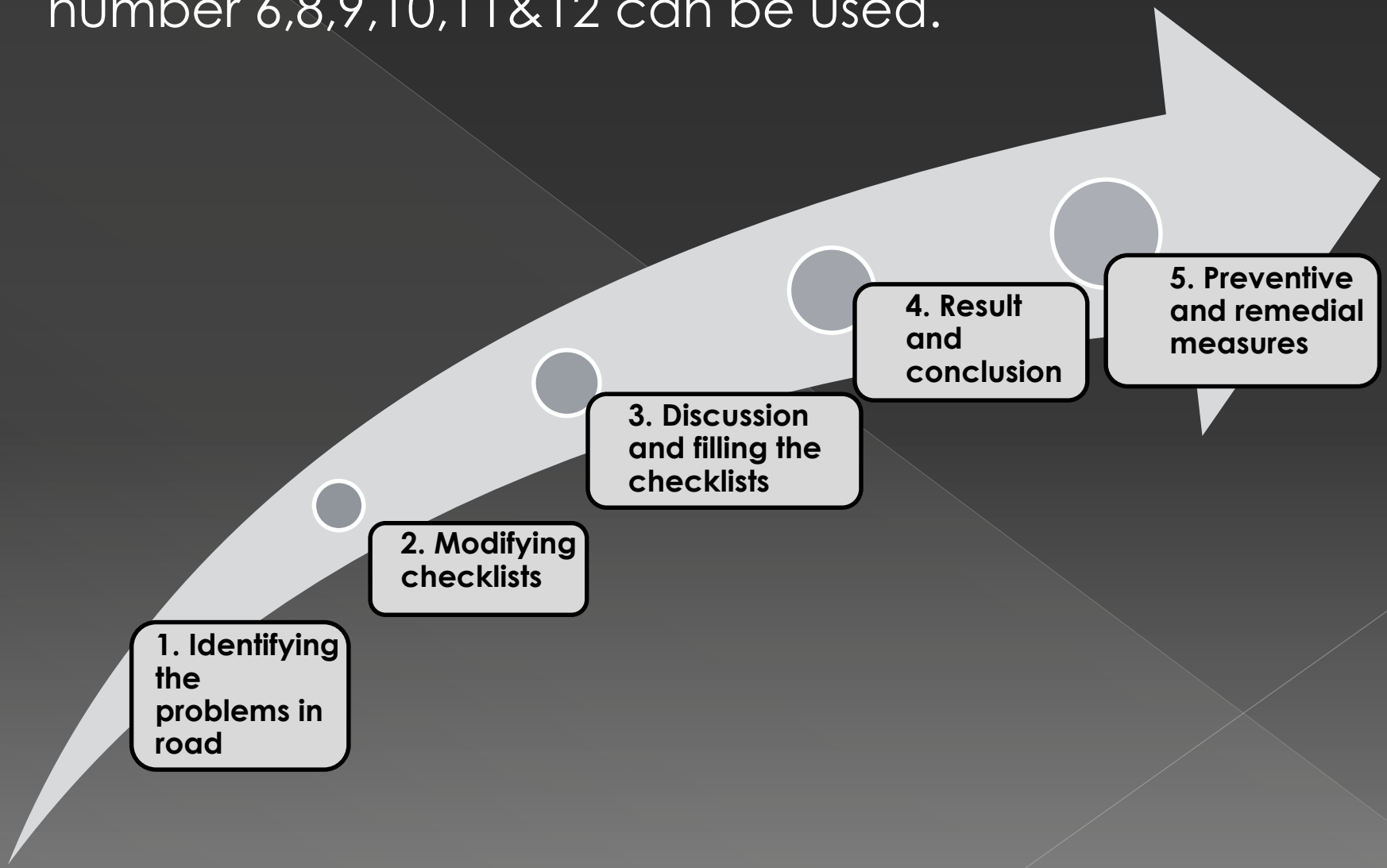
- To ensure high levels of safety on new road projects
- Reduce whole-life costs of projects
- Minimize accident risk on adjoining road network
- Promote the safety of all road user
- Promote road safety engineering

METHODOLOGY

Various tasks to be involved in Road Safety Audit on existing road are as follows:



As per IRC:SP:88 -2010 ,for conducting RSA on existing stretch of road checklist number 6,8,9,10,11&12 can be used.



IRC: SP:88-2010

CHECKLIST 6 - STAGE 6 AUDIT (ON EXISTING ROADS OR DURING OPERATION & MANAGEMENT)

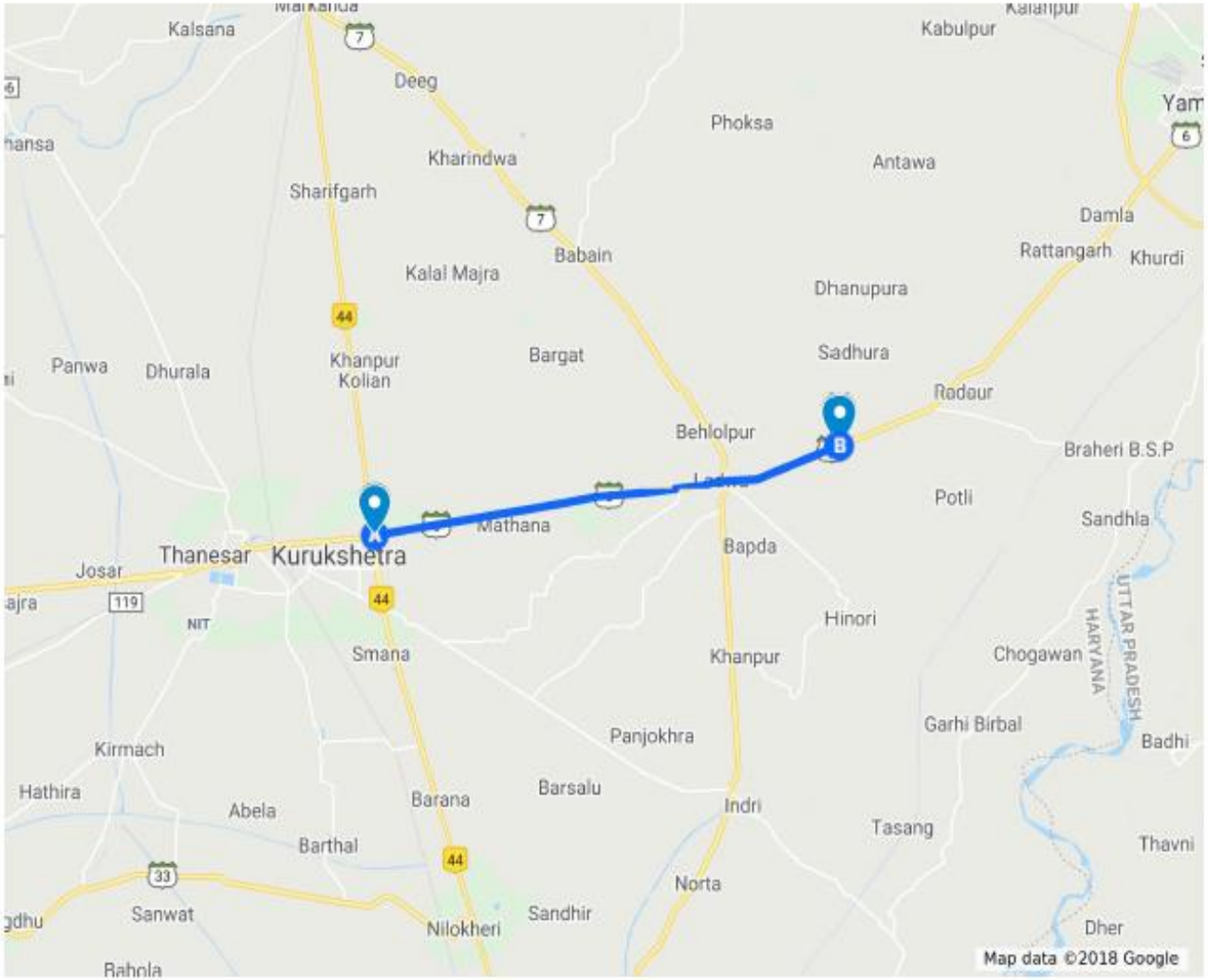
1) Carryout inspection - do not forget to take the results of accidents analysis and relevant checklists with you.
2) Does the actual function of the road correspond to its intended function?
3) Are the prevailing speed levels within desirable limits?
4) Do the equipment and standard of the road correspond to its function, speed level and classification? (Use checklist 2 and 3, as well as any specific checklists, which are relevant.)
5) Do road users park in ways that could constitute hazards?
6) Do plantations obscure visibility or the view of signs?
7) Are the surface and carriageway markings in good condition?
8) Are there any signs that road users drive over islands or kerbs or that the routes taken by motorists through junctions and bends are less than ideal?
9) Are there signs of other conflict situations and minor accidents?
10) Are the specified distances to rigid obstacles maintained for all groups of road users?
11) Are medians and islands of adequate width for the likely users.
12) Are there signs of pedestrian traffic in places that seem hazardous to pedestrians?
13) Does there appear to be a need for more or better crossing facilities for pedestrians?
14) Does there appear to be a need for more or better facilities for cyclists?
15) Has due consideration been given to children, the elderly, persons with disabilities?
16) Are bus stops and bus bays safely located with adequate visibility and clearance to the traffic lane.
17) Any provisions for parking satisfactory in relation to traffic operations and safety?
18) Are all locations free of construction or maintenance equipment, and any signing or temporary traffic control devices that are no longer required?

Study area and data collection

Study Area

Directions from 29.976403, 76.893784 to 30.008115,77.095534

- A 29.976403, 76.893784
- B 30.008115,77.095534



- Study area selected for Road Safety Audit was 21.150 km of existing stretch of State Highway 6, Kurukshetra, Harayana.
- Chainage from 76.150 to 55.
- Point A: Latitude-29.976403
  Longitude-76.893784
- Point B: Latitude-30.008115
  Longitude-77.095534

Item	Safety issue	Chainage		Observation
		From	To	
Cross-section and Alignment	Design speed • Is actual speed of vehicles meets proposed design speed? If not ... • Are proper advanced warning signs provided?			
	Stopping sight distance • Are horizontal and vertical alignment provide sufficient forward visibility? • Is adequate stopping sight distance available near junctions?	59.5	61	• Access road meeting major road at curve • Inadequate sight distance to access road
		64.2	64.4	• Improper sight distance and poorly designed access road.
		68.5	70	
		73	76.15	• Sight distance is obstructed due clinic at intersection.
		73	76.15	• Inadequate sight due to trees.
	Overtaking sight distance • Does alignment provide safe overtaking opportunities?			
	Width • Are width of carriageway, shoulder, median, bridge footpath (if any) in accordance with standard and adequate for function of road?	55	58	• Shoulders are covered with vegetation
		59.5	61	• Multiple openings to median without proper provision for pedestrian crossing
		61	63	• Shoulders are not maintained due to construction alongside the road
		73	76.15	• Shoulder drop due to construction activity
	Side drains • Are batter slopes and drains designed to safe standard and adequate for run-off vehicles to traverse?	55	61	• Water logged along road
		58	59.5	• Cross drainage without hazard marking

	Provision for Vulnerable Road Users (VRU) • **Is adequate paved footpath, up and down kerb for pedestrians and cyclists provided?**	**55**	**58**	• **Missing pedestrian crossing near establishments.**
		61	63	
		70.3	71	
		73	76.15	• No footpath provided for pedestrians and street venders just near intersection.
Junction	• Does the layout of junction safe for road users and all types of vehicle movement?			
	Signs • Are important junctions provided with advance direction sign, distance information sign and intersection sign? • Is STOP/GIVE WAY sign provided? if provided, Does the sign obstruct view of minor road?	61	63	• STOP sign on access road (Umri Indri) not properly placed and not following standard guidelines.
		64.2	64.4	• No STOP/GIVE WAY sign boards provided on access road/ICBP pavement.
		67	70	
		70.3	71	
		73	76.15	
	Marking • Are zebra crossings provided? • Is positioning of STOP line appropriate?	64.2	64.4	• No road markings and speed hump without markings near junction.
		67	70	• No STOP line marking provided near intersection.
		70.3	71	
		73	76.15	
	Roundabout • Is geometry simple and easily understood? • Have provisions made for pedestrians to cross the arms of junction? • Does the signing make the priorities clear? • Is there visibility for entering and circulating traffic adequate?	59.5	61	• Simple geometry • No zebra crossings provided • No marking provided near roundabout • adequate visibility for entering and circulating • Broken informatorily sign

Traffic control devices	**Road signs** • **Are road signs adequate and in accordance to standard?** **Location and spacing** • **Any locations where signs are overused and close to each other** • **Any situation where road signs obstructs line of sight** • **Are signs (regulatory sign, information sign, warning signs) provided where necessary?** • **Overhead signs- size, message information adequate according to IRC standards**	**61**	**63**	• **Improper and broken hazard sign** • **Roadside construction in Ladwa city without placing any signs**
		63	64.2	• Destination signs covered by trees
		65.6	67	• Curve sign covered with trees
		70.2	70.3	• Informatory sign covered by posters and not giving sufficient information.
		73	76.15	• Road markings completely disappeared.
	Road markings • **Are road markings visible, clear and simple?** • **Does correct type and colour of markings been used?** • **Are directional arrows marked on pavement guiding the driver or creating confusion?** • **Any location of lack of hazard markings at approach end of culvert, bridge, median, island, etc.** • **Are retro reflective markers installed wherever necessary? if provided, Are they in good condition?** • **If chevron alignment markers are installed, have the correct types of markers been used**	**55**	**58**	• **Longitudinal marking completely missing.**
		61	63	• absence of median marking and missing longitudinal road markings just ahead of median end.
		72	73	• Road markings are completely missing
		73	76.15	• Dilapidated road marking and pedestrian crossing
		61	63	• Multi legged intersection with no road markings and signals

Figure1: Shoulder drop with water logging and pedestrians moving on road

Figure 2: Damaged retro reflector

Figure3: Construction activity along the road

Figure 4:Sight distance obstructed by trees

RECOMMENDATIONS

1. Road marking :-

- Set longitudinal road marking with broken yellow centre line and solid white line at edges with standard dimensions as per IRC:35-2015 guidelines.

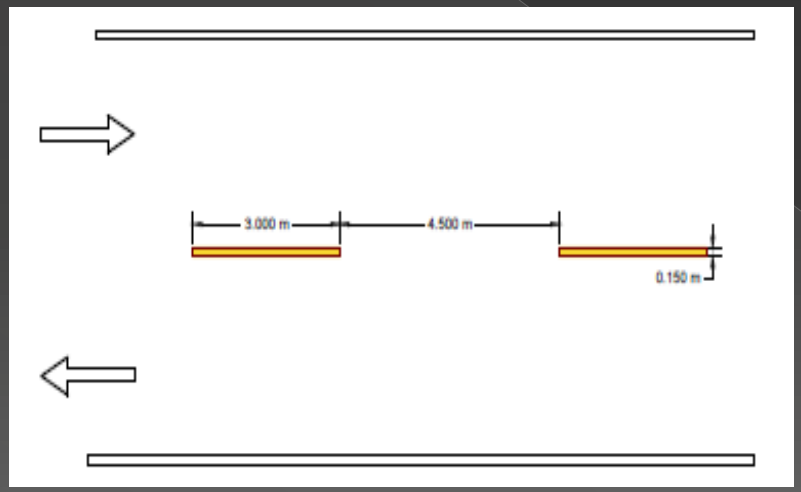


Figure: Standard practice of road marking for traffic going in opposite direction

- Give way line and STOP line supplemented by STOP sign should be placed where access road meeting State Highway. STOP sign should be placed where access road meets SH at 1.5 m advanced of STOP line such that it should not obstruct visibility along SH also access road should be provided with markings on speed breaker.

- As per IRC:67-2012, Standard sizes and dimensions for STOP sign on access road for different approach speed are given below:

Approach speed on minor road	Size	Height (mm)	Border (mm)	Font Size (mm)
Up to 50 kmph	Small	750	25	125
51 – 65 kmph	Normal	900	30	150
> 65 kmph	Large	1200	40	225

- At rotary intersection, kerb of central island and splitter islands should be painted with vertical black and yellow strips for visibility during night time, each 500 mm wide and pedestrian/cyclist crossing should be provided at each arm, double GIVE WAY line should be placed on approaching lanes.

- Central median and culvert should be marked with alternate vertical black and white strips of 500 mm width to improve visibility.

2. Road signs :-

- Informatory sign for fuel station should be fixed having symbol within rectangular board with blue background at a distance of 600 mm to 3 m from carriageway.
- The sign board should be erected in advance at a short distance ahead of the pedestrian crossing with supplementary plate indicating distance.
- Retro reflective signs should be provided at median for night time visibility.
- Speed limit sign should follow standard IRC guidelines. The speed limit signs should be placed where speed changes such as the vehicle travelling through a junction are reassured about speed limit on new road by placing speed limit sign board at 25 m from the intersection.

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- On roads without kerbs, route marker sign should be erected at a clear distance of 2 to 3 m from edge of carriageway.

Fig: Incorrect informatory sign

Fig: Standard practice of providing route marker sign

CONCLUSION

Road Safety Audit is an effective tool to identify deficiencies on the road. Audit is conducted on 21.150 km stretch of state highway 6, Kurukshetra, Haryana. After conducting Road Safety Audit it can be concluded that

- Questionnaire based checklist given in IRC:SP:88 can not be applied directly on actual site as it becomes difficult for practitioners to use
- In present study separate improved checklist is developed for existing stretch of road.

- Complete redesign of bus stop is required with provision of lay-by to avoid traffic congestion at the time of merging and diverging of bus also to safely pick and drop off passengers.
- Dilapidated and missing road markings on certain section needs to set as per standard dimensions given in IRC:35-2015.
- Retro reflectors need replacement, poor access to road side facilities such as petrol pump, rest areas can be improved by placing informatory signs ahead and markings near entry and exit.
- Road signs and sight line are obstructed by roadside trees which needs proper trimming and maintenance.
- Access roads are provided without any signs and markings with poor visibility from major road. On this stretch pedestrian crossing facilities, shoulders and warning signs at intersection are found to be inadequate.

- By implementing recommendations on this section of road, number of road accidents and their severity will minimize.
- Some good practices are seen while conducting audit such as placing pillars along the road indicating presence of speed hump.
- As the audit was conducted by videotaping method, unskilled person can perform it on site and the cost involved in experts going on actual site will reduce.

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THANK YOU