



RD SAFETY AUDIT PHASE I KEY ISSUES AND TAKE AWAYS

PROJECT BEACON: 15 DEC 21

BRO - Creates, Connects and Cares



- **Road Safety Audit**
- **Road Safety Council Meetings J&K**
- **Road Safety Audit : Project Beacon**
- **Composition of Audit Teams**
- **Key Takeaways**
- **Short Term and Long Term Measures**



WHAT IS ROAD SAFETY AUDIT ?



Road safety audit is “**a formal, systematic and detailed examination** of a road project by an independent and qualified team of auditors that leads to a report of the potential safety concerns in the project.”

- Para 2.4 of IRC:SP:88-2019



ROAD SAFETY AUDIT



Road Safety involves three components - **the human, the vehicle and the road**. International research shows that the road plays a crucial role in road crashes.

Aspects involved in Road Safety :-

- Geometric deficiencies.
- Inconsistent pavement markings.
- Missing (or wrong) road signs.
- Traffic signals not operational.
- Inadequate attention to needs of the vulnerable road users.

Purpose of this audit is to ensure that road users are exposed to minimal risks of accidents in both new roads and existing roads.

**GOOD ROADS ARE AN ASSET
AND
BAD ROADS A DEBT FOR THE NATION**



WHY SAFETY AUDIT ?



- To minimize the risk and severity of accidents on the roads.
- To meet the needs and perceptions of all type of road users during design stage itself.
- To ensure the workers safety during construction stage.
- To ensure the traffic management and safe working conditions.
- To ensure environmental safety of work zones and issues related to health of workers.
- To minimize the risk of accidents on the Highway and adjacent roads as a result of construction , operation and maintenance.
- To ensure safe operation of plants, machinery and equipment.



STAGES OF SAFETY AUDIT



- **Stage 1 - Audit during design and planning (Development Phase)**
 - **Collection of data for all the accidents**
 - **Identify the black spots**
 - **Carry out a design stage Road Safety audit**
- **Stage 2 – Audit during construction (Construction Phase)**
 - **Inspect the road considering const plg parameters**
 - **Carry out the Safety Audit once in a Quarter**
 - **Collect accident data (monthly)**
 - **Conduct Work Zone Safety Audit**
- **Stage 3 – Audit after the completion of the project (O & M Phase)**



ROAD SAFETY COUNCIL : J&K



ROAD SAFETY COUNCIL



- **Composition** : **Chaired by Advisor to Hon'ble LG J&K (UT)**
- **Member** : **Secretaries of State Govt Dept and all stake holders including (NHAI, NHIDCL, PWD (R&B) etc) (25 stakeholders)**
- **No of meeting held** : **07**
- **Frequency of meetings** : **Yearly**
- **Agenda points** : **State Road Safety Policy and preparation of action plan**
Implementation of Road Accident Data Mgmt System
Road Safety Audit of all roads
Black spots identification and rectification
Fixing of road signages
Erection of crash barriers
Maintenance of Distracted /Old Bridge



ROAD SAFETY COUNCIL



- 07th meeting of Road Safety Council held under the Chairmanship of Advisor (B) to Hon'ble Lieutenant Governor (UT of J&K) on 03 Aug 2021 at Secretariat Srinagar, wherein the Chairman has appreciated the efforts of Project Beacon in the implementation of the agenda points of 06th meeting of Road Safety Council held on 17 Oct 2019.

GOVERNMENT OF JAMMU AND KASHMIR
Secretariat of Road Safety Council, J&K, Jammu
(In the office of Transport Commissioner, J&K, Railhead, Jammu)
Email:-ssrcjk2015@gmail.com

Regional Officer,
NHAI, J&K Jammu
Chief Engineer,
Project Sampark
Chief Engineer,
Project Beacon
Chief Engineer,
PW(R&B), Jammu/ Kashmir
Chief Engineer,
PMGSY, Jammu/Kashmir
Chief Engineer,
Mughal Road.
Executive Director,
NHIDCL, RD-Jammu

No:- TC/J&K/SRSC/15/2020/1399-1409 Dated: 20-08-2021

Subject:- Submission of Action Taken Report on the decisions taken in the 7th Road Safety Council meeting held under the Chairmanship of Advisor (B) to Hon'ble Lieutenant Governor on 03-08-2021 at Civil, Secretariat, Srinagar.

Sir,

I am directed to refer minutes of 7th Road Safety Council meeting issued vide No. TC/J&K/SRSC/15/2021/1020-1102 dated 09-08-2021 and request you to kindly submit the Action Taken Report to this office with regard to following points:-

S.No.	Issue	Decision of 7th RSC
1.	Road Safety Audit of all existing roads.	The Chairman has desired to seek action report from the concerned agencies on the audit reports viz-a viz repair/renovation of black spots. Moreover, the Chairman has taken a serious view for absence of the representative of the NHAI and directed that a detailed meeting may be convened within 15 days with the NHAI.
2.	Fixing of Road Signages, Speed Limit and others traffic calming measures.	The Chairman expressed his views that the concerned agencies should give in detail the actual requirement of the signages required in particular stretches and also ascribe about the actual number of signages installed.
3.	Black Spots identification and remedial measures thereof and also furnishing details of black spots rectified thereof.	The Chairman directed that the issue may be expedited by rectifying all the black spots by the concerned agencies. All the stakeholders involved in rectification of black spots/installation of signages should associate Traffic Police in the matter to see such rectification/installation serve any purpose or not.

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4.	Erection of Crash Barriers on the National Highway and other major roads.	While reviewing the progress in this matter, the Chairman appreciated the efforts by BRO, Beacon. However, he expressed his concern about the progress by NHAI, NHIDCL/PWD and directed for its early implementation. The Chairman advised that the target and achievement in installation of crash barrier (in Km) may be fixed and the data be submitted in one month so that progress is monitored effectively.
5.	Identification of State Highways.	The concerned Public Works Department should present the matter promptly for declaration of State Highways and other roads which have been identified by them.
6.	Preparation of calendar for training of adequate number of Engineers	The Chairman directed concerned Department for early completion of training program of its engineers.

Yours faithfully,

(Paramvir Singh) JKS
Additional Secretary (Technical)
Secretariat of Road Safety Council, J&K
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Copy to the:-

- OSD to Advisor (B) for kind information of Advisor (B) to Hon'ble Lieutenant Governor.
- Private Secretary to Commissioner Secretary to Government, Transport Department for kind information of Commissioner Secretary.
- Private Secretary to Transport Commissioner, J&K (Member Secretary, Road Safety Council) for information of Transport Commissioner.



**AGENDA POINTS FOR 7TH ROAD SAFETY COUNCIL MEETING HELD UNDER THE
CHAIRMANSHIP OF ADVISOR TO HON'BLE LIEUTINENT GOVERNOR ON 03 AUG 2021**



<u>S No</u>	<u>Agenda Point Ref No.</u>	<u>Description</u>	<u>Action Taken</u>
1	12	Road Safety Audit of all existing roads.	<ul style="list-style-type: none">• Road Safety Audit for the year 2020-21 for all roads under project Beacon has been carried out by Technical Board of Officers. Action in hand to implement the recommendations of TBOO.
2	13	Fixing of Road Signages, Speed limit and others traffic calming measures	<ul style="list-style-type: none">• Project Beacon has installed Signages and rd furniture at 731 spots.
3	14	Black spots identification and remedial measures thereof and also furnishing details of Black spots rectified thereof.	<ul style="list-style-type: none">• Out of 42 identified Black spots, 39 Black spots have been rectified. 03 Nos are under Progress.• Additional 10 Nos Black spots have been identified, out of which 03 Nos rectified and works for rectification of 07 Nos under progress.
4	15	Erection of Crash Barriers on the National Highway and other major roads.	<ul style="list-style-type: none">• Project Beacon has installed <u>22,209</u> Mtrs Crash Barriers at 20 Spots.
5	20	Implementation of Ribbon development Act.	<ul style="list-style-type: none">• Various Joint visits with Administration have been carried out on various rds in AOR of Project Beacon.



ROAD SAFETY AUDIT : PROJECT BEACON





DIRECTIONS OF HQ DGBR



- **Identify black spots & accident prone areas.**
- **Recommend / undertake measures to minimize effect on accidents**
 - **Short Term Measures with cost & plan of completion**
 - **Long Term Measures with cost & plan of completion**
- **Timelines for RSA**
 - **Receipts of Instrs – 10 Sep 20221**
 - **Earmarking of RSA Teams – by 12 Sep 2021**
 - **Commencement of RSA – 13 Sep 2021**
 - **Completion of RSA – 10 Oct 2021**
 - **Prep of RSA Report – 15 Oct 2021**
 - **Submission of RSA Report – 20 Oct 2021**



TIME SCHEDULE



<u>Activity</u>	<u>Date</u>	<u>Remarks</u>
Road Safety Seminar	06 Sep 2021	
Issue of Instrs from HQ DGBR	10 Sep 2021	
Convening Order issued	14 Sep 2021	03 teams TF wise with 2IC TF as Team Leader
Commencement of Road Safety Audit	16 Sep 2021	After initial Briefing and deliberation
Site visits and collection of data incl photographic record	17 Sep to 30 Sep 2021	36 Roads in AOR of Proj Beacon covered (1181.76 Km)
Data evaluation and analysis	01 Oct to 04 Oct 2021	TF level
Compilation of final report	05 Oct to 06 Oct 2021	Proj Beacon
Submission of report to HQ DGBR	07 Oct 2021	



COMPOSITION OF AUDIT TEAMS



TEAM 1

PO

- **Shri A K Dutta, EE (Civ)**
2IC 32 BRTF

Members

- 1 **Shri D S Tiwari, AEE (Civ)**
109 RCC
- 2 **Shri A K Pan, JE (Civ)**
56 RCC
- 3 **Shri Neeraj Sah, JE (Civ)**
122 RCC



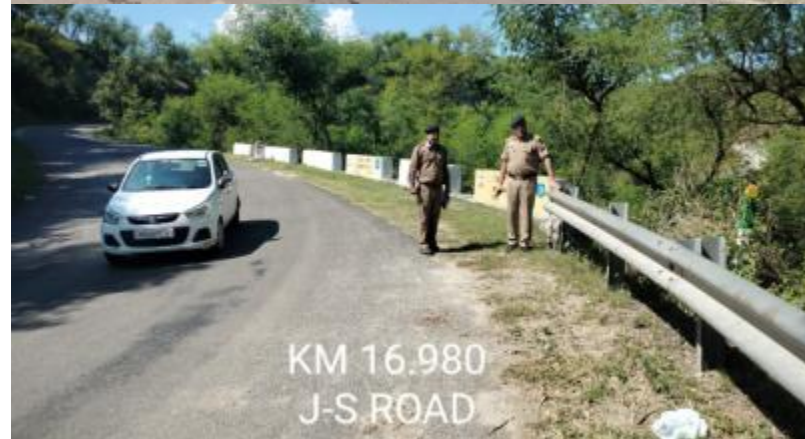
TEAM 2

PO

- **Shri Ajit Kumar, EE (Civ)**
2IC 760 BRTF

Members

- 1 **Shri Shashikant Kumar, AEE(Civ)**
53 RCC
- 2 **Shri Md Yauqub Kumar, JE (Civ)**
99 RCC



TEAM 3

PO

- **Shri Jagdish Chandra, EE (Civ)**
2IC 35 BRTF

Members

- 1 **Shri Avinash Kumar, AEE (Civ)**
52 RCC
- 2 **Shri Ajay Kumar, JE (Civ)**
118 RCC
- 3 **Shri Vishal Sharma, JE (Civ)**
114 RCC





TERMS OF REFERENCE OF BOO



- **RSA to be conducted as per HQ DGBR letter dated 10 Sep 2021.**
- **Status of rectifications of black spots in AoR as advised by State Govt Agencies from time to time.**
- **Status of compliance of Agenda Points of 06th meeting of Road Safety Council held on 17 Oct 2019.**
- **Specifically identify hotspots and accident prone areas.**
- **Recommend/ undertake measures to minimize accidents.**



DETAILS OF ROADS AUDITED : TEAM 1 (32 BRTF)



No of Roads - 09

Details (From 17 Sep to 30 Sep 2021)

- **Srinagar - Sonamarg – Gumri** - 84.32 Km
- **Bandipur - Gureiz** - 81.76 Km
- **Dawar – Kaobul Gali** - 73.40 Km
- **Baramulla- Chowkibal** - 40.20 Km
- **Chowkibal –Tangdhar – Chamkot** - 57.67 Km
- **Melyal – Pharkiyen – Datt Br** - 35.60 Km
- **Hazibal – Z Gali – Machhal** - 33.93 Km
- **Kupwara – Kalaroos** - 11.00 Km
- **Kalaroos – Sarkuli** - 4.69 Km

Total - 422.57 Km



DETAILS OF ROADS AUDITED : TEAM 1 (32 BRTF)



Barmulla-Kupwara-Chowkibal Rd



Chowkibal-Tangdhar -Chamkot Rd



Malyal-Pharkiyar-Datt Br Rd



Srinagar-Sonamarg-Gumri Rd



Hazibal-Z Gali-Machhal Rd



Kupwara-Kalaroos Road



DETAILS OF ROADS AUDITED – TEAM 2 (35 BRTF)



No of Roads - 14

Details (From 17 Sep to 30 Sep 2021)

■ Ramban – Gul	- 53.00 Km
■ Jammu – Srinagar	- 26.06 Km
■ Dhar – Udampur	- 33.00 Km
■ Patnitop – Natha Top	- 15.57 Km
■ Nashri Bypass	- 18.00 Km
■ Kishtwar – Dul	- 15.61 Km
■ Dul – Galhar	- 16.65 Km
■ Galhar – Sansari	- 39.60 Km
■ Baderwah – Bani – Basoli	- 76.85 Km
■ Atalgarg- Kapra	- 7.60 Km
■ Kapra – Bhalra – Chinta	- 10.45 Km
■ Chinta – Jaighati	- 9.80 Km
■ Drudu – Bhalra	- 7.97 Km
■ Banot – Naska	- 2.25 Km
<u>Total</u>	<u>- 362.73 Km</u>



DETAILS OF ROADS AUDITED – TEAM 2 (35 BRTF)



Jammu - Srinagar Road



Ramban - Gul Road



Dul - Galhar Road



Galhar – Sansari Road



Baderwah-Bani-Basoli Rd



Kapra - Chinta Road



DETAILS OF ROADS AUDITED- TEAM 3 (760 BRTF)



No of Roads - 13

Details (From 17 Sep to 30 Sep 2021)

▪ Srinagar – Baramulla – Uri	- 94.00 Km
▪ Banihal Old Alignment	- 40.20 Km
▪ Baramulla – Chowkibal	- 30.00 Km
▪ TMG – Kaiyan Bowl	- 13.50 Km
▪ Handwara – Naugam	- 15.66 Km
▪ Jammu – Srinagar	- 7.14 Km
▪ Kastwar- Nildori – Bangus – Drangyari	- 32.62 Km
▪ Naugam – Radha – TMG	- 34.08 Km
▪ Mohra – Baaz	- 79.27 Km
▪ NS Br – Rustam – UK	- 25.10 Km
▪ Red Br – Dherian – Kathi	- 27.69 Km
▪ Uri - Salamabad – Kaman Post	- 17.25 Km
▪ Uri - Santra – Mike	- 19.95 Km
<u>Total</u>	<u>- 396.46 Km</u>



DETAILS OF ROADS AUDITED- TEAM 3 (760 BRTF)



Jammu - Srinagar Road



Srinagar – Baramulla - Uri Rd



Banihal Old Alignment



Mohra - Baaz Road



Uri – Salamabad – Kaman Poast Rd



TMG – Kaiyan Bowl Road



PARAMETERS CHECKED BY THE TEAM



➤ **Visibility : Sight Distances.**

➤ **Road Width.**

➤ **Design Speed.**

➤ **Shoulders.**

➤ **Cross Falls.**

➤ **Drains.**

➤ **Signs and Markings.**

➤ **Turning Traffic.**

➤ **Intersection.**

➤ **Control and Delineation.**

➤ **General Sign Issues.**

➤ **Sign legality.**

➤ **Marking and Delineation.**

➤ **Centre Lines, Edge Lines and Lane Lines.**

➤ **Guide Post and Reflectors.**

➤ **Curve warning and delineation.**

➤ **Crash Barriers.**

➤ **End Treatments.**

➤ **Public Transports.**

➤ **Pavements.**

➤ **Flood Ways and Cause Ways.**



SAMPLE DATA SHEET: PARAMETERS



	A	B	C	D	E
1	Road Safety Audit Details Baramulla-Kupwara-Chowkibal Road				
2	Name of Project : Beacon				
3	Name of Task Force : HQ 32 BRTF				
4	Name of RCC : 109 RCC (GREF)				
5	Name of Road : Baramulla-Kupwara-Chowkibal Road				
6	The road Baramulla-Kupwara-Chowkibal is the main vital lifeline of communication to Tangdhar valley. This road was taken over from State PWD on 13 Sep 1995. Presently road conforms to NHDL specification.				
7	S.No	Issue	Location	Comments	Recommendation
8	Visibility: Sight Distances				
9	1	Inadequate Sight Distances noticed	(1) km 45.350	Sharp horizontal and steep gradient	(1)Formation cut on hill side and curve regrading
10			(2) km 66.550	Sharp horizontal curve and due to dense vegetation on valley side	(1) Vegetation clearance
11	2	Inadequate Sight Distances at intersection	Found Adequate	-	-
12	3	Inadequate Sight Distance at end auxiliary lane	Found Adequate	-	-
13	Design Speed				
14	4	horizontal and vertical alignment not found suitable for design traffic speed.	(1) KM 36.950	Black Spot due to sharp horizontal curve	(1) Speed Limit Sign Board
15			(2) km 45.350	Sharp horizontal curve and steep	(1)Formation cut on hill side and regrading
16			(3) km 54.500	Sharp Horizontal curve	(1) Speed Limit Sign Board
17			(4) km 56.300	Encroachment under ROW	(1) Removal of illegal construction
18			(5) km 62.350	Encroachment under ROW	(1) Removal of illegal construction
19	5	Warning signs for traffic speed	(1) KM 31.700	Black Spot due to populated area	(1) Speed Limit Sign Board
20			(2) KM 33.900	Black Spot due to populated area	(1) Speed Limit Sign Board
21			(3) KM 36.950	Black Spot due to sharp curve	(1) Speed Limit Sign Board
22			(4) KM 42.100	Black Spot due to populated area	(1) Speed Limit Sign Board
23			(5) KM 42.250	Black Spot due to hospital	(1) Speed Limit Sign Board
24			(6) KM 42.300	Black Spot due to hospital	(1) Speed Limit Sign Board
25			(7) km 45.350	3	(1) Speed Limit Sign Board
26			(8) km 54.500	Sharp Horizontal curve	(1) Speed Limit Sign Board
27			(9) km 56.300	Sharp Horizontal curve	(1) Speed Limit Sign Board
28			(10) km 62.350	Sharp Horizontal curve	(1) Speed Limit Sign Board
29	6	Advisory speed signs	(1) KM 31.700	Black Spot due to populated area	(1) Population Ahead sign board



SAMPLE DATA SHEET: PARAMETERS



	A	B	C	D	E
29	6	Advisory speed signs	(1) KM 31.700	Black Spot due to populated area	(1) Population Ahead sign board
30			(2) KM 33.900	Black Spot due to populated area	(1) Population Ahead sign board
31			(3) KM 36.950	Black Spot due to sharp curve	(1) Population Ahead sign board
32			(4) KM 42.100	Black Spot due to populated area	(1) Population Ahead sign board
33			(5) KM 42.250	Black Spot due to hospital	(1) Hopital sign board
34			(6) KM 42.300	Black Spot due to hospital	(1) Hopital sign board
35			(7) km 45.350	Sharp Horizontal curve	(1) Turn Sign Board
36			(8) km 54.500	Sharp Horizontal curve	(1) Turn Sign Board
37			(9) km 56.300	Sharp Horizontal curve	(1) Turn Sign Board
38			(10) km 62.350	Sharp Horizontal curve	(1) Turn Sign Board
39			(11) km 66.150	Sharp Horizontal curve	(1) Turn Sign Board
40	Width				
41	7	Traffic lane and carriageway width not found	Found Adequate		
42	8	RCC Culver/Bridge width not found adequate	Found Adequate		
43	Shoulders				
44	9	Shoulders not wide enough as per IRC SP 48	(1) km 62.800	Inadequate shoulder	(1) Shoulder filling
45			(2) km 66.700	Inadequate shoulder	(1) R/w all (2) Shoulder Filling
46	10	Berm filling not filled with suitable material			
47	Crossfalls				
48	11	No appropriate superelevation provided on curves.	Found Adequate		
49	12	No adequate drainage provided at crossfall locations (carriageway and shoulders)	Found Adequate		
50	Drains				
51	13	Inadequate Roadside drain noticed	Found Adequate		
52	Signs and Markings				
53	14	Signs have not been installed in accordance with the appropriate guidelines	Found Adequate		
54	15	Road marking not conform with the guidelines	Found Adequate		
55	16	Advance warnig of approaching auxiliary lane not provided	Found Adequate		
56	Turning Traffic				
57	17	Have right turns from the thorough lanes been avoided?	Found Adequate		
58	18	Advance warning of turn lanes not fixed	(1) km 45.350	Sharp Horizontal curve	(1) Turn Sign Board



DETAILS OF BLACKSPOT BETWEEN KM 11.975 TO 12.045 ON KISHTWAR-DUL ROAD



PROPOSAL

- Fmn cutting in SMB 70 Mtr length
- B/Wall 56 Mtr rx 3.50 Mtr in PCC 1 :3:6
- B/Wall 16 Mtr rx 3.00 Mtr in PCC 1 :3:6
- Covered drain 70 Mtr
- Chevron sign board 20 Nos
- Road marking 70 Mtr
- Fixing of Crash barrier 70 Mtr
- Surfacing Wks for 70 mtr

DETAILS OF BLACK SPOT

- Sharp curve
- Sight distance less due to blind curve



DETAILS OF BLACK SPOT AT KM 0.720 ON DUL - GALHAR ROAD



DETAILS OF BLACK SPOT

- Sharp curve
- Sight distance less due to blind curve

PROPOSAL

- Fmn cutting in HR 70 Mtr length
- Lined drain 70 Mtr
- Road marking 70 mtr
- Surfacing Wks for 70 mtr



DETAILS OF BLACK SPOT AT KM 2.900 ON DUL - GALHAR ROAD



DETAILS OF BLACK SPOT

- Sharp curve
- Sight distance less due to blind curve

PROPOSAL

- Fmn cutting in SMB 40 Mtr length
- B/Wall 40 Mtr x 4.00 Mtr (PCC 1: 3: 6)
- Lined drain 40 Mtr
- Chevron sign board 20 Nos
- Road marking 40 Mtr
- Fixing of Crash barrier 40 Mtr
- Surfacing Wks for 40 mtr



BLACK SPOT AT KM 11.800 ON DUL - GALHAR ROAD



DETAILS OF BLACK SPOT

- Inadequate overhead clearance
- Sight distance less due to overhanging rock portion

PROPOSAL

- Fmn cutting in HR 15 Mtr length
- Lined drain 15 Mtr
- Road marking 15 Mtr
- Surfacing Wks for 15 mtr



BLACK SPOT AT KM 1.950 ON GALHAR-SANSARI ROAD



DETAILS OF BLACK SPOT

- Crash barrier not provisioned

PROPOSAL

- Fixing of Crash barrier 50.00 Mtr



DETAILS OF BLACK SPOT AT KM 97.685 BBB ROAD



DETAILS OF BLACK SPOT

- Stone boulder in fmn width

PROPOSAL

- Cutting of stone boulder by blasting



DETAILS OF BLACK SPOT AT KM 22.650 HZM ROAD



DETAILS OF BLACK SPOT

- Sight distance less due to blind curve

PROPOSAL

- Fmn Cutting required



DETAILS OF BLACK SPOT AT KM 35.30 MPD ROAD



DETAILS OF BLACK SPOT

- Turning Radius not achieved

PROPOSAL

- Fmn Cutting reqd for grade compensation



KEY TAKEAWAYS & RECOMMENDATIONS





KEY TAKEAWAYS



<u>Issues emerged during RSA</u>	<u>Recommendation</u>	<u>IRC Code</u>
Safety Measures for Hair Pin Bends on Hill Roads	<ul style="list-style-type: none">▪ Speed limit signs▪ Centre line marking▪ Rumble strips▪ Convex mirrors▪ Crash barriers	IRC:99:2018 "Guidelines for Traffic Calming Measures in Urban and Rural Areas"
Traffic signs not uniform	<ul style="list-style-type: none">▪ Provide standard traffic signs as per colour and sizes given in IRC code	IRC:67:2012 "Code of Practice for Road Signs"
Use of Chevron signs to inform the drivers about sharpness of curve	<ul style="list-style-type: none">▪ Depending on sharpness of curve single, double and triple chevron sign to be used	IRC:67:2012 "Code of Practice for Road Signs"
Improvement of Junctions/ Intersections	<ul style="list-style-type: none">▪ Different kinds of prohibitory signs to be installed	IRC:67:2012 "Code Of Practice For Road Sign"



KEY TAKEAWAYS



<u>Issues emerged during RSA</u>	<u>Recommendation</u>	<u>IRC Code</u>
Steep road gradient in hill section	<ul style="list-style-type: none">▪ Provide adequate delineation using Chevron Signs, Delineator Posts as well as Centre Line, Edge Line and Advanced Warning Signs▪ Install Suitable Safety Barriers	IRC:SP:88:2019.
No concept of End Treatment for Steel Edge Barriers (Crash Barrier) .	<ul style="list-style-type: none">▪ End treatment should not spear, vault or roll a vehicle for head on angled impact	IRC:119:2015 Guidelines for Traffic Safety Barriers.
Inadequate sign boards and road markings	<ul style="list-style-type: none">▪ Sign boards, delineators and road markings, slogan boards motivating road users towards safety should be installed at frequent intervals	



SHORT TERM MEASURES



- Crash Barriers
- Retaining Walls
- Road Furniture
- Berm Filling
- Thermoplastic Paint
- Road Sign Boards
- Bus Stops in Built Up Areas
- Warning Signs



LONG TERM MEASURES



- **Removal of encroachments**
- **Improvement of Curves by Fmn Cutting**
- **Rectification of super elevation by laying DBM/ BC**
- **Surfacing work**
- **Rehabilitation of Road Stretches**
- **Lined Drains**
- **Addl PMT works**
- **Grade compensation of Curves**
- **Avalanche protection works (like snow gallery)**
- **Short Tunnels**



JAIHIND