

REPORT NO.

354



सत्यमेव जयते

PARLIAMENT OF INDIA
RAJYA SABHA

**DEPARTMENT-RELATED PARLIAMENTARY STANDING COMMITTEE
ON TRANSPORT, TOURISM AND CULTURE**

THREE HUNDRED FIFTY FOURTH REPORT

‘Construction of Road-Over-Bridges (ROBs), Road-Under-Bridges (RUBs), Service Roads and Review of Road Survey Guidelines etc.’

(Presented to the Rajya Sabha on 10th August, 2023)
(Laid on the Table of Lok Sabha on 10th August, 2023)



Rajya Sabha Secretariat, New Delhi
August, 2023 / Sravana, 1945 (Saka)

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RAJYA SABHA SECRETARIAT
NEW DELHI

August, 2023 / Sravana, 1945 (Saka)

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*To be appended

COMPOSITION OF THE COMMITTEE
(2022-23)
(Constituted on 13th September, 2022)

1. **Shri V. Vijayasai Reddy** - Chairman

Rajya Sabha

2. Shri Mohammed Nadimul Haque
3. Shrimati S. Phangnon Konyak
4. Shri Jugalsinh Lokhandwala
5. Shri Manas Ranjan Mangaraj
6. Dr. Sonal Mansingh
7. Shrimati Rajani Ashokrao Patil
8. Shri A. A. Rahim
9. Dr. C. M. Ramesh
10. (vacant)*

Lok Sabha

11. Shri Anto Antony
12. Shri Ram Margani Bharat
13. Shri Tapir Gao
14. Shri Rahul Kaswan
15. Shri Ramesh Chandra Majhi
16. Shri Sunil Baburao Mendhe
17. Shri K. Muraleedharan
18. Shri S. S.Palanimanickam
19. Shri Chhedi Paswan
20. Shri Kamlesh Paswan
21. Shri Sunil Kumar Pintu
22. Shri Prince Raj
23. Shri Tirath Singh Rawat
24. Shrimati Mala Roy
25. Shri Rajiv Pratap Rudy
26. Shri Dushyant Singh
27. Shri Rajbahadur Singh
28. Shri Ramdas Chandrabhanji Tadas
29. Shri Manoj Kumar Tiwari
30. Shri Krupal Balaji Tumane
31. Shri Dinesh Lal Yadav "Nirahua"

SECRETARIAT

Shri Raghav Prasad Dash, Joint Secretary
Shrimati Monica Baa, Additional Director
Shrimati Subha Chandrashekar, Deputy Secretary
Shri Ranajit Chakraborty, Under Secretary
Shri Raj Kamal Singh, Assistant Committee Officer

*Vacancy caused due to retirement of Shri Vinay Dinu Tendulkar w.e.f. 28.07.2023

INTRODUCTION

I, the Chairman, Department-related Parliamentary Standing Committee on Transport, Tourism and Culture, having been authorized by the Committee to present on its behalf, do hereby present this Three Hundred Fifty-Fourth Report on 'Construction of Road-Over-Bridges (ROBs), Road-Under-Bridges (RUBs), Service Roads and Review of Road Survey Guidelines etc.'

2. The Committee heard the views of the representatives of the Ministry of Road Transport & Highways, on the subject, on 25th April, 2023. The Committee also heard the views of the representatives of Bridges and Structure Directorate of Research Designs & Standards Organisation (RDSO), Ministry of Railways; and Indian Roads Congress (IRC), in its meeting held on 16th May, 2023. Further, the Committee heard the views of Save Life Foundation, NGO; TRAX, NGO; and Central Road Research Institute (CRRI), on the subject, on 15th June, 2023. The Committee also took up the issue during its Study Visit to Goa on 7th July, 2023 and held discussions with the Ministry of Road Transport & Highways; National Highways Authority of India; and State Government of Goa.

3. The Committee wishes to express its thanks to the officers of the Ministry of Road Transport & Highways; National Highways Authority of India; Bridges and Structure Directorate of Research Designs & Standards Organisation, Ministry of Railways; State Government of Goa; Indian Roads Congress; Save Life Foundation; TRAX; and Central Road Research Institute, for placing before the Committee, the material and information desired in connection with the subject and for clarifying the points raised by the Members.

4. The Committee considered and adopted the Report in its meeting held on the 9th August, 2023.

NEW DELHI;
August 9, 2023
Sravana 18, 1945 (Saka)

(V. Vijayasai Reddy)
Chairman,
Department-related Parliamentary Standing
Committee on Transport, Tourism and Culture,
Rajya Sabha

ACRONYMS

AE	Authority's Engineer
AMC	Ahmedabad Municipal Corporation
BG	Broad Gauge
CAG	Comptroller and Auditor General
CCEA	Cabinet Committee on Economic Affairs
CFRP	Carbon Fiber Reinforced Polymer
CMVR	Central Motor Vehicles Rules
CNC	Computer Numerical Control
COD	Commercial Operation Date
CRIF	Central Road and Infrastructure Fund
CRR	Central Road Research Institute
CRR	Central Road Research Institute
CSIR	Council of Scientific and Industrial Research
DLP	Defect Liability Period
FOB	Foot Over Bridge
FRCM	Fortnightly Regional Coordination Meeting
FRPs	Fiber-Reinforced Polymers
FWD	Falling Weight Deflectometer
GAD	General Arrangement Drawing
GAD	General Arrangement Drawing
GFRP	Glass Fiber Reinforced Polymer
GIS	Geographic Information Systems
GPR	Ground Penetrating Radar
IE	Independent Engineer
IIT/NIT	Indian Institutes of Technology / National Institutes of Technology
IITs	Indian Institutes of Technology
IR	Indian Railways
IRC	Indian Roads Congress
ITS	Intelligent Transportation Systems
ITS	Intelligent Transportation Systems
LA	Land Acquisition
LiDAR	Light Detection and Ranging
MBIU	Mobile Bridge Inspection Unit
MIS	Management Information System
MLA	Member of Legislative Assembly
MLCs	Manned Level Crossings
MoEF&CC	Ministry of Environment, Forest and Climate Change
MoRTH	Ministry of Road Transport and Highways
MoU	Memorandum of Understanding
MP	Member of Parliament
MUTCD	Manual on Uniform Traffic Control Devices
MVAA	Motor Vehicles (Amendment) Act

NATPAC	National Transportation Planning and Research Centre
NDT	Non-Destructive Testing
NG	Narrow Gauge
NGO	Non Governmental Organisation
NHAI	National Highways Authority of India
NHDP	National Highways Development Project
NHIDCL	National Highways and Infrastructure Development Corporation Limited
NHs	National Highways
NITs	National Institutes of Technology
NSV	Network Survey Vehicle
PMIS	Program Management Information System
PPP	Public-Private Partnership
PRAGATI	Pro-Active Governance and Timely Implementation
PWDs	Public Works Departments
R&D	Research and Development
R&R	Resettlement and Rehabilitation
RAMS	Road Asset Management System
RDSO	Research Designs and Standards Organization
ROBs	Road Over Bridges
RUBs	Road under Bridges
SHM	Structural Health Monitoring
SHM	Structural Health Monitoring
SuDS	Sustainable Drainage Systems
TVU	Train Vehicle Unit
UMLCs	Unmanned Level Crossings

Report

Road infrastructure remains at the heart of a country's transportation system. It plays a pivotal role in connecting people, facilitating trade and driving economic growth. It forms the backbone of transportation networks, providing essential links between cities, towns, rural areas, and various economic centres. Good road infrastructure ensures faster connectivity and easy mobility. Reliable road networks reduce travel time, enhance accessibility, and open up new growth opportunities for individuals and communities.

2. Additionally, road infrastructure plays a crucial role in public safety and emergency response. Well-designed and well-maintained roads ensure smooth and safe transportation, reducing the risk of accidents and improving overall road safety. They enable timely access to emergency services, such as ambulances, fire trucks, and law enforcement, potentially saving lives and minimizing damage during critical situations.

3. Road Over Bridges (ROBs), Road under Bridges (RUBs) and service roads are key components of any road network. Ambitious expansion of road network in the country requires the construction of ROBs/RUBs on a large scale. ROB and RUB are constructed for hassle-free movement of road and rail traffic in addition to improving safety at level crossings. The Government has also embarked on a mission to eliminate manned level crossings to improve mobility and safety in rail and road operations. Cost-effective construction of ROBs and their timely completion across the rail and road network have assumed enormous importance. Meticulous planning, adoption of state-of-the-art design and bridge engineering can help achieve the objective of safe and hassle-free mobility.

4. Cognizant of these facts, the Committee decided to take up the subject 'Construction of Road-over Bridges (ROBs), Road-under Bridges (RUBs), Service Roads and Review of Road Survey Guidelines, etc'. The Ministry of Road, Transport and Highways, its attached office of the National Highways Authorities of India (NHAI) and Ministry of Railways are the nodal organizations concerned with the construction and management of ROBs, RUBs and service roads. During the course of examination, the Committee heard the Ministries of Road, Transport and Highways; NHAI; Railways; Bridges Directorate and Bridges & Structure Directorate of Research, Development & Standards Organization (RDSO); Indian Roads Congress (IRC); Central Road Research Institute (CRRI); NGOs, namely, TRAX Society and SaveLIFE Foundation in its meetings held on 25th April, 2023, 16th May, 2023 and 15th June, 2023, respectively. The

Committee also discussed the subject with the representatives of the Ministry of Road Transport and Highways; NHAI; and the State Government of Goa during its Study Visit to Goa on 7th July, 2023.

Construction of ROBs, RUBs and Service roads

Guidelines for construction of ROBs/RUBs

5. The Ministry of Road Transport and Highways informed that other than the usual considerations/requirements involved in any civil engineering project, such as preparation of Detailed Project Report, administrative approval, procurement of contractor, construction, quality assurance & quality control, etc., ROBs and RUBs have several special requirements as detailed below:

6. The Ministry of Road Transport and Highways seeks approval of General Arrangement Drawing (GAD) from the Ministry of Railways which gives an overall view of the ROB as it will appear once constructed. GAD approval process is secured through a portal of Railways called "Rail-Road Crossing GAD Approval System (RORACS)". There are several step-by-step actions by both officials of implementing agencies of MoRTH and the Ministry of Railways, starting from uploading of the proposal, joint site visit, preparation and approval of the conceptual plan and final preparation of GAD and its approval by Chief Bridge Engineer of Railways. The entire exercise gets completed in 70 days time period. After the portal was revamped in 2021, there has been considerable improvement in the approval process of GADs.

7. The Railways normally require piers to be located outside railways Right of Way (RoW). Provision is kept for future tracks and other installations. This results in long-span structures. As far as possible, standard spans as per RDSO design are adopted for spans above railway tracks. In case the site conditions warrant the use of girders other than RDSO's standard drawings, reasons for doing so are recorded for approval of the Chief Bridge Engineer. The design of nonstandard spans requires approval by the RDSO. Various strategies are adopted to minimize skew angle as far as possible. Detailed design of ROB/RUB, including drawings prepared by contractor, is proof checked by IIT/NIT before its approval by the Chief Bridge Engineer of Railways. Fabrication of steel girders requires to be done by an approved vendor of RDSO after due approval from the Railways.

The Quality Assurance Plan (QAP) and Welding Procedure Specification Sheet (WPSS) prepared by the authorised vendor are approved by the Railways before fabrication of steel girders. The raw materials procured by the contractor at the fabrication yard/workshop of the approved vendor are inspected and approved by the Railways officials before the commencement of the fabrication of steel girders.

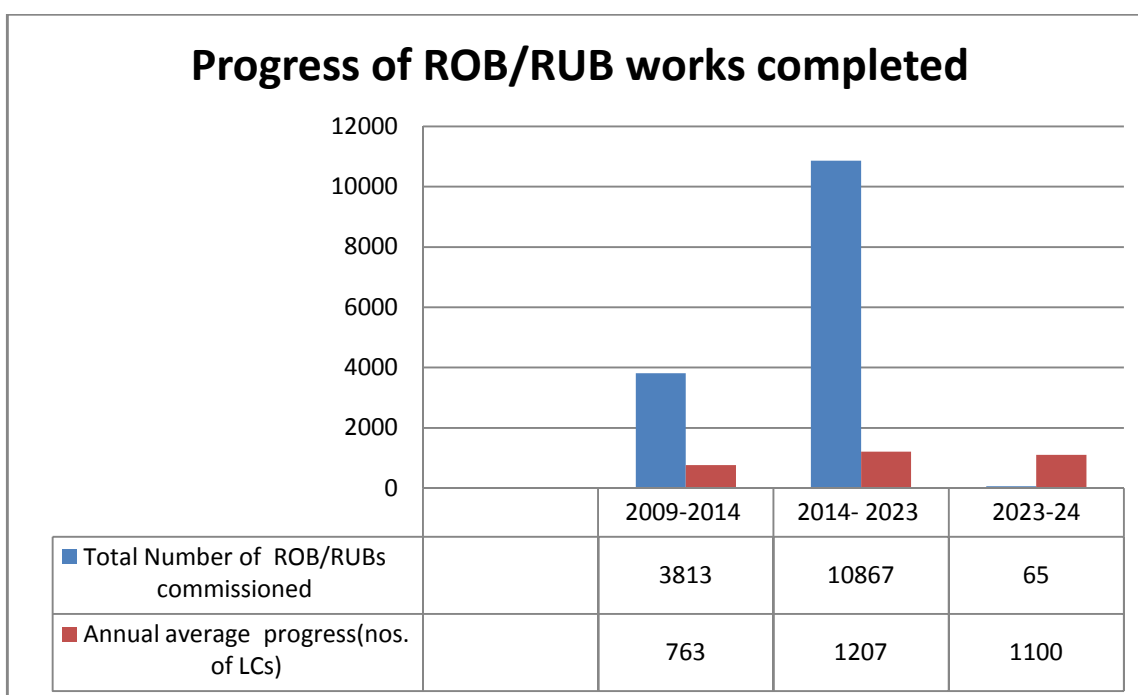
8. Master plate prepared by the vendor has to be approved by the Railways officials in advance.

The calibration of Computer Numerical Control (CNC) machine is also approved by the Railways officials. Approval of welder qualification from the Railways is also required before the commencement of fabrication. The Railways officials undertake inspection of fabrication at the vendor fabrication yard/workshop to ensure process quality as per QAP & WPSS. It includes two major inspections, i.e. dimension check and post-welding inspection. A Temporary Arrangement Drawing (TAD) for the launching steel girders and launching scheme must be approved by Principal Chief Engineer of Railways after series of verifications and approvals at different levels, including the Chief Bridge Engineer of Railways. For launching of girder and subsequent deck slab casting, approval for the block of the Railway line and reduction of speed of passing trains has to be obtained from Railways. Railways officials carry out inspection of launching work and there is a final inspection after launching of the girders. The additional approval procedure is involved in case there is a requirement for shifting of existing Railway level crossing till completion and opening of the ROB/RUB and also in case of requirement of shifting of any railways utilities.

Construction of ROB and RUBs

9. As per the Manual for 2/4/6 laning, existing level crossings on National Highways (NHs) must be replaced by ROB/RUB as part of the improvement and upgradation project of a section of NH. Similarly, wherever NH Greenfield project alignment crosses a railway line, ROB/RUB is required to be provided. ROB/RUBs also replace Standalone level crossings as per the Ministry's guidelines. The state-wise details of existing ROB/RUBs on NHs and ROB/RUBs under construction on NHs are given in **Annexure-I**.

The details of the construction progress of ROB/RUBs are given in the Table below.



10. The Committee appreciates the increase in annual average progress in the number of Level Crossings (LCs) replaced with Road-Over-Bridges and Road-Under-Bridges. However, it also notes that the target of replacement of 1100 LCs set for 2023-24 is lower than the annual average of 1207 progress achieved during 2014-2023. The Committee is of the view that the target should be increased and the pace of replacement of LCs with ROBs/RUBs should be expedited in the interest of greater safety and seamless mobility of the commuting public.

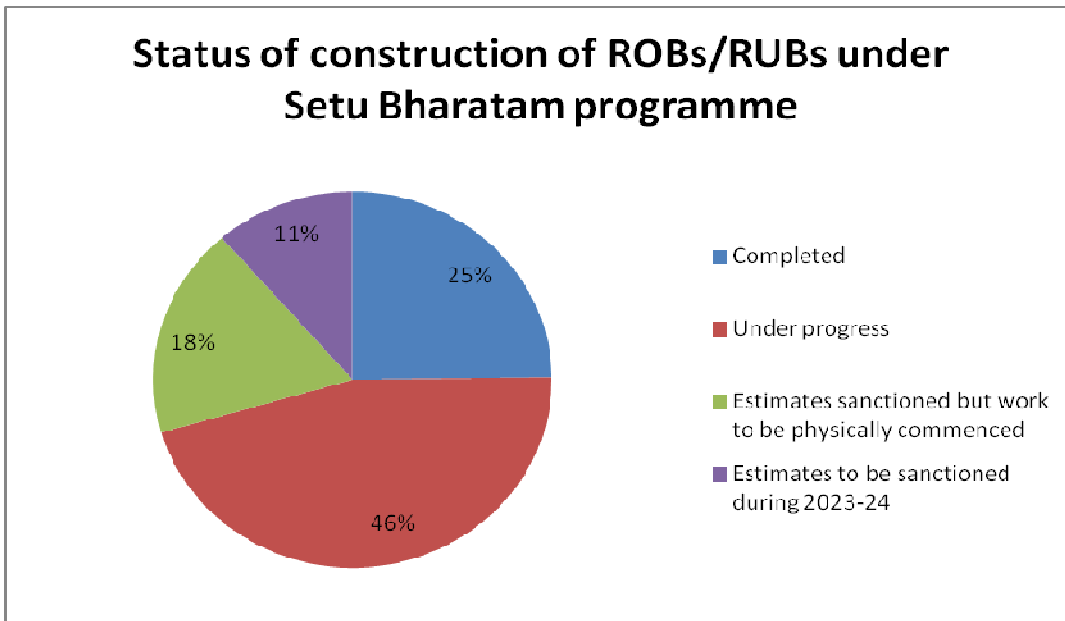
Progress of projects under the Setu Bharatam Programme

11. The Ministry informed that Government has taken up construction of such ROBs/RUBs on National Highways under the 'Setu Bharatam' programme through its own implementing agencies such as State PWDs, NHAI, and National Highways and Infrastructure Development Corporation Limited (NHIDCL). Funds are provided for constructing ROBs/RUBs like other National Highways Projects. ROBs/RUBs are sometimes constructed as standalone projects and sometimes as part of an improvement project for a section of the National Highway. Hence, expenditure figures are not separately maintained for the construction of ROBs/RUBs under the Setu Bharatam programme. A total of 149 level crossings have been identified under the programme.

The status of the progress of the ROB/RUB projects under the Setu Bharatam Programme is given below:

Status of ROBs/RUBs under Setu Bharatam Programme	No. of Projects
Completed	37
Under progress	68
Estimates sanctioned but work to be physically commenced	27
Estimates to be sanctioned during 2023-24	17
Total	149

Percentage-wise status of the projects is depicted below:



12. The Committee notes that only 25% of ROB/RUB projects have been completed since the inception of the Setu Bharatam scheme in March, 2016. The construction of the ROB/RUB projects indicates staggered growth. The majority of the projects are either in progress or have not been started as yet. The Committee recommends that the Ministry makes concerted efforts to achieve the aims and targets of the Setu Bharatam Programme. If needed, Ministry should increase the allocation of funds under this programme for timely construction of ROB/RUBs. Also, the Ministry should strive towards completing all the pending ROB/RUBs projects in a time-bound manner to ensure safe and smooth flow of traffic besides minimising road fatalities.

Construction of Service Roads

13. The requirement of Service Roads along Highways is broadly specified in IRC: SP: 15 "Ribbon Development along Highways and its Prevention". The concept of service roads has relevance in limiting access to the main highway while simultaneously meeting the demands of the abutting land owners for ingress and egress. Such service roads can prevent the congestion caused on the main highway due to purely local traffic. At the same time, they reduce the number of intersections which cause traffic hazards and reduce the capacity. Along all highways where ribbon development has already taken place as well as along new bypasses where ribbon

development is expected in the near future, service roads should be insisted upon. It would be advantageous to acquire land for service roads sufficiently in advance, even though their construction may not come up for some time. The service roads shall have a 7.5m/10.0m wide carriageway for four/six lane NH with raised footpath and separator on either side.

14. CRRRI suggested merging of Service Road with Project Corridor at least 75 m away from the intersection influence area and allowing only a left turn of Service Road traffic.

15. The Committee notes that Service roads are designed for a minimum 40 kmph designated speed. The acceleration and deceleration lane for ingress and egress to and from the main carriageway has a minimum of 5.5 m width. It is designed for a 60 kmph speed differential with a minimum 1:15 tapering. The pavement of the service road is designed for minimum of 10 ms traffic. The "Manual of Specifications and Standards for two laning of Highways with Paved Shoulders" (SP: 73-2018) specifies that the Service Road width shall preferably be 7.0 m. However, in the case of the RoW constraint, the width may be 5.5 m. The detailed status of service roads on National Highways is given in **Annexure-II**.

The Table below gives the status of Service Roads:

No. of States	Length of Service Roads (In Km)		
	Single Lane	Intermediate Lane	2-Lane
35			
Total	1614	4492	14505

16. The Committee notes that the National Highways (Land and Traffic) Act, 2002 provides for control of land within the National Highways, right of way and traffic movement on the National Highways and also for removal of unauthorized occupation thereon.

17. The Committee while taking note of the utility of service roads recommends that NHAI should put up signboards along the service roads on the highway, indicating that the traffic on these roads is two-way and not one-way. City commuters are under the impression that the traffic on the service roads is one-way. This creates hurdles for those coming from the opposite direction. Service roads should have painted arrows directing two-way traffic on the stretch.

Elimination of Level crossing

18. The Ministry of Railways informed that level crossings are provided on the railway lines to pass the road traffic across the track. Level crossings are a potential source of safety hazard. It is envisaged to eliminate LC on Indian Railways in an accelerated manner by the construction of ROBs/RUBs to improve safety in train operation and increase mobility. The Indian Railways have eliminated 100% of unmanned level crossings (UMLCs) on broad gauge (BG) routes by January

2019. The status of Level Crossings on the Indian Railway (as of 01.04.23) is provided below in tabulated form:

Status of level Crossings on Indian Railway				
Type	BG	MG	NG	Total
Manned Level Crossings (MLCs)	17720	120	78	17918
Unmanned Level Crossings (UMLCs)	*	288	271	559
Total	17720	408	349	18477
	*All unmanned level crossings on Broad Gauge have been eliminated by 31.01.2019			

19. The Committee notes with satisfaction that all unmanned level crossings on Broad Gauge have been eliminated by January 2019. However, existence of 559 Unmanned Level Crossings in both Metre Gauge and Narrow Gauge needs to be replaced with ROB/RUB expeditiously in a focused and time bound manner.

Policy for the elimination of Level crossing

20. The Ministry informed that 100% cost of work relating to the elimination of level crossings is being borne by the Railways, except on National Highways (NH) and where State Government/ Road Owning Authority/ Local Authority wants to take up the works at its cost. Rebuilding/replacement of existing ROB/RUBs/public FOBs on a condition basis may be sanctioned at Railways cost. All works are being executed on a single entity basis by the Railways. The portion of ROB/RUB within the railway land area is being maintained by the Railways, and outside railway land, it will be maintained by State Government/Road Owning Authority/ Local Authority at its own cost.

21. With respect to the cost of land acquisition involving private land, Resettlement and Rehabilitation (R&R) and utility shifting will be borne by:

- Railway if work is sanctioned at Railway Cost.
- State Government/ Road Owning Authority/ Local Authority is sanctioned at their own cost.
- LC elimination works already sanctioned on a cost-sharing basis are being examined for funding the entire project through Railways in case of inadequate response/unwillingness of State Govt./Road Owning Authority.
- As a matter of policy, no new Level Crossings will be provided on existing lines.

22. The Committee observes that the waiting time, at Level Crossings are high, leading to avoidable congestion in road traffic and consequential increase in commuting time. A classic example in this regard is the Bholra Talkies, Gumti and Muktapur in Bihar. The Ministry of Railways submitted that Level Crossing gates are required to be closed to grant line clearance to the passing train. Level Crossing needs to be closed intermittently for train operation. If the Level Crossing is closed for a longer duration (due to higher rail traffic), then a rush of vehicles on the approach road takes time to clear. This adversely affects the train operation. There is no prescribed scale regarding the seriousness of the closure of the Level Crossing. The Railways does not maintain any record of detention of the road traffic at the level crossing.

MoU between the Ministry of Railways and the Ministry of Road, Transport and Highways regarding the construction of ROB/RUBs on National Highways

23. MoRTH/NHAI shall construct complete ROB/RUB (including railway bridge portion) on National Highways, i.e. NH Corridors (NHDP & non-NHDP) in the country at their own cost on a single entity basis. The existing ROB/S, if any, will be upgraded as and when required by MoRTH/NHAI.

24. MoRTH/NHAI shall do the instrumentation in the railway super-structure across the railway bridge portion. MoRTH/NHAI shall not levy Supervision Charges, Departmental Charges, Maintenance Charges and Land Lease Charges where railway track crosses National Highways in case of New Railway Line/Gauge Conversion.

25. Along with the construction of ROB, MoRTH/NHAI shall construct a Subway to facilitate the movement of pedestrian and vehicular traffic across the railway track to facilitate the closure of level crossing by Railways. Construction of the Subway within Railway Portion should be done under the supervision of Railways without any supervision charges. If a subway is not possible, then a suitable Foot Over Bridge (FOB) with a ramp should be provided. Wherever subway/FOB with a ramp is not feasible at the site, then in all such cases suitable footpath of appropriate width along with a staircase should be provided on ROB. Wherever footpath on ROB is provided then in all such cases, the height of the kerb of ROB should be increased, so that in case of road accidents, chances of mounting off road vehicles on the kerb and falling on railway track could be avoided.

26. The Ministry informed that Manned Level crossing elimination is being done at an average rate of 922 numbers per year (in the last 5 years). If work is carried on at the

same speed, it might take another 20 years for the complete elimination of level crossing, depending upon technical feasibility.

27. In this regard, the Committee underscores the need for replacement of LCs with ROB/RUB on priority and recommends that the Ministry should examine whether there is proper co-ordination between the Railways and Central/ State Governments in identifying, prioritizing and allocating resources to various ROB/RUB projects sanctioned.

Status of ROB/RUBs/Level Crossings on National Highways

28. The Zone-wise details of existing LCs on NHs, ROB/RUBs under construction on NHs, General Arrangement Drawing (GAD) approved for construction of ROB/RUBs but work not commenced, level crossings existing on NHs and yet to be proposed for ROB/RUBs are appended as **Annexure-III**.

The status of existing LCs on NHs, ROB/RUBs under construction on NHs is given below:

	LCs on NH	Work completed (LCNOT closed)	Work in progress	GAD approved but work not started	GA under progress	Proposed yet to come from NHAI	Diversions planned by NHAI
IR	405	24	105	102	6	135	33

29. The Committee notes that out of total 405 Level Crossings on NHs, only 24 have been completed, and around 213 LCs, the work is under process, or the GAD approval is awaited. The Committee also observes that in around 135 cases, approval is pending on the part of NHAI. The Committee takes note of the fact that only 6% of the LCs have been successfully replaced with ROB/RUB. The Committee suggests that a dedicated inter-agency co-ordination mechanism involving railway authorities, road transportation agencies, local governments, and other relevant stakeholders may be put in place to ensure effective planning, fund allocation, and timely implementation of level crossing elimination projects in a time bound manner.

30. The Committee recommends the Ministry/ NHAI to implement a robust monitoring and evaluation system to track the progress of level-crossing elimination projects. The Committee urges upon the Ministry/ NHAI to regularly assess the effectiveness of

implemented measures and identify areas for further improvement.

Status of Level Crossings (LCs) and Road over Bridges/Road under Bridges (ROBs/RUBs) on Indian Railways

31. The Ministry has submitted State/Railway Wise Level Crossings (As of 01.04.2023) as given in **Annexure IV**.

32. The Committee notes that there are still 427 Manned Level Crossings on National Highway (NH) and 954 on State Highways. Given the unfinished task at hand, the pace of construction of ROBs/RUBs on Railway Level Crossings needs to be accelerated to avoid accidents, clear congestion and ensure dependability of road transportation. The Committee, therefore, recommends the Ministry to expedite the progress of eliminating level Crossings in a time-bound manner.

33. The Committee also discussed the subject with MoRTH, NHAI and State Government of Goa during its study visit to the State on 7th July, 2023. The Chief Engineer, MoRTH informed about the status of construction of the remaining 2 ROBs (out of the total of 12) at the level crossings; construction of service roads in 4 and 6 laning projects ; and the progress of the remaining 4 NH projects (out of total of 10 NH projects), namely, Zuari bridge Package II (NH-66), Zuari bridge Package III (NH-66), MOPA Airport link (NH-166S), Mandovi bridge (NH-66) and Port connectivity (NH-566). The Committee was informed that these were expected to be completed this year, i.e. 2023.

34. The Committee raised the following issues, namely, losses that a government faces if a project delays due to the escalation of project costs; issues arising at the time of preparation of DPR; lack of coordination between the State Government and concerned agencies during the construction of ROBs/RuBs leading to delay in construction of projects; need for expediting the construction of approach roads to Maharashtra -Karnataka National Highway; lack of approach roads for villages due to lack of funds with Gram Panchayats; total number of projects delayed due to non clearance from Ministry of Environment, Forest & Climate Change including number of projects halted due to the presence of forests; timeline for the completion of Mumbai-Goa-Mangalore Sector; process of identification and rectification of Black Spots and how much time it takes; and clarification on the need for multiple (7-8) small bumpers/speed breakers on highways.

III

Review of Road Survey Guidelines

Present Road Survey Guidelines

35. The guidelines on Road Surveying with Network Survey Vehicle (NSV) prescribe that for all projects involving 2/4/6/8-lane expressways and strengthening, surveys shall be undertaken in the following intervals:

- (i) Before the start of the work
- (ii) Before the issuance of the completion certificate
- (iii) After completion of work, every six months.

36. The Ministry of Road Transport and Highways informed that NSV surveys are conducted after the completion of a project. The NSV report is mandatory for issuing Commercial Operation Date (COD). In the Defect Liability Period (DLP) period, NSV reports are mandatory for the release of maintenance payments. The Ministry has developed an online centralized Road Asset Management System (RAMS) to upload and integrate NSV/ Falling Weight Deflectometer (FWD) survey data with RAMS for all NH stretch. NHAI has linked the monthly payments of Independent Engineer/Authority Engineer /Supervision Consultant to the uploading and acceptance of NSV data. NSV data are utilized for internal planning and monitoring by the Ministry of Road Transport and Highways, and as such, there is no plan for uploading the same into the public domain, considering its limited utility for the general public.

37. The Ministry of Railways informed that Indian Railways conducts the Train Vehicle Unit census (TVU census) every three years. The TVU is displayed at Gate Lodge on Level Crossing. All ROBs and RUBs are inspected annually by the field officials at various levels as per provisions of the Indian Railways Bridge Manual. On the basis of these inspections, maintenance/replacement/rehabilitation is being planned. Total 13 ROBs have been declared abandoned in the last five years involving an estimated cost of 454.94 cr.

38. The Committee notes that the NSV data being technical in nature is of limited utility for the general public. The Committee, however, feels that the survey data must be made public so that the organizations and NGOs related to road sector can make use of it in strengthening policies.

39. The Committee also notes that in the case of 'New Highway Construction Projects', 'Compromising Stages' along with 'Solutions' must be added in each survey mentioned under 'Road Survey Guidelines' and be a mandatory part of DPR. Further, the detailed

design of highways of Merging and Diversion, Intersection, Cuts and U-Turns including drawings, etc., prepared by the Contractor must be proof checked by IIT/NIT before its approval by NHAI and must be uploaded in public domain on NHAI Portal. The Committee recommends that the road safety measures being integral to the road projects must be strictly implemented, so that the varied levels of road safety will validate or otherwise the road design and engineering, which in turn, can help develop the standard of road safety.

Analysis of existing road survey guidelines

40. The surveys conducted for road construction play a crucial role in gathering essential information about the project area and its surroundings. These surveys provide valuable data before the construction of a project and the insights that inform the design, planning, and construction processes.

41. IRC: SP:19-2001- The "Manual for Survey, Investigation and Preparation of Road Projects (Second Revision)" provides detailed instructions and methodologies for conducting surveys, investigations, and preparing road projects in India. The manual covers various aspects of road project preparation and outlines the necessary survey methodologies and procedures to be followed during each stage of the project.

42. The manual specifically highlights the following surveys necessary for the road construction project such as:

- i. Traffic Survey
- ii. Reconnaissance Survey
- iii. Topographic Survey
- iv. Geotechnical and Material Survey
- v. Environmental Survey
- vi. Final Location Survey
- vii. Utility Survey
- viii. Right-of-Way Survey

43. The existing guidelines also prescribe many other surveys that are essential for road construction projects. Overall, this guideline offers details on various surveys that are essential to design and build quality roads.

The Committee notes that community engagement plays a crucial role in road construction projects as it caters to the needs, requirements, and difficulties faced by the local communities. These communities often experience disruptions in their daily lives due to construction of highways.

44. The Committee observes that a notable limitation of the existing guidelines, particularly for highways and expressways, is the lack of emphasis on community engagement and the impact of road projects on local communities.

45. Incorporating the elements of community engagement into the guidelines would involve measures such as conducting public consultations, holding informational sessions, and actively seeking feedback from the affected community. By involving local residents, businesses, and other stakeholders in the decision-making process, road construction projects can better serve their specific needs and mitigate potential negative impacts. This may include implementing traffic management plans, providing alternative routes, adjusting construction schedules to meet local requirement or minimising disruption.

Use of technology for inspections

46. Ministry of Road Transport and Highways informed that during the construction stage, there is a periodic inspection carried out by the Authority's Engineer (AE)/ Independent Engineer (IE) and Authority (MoRTH & its implementing agencies) for ROBs/RUBs. Different tests are done for quality assurance and quality control as per guidelines, and special attention is taken during the launching of girders. During Operation and Maintenance, periodic visual as well as instrument-aided inspections including non-destructive tests, are conducted. The Authority's Engineer (AE)/ Independent Engineer (IE) carry out the condition and structural assessment survey of the bridges in accordance with IRC-SP: 35 with the use of Mobile Bridge Inspection unit (MBIU) for close access to different component of the ROBs/RUBs. Regular inspections are carried out by the Authority's Engineer (AE)/ Independent Engineer (IE) for timely identification of problems as per the provisions of the Contract Agreement. Additionally, Bridge Health Monitoring System has been included in some of the contracts to identify the problems/distress occurring on the bridge so that the same can be addressed timely.

47. Modern technology for periodic inspection of ROBs/ RUBs can help in the early detection of damage, minimize human errors and lower maintenance costs. The Committee, therefore, feels that more steps should be taken to adopt modern technology for inspection of ROBs/RUBs. Drones equipped with high-resolution cameras and sensors can be used to capture aerial imagery of ROBs/RUBs, providing a detailed visual assessment of the structure's condition. The images can be analysed further to identify any signs of damage, deterioration, or structural weakness. Drones are particularly useful for accessing hard-to-reach areas and can significantly reduce inspection time and costs.

48. Laser scanning technologies, such as LiDAR, can be used to generate accurate 3D models of ROBs/RUBs. LiDAR sensors emit laser pulses and measure the reflected light, creating precise point cloud data. This data can be used to assess the geometry, dimensions, and deformations of the structure, detecting any irregularities or deformations that may indicate structural deficiencies.

49. Ground Penetrating Radar (GPR) should be used to penetrate the ground or structure, allowing for subsurface inspection of ROBs/RUBs. It can identify hidden defects, such as voids, delamination, or corrosion in concrete or steel elements. GPR can provide valuable information on the internal condition of the structure without the need for invasive investigations.

Structural Health Monitoring (SHM) Systems should be adopted to involve the installation of sensors and monitoring devices on ROBs/RUBs to continuously monitor their structural behaviour. These sensors can measure parameters like vibrations, strains, and deflections, providing real-time data on the performance and health of the structure. SHM systems enable early detection of structural abnormalities and help in proactive maintenance and intervention.

50. Non-Destructive Testing (NDT) Techniques, such as ultrasonic testing, magnetic particle testing, and radiographic testing, can be employed for ROB/RUBs inspection. These techniques assess the integrity of structural components, detect cracks, weld defects, or corrosion, and identify potential failure points. NDT methods are typically used in combination with visual inspections to provide a comprehensive assessment of the structure's condition.

51. Data Analysis and Visualization Software should be used to process and analyse the data collected from various inspection technologies. These tools facilitate the interpretation of data, enabling engineers and inspectors to identify anomalies, assess risks, and generate reports on the condition of ROBs/RUBs. Data Visualization software helps in presenting the raw inspection data in a clear and easily understandable format, which can be interpreted correctly to facilitate decisions.

IV

Challenges faced in the construction of ROBs, RUBs and Service roads

52. The Committee, through its engagements with various stakeholders, identifies the following bottlenecks in the construction of ROBs/RUBs and service roads:

(i) Major issues

Environment clearances and land acquisition

53. The Ministry of Road Transport and Highways informed that land acquisition (LA) is a major reason for the delay in the construction of ROBs/RUBs in standalone project. In the corridor project, the delay in the construction of ROBs/RUBs on account of land acquisition is insignificant as the process of land acquisition is completed prior to the award of the NH project. However, there have been some cases of delay in the implementation of ROBs/RUBs where the land of other departments, such as Railways, State Government etc., is to be acquired. Approximately 40 to 50 % of ROBs/RUBs have been reportedly delayed due to delays in various clearances from Railways, such as approval of GAD of ROBs/RUBs, detailed design, etc.

54. The Ministry has taken various steps to expedite land acquisition and statutory clearance. The Government of India has established the Bhoomirashi portal to make the land acquisition process online and thereby speeding up the process. Regular review meetings are being conducted at State/ Central Govt. level to coordinate, monitor and complete the LA process in a time-bound manner. The Ministry has also signed an MoU with the Ministry of Railways to streamline the approval process for the construction of ROBs and RUBs. Now, the process has been initiated for the signing of another MoU with the Ministry of Railways to facilitate the acquisition of land owned by the Ministry of Railways. As per the proposed MoU, land will be cleared within a period of 90 days.

55. The Committee appreciates the initiatives of the Ministry of Road Transport and Highways in addressing the most important issue of land acquisition in fast tracking the ROB/RUB projects. The Bhoomirashi portal has undoubtedly expedited the process of land acquisition for National Highways. However, the Committee urges upon the Ministry and NHAI to accord continued priority to the land acquisition issue and fails to appreciate as to why huge Government funds are parked with Competent Authority for Land Acquisition (CALAs).

56. The Ministry of Railway informed that clearances are required at three levels in the construction of ROBs:

- i. Approval of GAD, Structural design and Launching scheme
- ii. Sanction of Principal Chief Engineer for execution over railway portion.
- iii. In case of construction of ROB in lieu of level crossing, consent of the State Government for closure of level crossing is also required.

57. The Railways has developed an online portal to resolve the transfer of land cases for the construction of ROBs/RUBs. To avoid delay due to GAD approval, the Railways has developed an online portal RORACS for GAD approval with a specified timeline of 70 days. The Chief Bridge Engineer, Indian Railways conducts monthly or bimonthly coordination meeting at all Zonal Railways between Railway Field Unit and Field Units of implementing agencies of MoRTH. The Issues related to ROBs/RUBs are discussed in the meeting for early resolution. Policy-related issues are discussed at Railway Board Level. In this meeting, Senior Officers of MoRTH and the Railways participate for resolving the issues. In addition to it, State Government is being regularly approached for land acquisition and shifting of utilities.

58. The Committee observes that the MoRTH/ Railways should regularly engage with the Ministry of Environment, Forest and Climate Change (MoEF& CC) to address policy and project-specific issues, ensuring swift clearances and resolution of operational challenges. The MoEF&CC has taken proactive steps to streamline the process of obtaining statutory clearances, particularly for Stage-I and Stage-II forest clearances. This includes issuing directions for the one-time submission of Essential Details Sought (EDS) and eliminating the requirement for hard copies of proposals. Fortnightly Regional Coordination Meetings (FRCM) are conducted to monitor the progress of clearances and expedite forest clearances. Additionally, Inter-Ministerial Co-ordination and Monitoring Committee meetings are held to address policy matters and address long-standing proposals.

Poor contract management

59. MoRTH informed that the National Highway projects are executed as per the provisions specified in standard documents viz.RFP/DCA/MCA, finalized and approved by Inter-Ministerial Group (IMG) and then adopted by concerned implementing agencies of the MoRTH. The standard document lays down defined roles and responsibilities of Authority's Engineer (AE)/ Independent Engineer (IE) and Authority (MoRTH or its implementing agencies) for different aspects of contract management; and, accordingly, contracts are being managed /administered.

60. Senior officials of the Ministry/NHAI/NHIDCL periodically review the standard documents to ensure that contracts are effectively managed. Based on the current industry practice, government regulations, standards and feedback received from various stakeholders, viz Contractors/Concessionaires AE/IE, NHBF etc., standard documents are regularly updated by Inter-Ministerial Group (IMG) and then adopted by concerned implementing agencies of MoRTH.

61. To expedite the conciliation of disputes, NHAI has established a system for conciliation of disputes through a Conciliation Committee of Independent Experts (CCIEs) *vide* the NHAI circular dated 02.06.2017 based on the decision of the Cabinet Committee on Economic Affairs (CCEA) in its meeting held on 31.08.2016.

62. The Committee notes that CAG has flagged off the issue of poor contract management, such as delays in the finalisation of the negotiated rates and grant of extensions despite poor progress by the contractor. The Committee recommends that the Ministry should look into the issue on priority as such problems have resulted in avoidable expenditures and delays.

63. The Committee also desires to be apprised of the reasons as to why the Ministry/NHAI allows contractors to hire or lease out to sub-contractors for carrying out specific work instead of splitting the project into smaller parts so that contractors with limited wherewithals could also bid for the same and legitimately get awarded on merit as principal contractor for the assigned work.

64. The Committee also recommends that Ministries should assign competent contract managers who have the necessary skills and expertise to effectively manage contracts. These managers should have a strong understanding of contract law, project management, and negotiation skills. Imparting them adequate skill training will enable them to fulfil their responsibilities.

65. The Ministry may also develop a transparent and efficient payment management system. Emphasis should be laid on establishing clear protocols for verifying contractor invoices, approving payments, and addressing any payment disputes promptly. Timely and accurate payments can help maintain contractor's motivation, besides ensuring timely completion of project.

66. The Committee suggests that the Ministry should incorporate performance incentives and penalties into the contract terms. Incentives can motivate contractors to contribute

significantly to the project, exceeding expectations, while penalties can lead to poor performance or non-compliance.

Flooding/ water logging issues

67. Ministry of Road Transport and Highways stated that there is no issue of flooding/water logging on ROBs. However, in the case of RUBs, drainage considerations are an upfront part of fixing Finished Road Level (FRL) and design of RUBs and service roads. RUBs are constructed with a vertical clearance of 5.50 metres. Whenever required clearance permits, the road level of RUB is raised by 0.3 to 0.5 metres, as a result of which the water logging problem is minimized. This also facilitates adequate hydraulic gradient to the outfall (either natural stream or percolation pit or low-lying area) besides avoiding reverse flow from the stream/percolation pit. In spite of this, there is sometimes the problem of drainage due to ribbon development and inadequate drainage arrangement on the land affecting NH. The same is being resolved in consultation with local bodies and District Administration. De-silting of pipes is ensured before monsoon as well as during monsoon. The Ministry holds frequent interactions with local bodies and District Administration to resolve the issues.

68. The Ministry of Railways is taking the following steps to address flooding/water logging on RUBs:

- (a) Sealing of joints.
- (b) Provision of the cover shed.
- (c) Provision of humps on approach.
- (d) Provision of the sump.
- (e) Provision of dewatering pump.

69. The Committee notes that several instances of flooding/water logging on ROBs, RUBs and service roads have been reported in the recent past. This not only results in great public inconvenience but also damages the roads for future use.

70. The Committee recommends that a comprehensive hydrological study of the area surrounding the ROBs, RUBs and service roads should be undertaken to understand the flood patterns, including the frequency, duration, and intensity of floods. Such a study will help determine the design requirements that address the issues of flood mitigation for the ROBs/RUBs.

71. The Ministry can also construct flood barrier walls or embankments around the RUBs to prevent floodwater from entering into the underpass. These barriers can be designed to

withstand the anticipated flood levels and provide protection to the RUBs during flood occurrences.

72. The Railways should look for a cost-effective and durable solution to the problem of water-logging by modifying embankment height, providing suitable cross and longitudinal drains, cutting off the ingress of water from the catchment area into the subway, etc.

73. The Committee recommends conducting regular inspections and maintenance of the drainage systems, pumps, and flooding barriers to ensure their proper functioning, especially during monsoon season. Debris or obstructions that may hinder the flow of water during floods should be cleared regularly.

Delay in construction

74. The Ministry of Railways informed that the problem of delay in construction of ROB/RUBs is faced due to factors such as fixing the alignment of approaches, delay in land acquisition, removal of encroachments, delay in finalization of General Arrangement Drawing (GAD), acceptance and sanction of estimate in approaches by State Government, etc. Therefore, it is not possible to fix definite timelines for the completion of these ROB/RUBs.

75. Indian Roads Congress (IRC) informed that the construction of ROB/RUB/service roads normally gets delayed during implementation because of delays in land acquisition. ROB/RUBs also require approvals in various stages from the railway authorities, which is very time consuming process. Standard drawings issued by RDSO may avoid delay in initial approval in normal cases but the cases requiring site-specific modifications or innovations in design may still result in delay in approvals. For example, if a RUB has a height restriction as the Rail Track level is less than 3 m above the road level, the service or approach road will need to be depressed. This poses an additional problem of drainage of storm water. Some of the RUBs can have surface (Municipal) drains which can be placed below or adjacent to the Road carriageway.

76. IRC further informed that though for ROB/RUB, GAD approvals can be pursued online, Railway authorities still insist on physical submission also, which can be avoided to expedite the work.

77. The Committee recommends that Ministries should adopt digitalization of GAD approval as it will help the stakeholders to check online the status of the approval. This can reduce the undue delay in the construction of ROB/RUBs. Further, there is a need for an

inter-ministerial co-ordination mechanism to bring all the stakeholders on one platform for better discussion and understanding.

78. The Ministry should also come up with an expected timeline of events along with the deadline, and the updated status should be brought into the public domain for better information of MPs, MLAs and other citizens. Further, the charter shall also have the details of contractors, engineers and officers involved. This will set the accountability of all the stakeholders involved.

Shortage of manpower

79. The Committee notes that the issue of the shortage of staff is a concern at a time when the country is moving ahead with a huge number of road networking projects. Since the time factor is of paramount importance, every effort should be made to complete the ongoing projects on time. The role of human resources in the project management, being critical, the Committee may be apprised about the staff requirement. The Committee expresses the view that in case of any shortage, recruitment process must be rolled out. In the case of consultants, the Committee seeks to know the total number of consultants with the Ministries and the basis for their appointment.

80. The Committee recommends that recourse be taken to five R's - (i) Revive or create posts, (ii) Restructure the organization to bring in efficiency, (iii) Recruit young talent, (iv) Reframe policy/processes, (v) Refresh minds by giving interim professional training and also to revive and create posts.

Budgetary Allocation

81. The State/UT-wise details of accrual, Unspent Balance as of 01.04.2022 and Maximum Possible Release under CRIF during FY 2022-23 are attached as Annexure VII.

82. The Committee notes that the provisioning and utilization of funds for the construction of ROBs/ RUBs could be better. There needs to be more co-ordination between the Railways and the State Governments in providing a budget and executing the works. Further, the large chunk of unspent amount under the Setu Bharatam programme is an overarching concern. There is a need for proper channelization and utilization of the earmarked funds.

(ii) Road Safety related issues

83. The Committee notes that ensuring road safety is a humongous challenge both during construction and after construction of ROBs/RUBs and service roads. In 2021, an estimated 1,550 railway crossing crashes caused 1,807 deaths all across India. As per the Road Accidents in India 2021, in the Million Plus Cities, ongoing road works/roads under construction and Bridges together account for 5.9% of road accidents, 9.0% of deaths, and 5.23% of injuries. Potholes account for nearly 0.8% of road accidents, 1.4% of road accident deaths and 0.6% of injuries. Many of these crashes could have been averted if due care had been taken at the fundamental stages of road design construction and maintenance and if guidelines were followed properly.

84. The Committee notes that the Motor Vehicles Amendment Act (MVAA), 2019 creates adequate accountability framework to ensure that road-owning agencies, contractors and concessionaires are held accountable for faulty road design and construction. To operationalise this at the State level, the Act provides discretionary powers to States to create Rules under Section 210D. The Section 210 D authorizes State Governments to make rules for design, construction and maintenance standards for National Highways and roads other than National Highways, respectively.

85. The Committee, therefore, recommends that the Ministry of Road Transport and Highways should persuade State Governments to frame such rules under Section 210D of the MVAA Act at the earliest. The Committee may also be kept apprised of the matter.

86. The Indian Railways has taken the initiative of Gate Mitras to enhance safety and prevent accidents at unmanned level crossing gates. Under this system, the person engaged as "Gate Mitra" alerts road users about approaching trains at unmanned level crossings. They are primarily deployed to counsel road users to be vigilant while crossing the unmanned level crossing gates. However, the Committee observes that Gate Mitras often complain of exploitation and meagre payment. They are made to work for 12 hours every day, without any off throughout the year, for a meager salary of 3000 to 4000 rupees per month. There are also complaints that there is no arrangement for shelter, first aid and bathroom. Further, if somebody is not well, taking a day off would amount to a salary cut and even losing the job.

87. The Committee recommends that the Ministry of Railways should relook into 'Gate Mitra' scheme and ensure that these personnel are being provided with all basic amenities. In the Committee's view, proper implementation of the Gate Mitra scheme will promote the safety of road users, besides generating employment.

88. The Committee identified the following flaws on ROB/RUBs and service roads, which lead to accidents and loss of life and property.

Damaged Pavement Surface

89. The Committee observes that a damaged pavement surface can result in loss of vehicle control and compromised braking performance, which can lead to accidents. It is a matter of concern that service roads are often neglected despite regular maintenance of main carriageways. Neglecting the repair of service roads can create uneven surfaces, potholes, and other hazards, posing risks to drivers, pedestrians, and cyclists and increasing the likelihood of accidents. Ensuring the maintenance and repair of service roads is essential for promoting road safety and preventing accidents.

90. The Committee recommends that timely repair and maintenance of damaged pavement surfaces on service roads should be undertaken on priority in the interest of road safety. Routine inspection should be carried out at regular intervals to identify and address any issues such as waterlogging, potholes, cracks, or uneven surfaces. Adequate resources and manpower need to be allocated for timely repairs, including resurfacing, relaying or patching of service roads as needed. The safety of all road users needs to be prioritized by maintaining smooth and well-maintained service roads.

Lane Drop

91. A lane drop is a location on a road where the number of lanes provided for through traffic decreases. This is mainly due to issues relating to land acquisition and other technical or cost constraints. Hence, many sections of the bridges act as a bottleneck, resulting in frequent congestion and conflict. Limited space also leads to difficulty in manoeuvring and increases the risk of collisions or sideswiping.

92. The Committee observes that lane drops with poorer site geometrics have higher conflict rates. The Committee is of the view that there is a need to revise existing guidelines/criteria to ensure that bridge sections are designed with consistent geometry, including the same number of lanes, similar to those of the through road for fast and long distance traffic. Lane drops must be designed properly from the outset, in as much as traffic control devices are not as effective in reducing conflicts as are proper site geometrics.

Absent Shoulders

93. Shoulder refers to the paved/unpaved section of road present along the road, which is

generally provided to give support to the road surface and for emergency stops. The Committee observes that many of the bridge sections do not have shoulders. This has become a critical issue during breakdowns or emergencies.

94. The Committee recommends that the Ministry may re-examine the existing guidelines/criteria relating to paved and unpaved sections of the road. If needed, the Ministry should come out with revised guidelines/criteria to ensure that bridge sections are designed with shoulders so that they can be used for emergency stopping of vehicles. Further, these guidelines must be strictly followed during the construction of the roads.

Inadequate Illumination

95. The Committee notes that the provision of artificial lighting systems along roadways needs to be improved. Inadequate illumination reduces visibility and exposes the traffic to greater risks of accidents.

96. The Committee takes note of the technological advances made in the field of streetlighting and recommends that installation of street lights, preferably with automatic sensors, retro-reflectors may be undertaken for proper road illumination. In the case of power supply failure or damage to the street lights, the retro-reflectors act as reliable visual guides, reflecting light from headlights and assisting drivers in manoeuvring safely and staying on the correct path.

97. The Committee recommends conducting comprehensive lighting audits to assess the adequacy of current lighting conditions on roads. Areas with inadequate lighting should be identified and prioritized based on factors such as traffic volume, accident history, and visibility requirements.

Inefficient Safety Barriers

98. The Committee notes that one of the primary functions of safety barriers is to prevent vehicles from accidentally veering off the bridge and falling onto lower levels. By acting as a containment system, these barriers help to reduce the severity of crashes and prevent fatality. However, in certain bridge sections, the safety barriers are inefficient in terms of height and capacity to effectively prevent heavy vehicles from falling off the bridge section.

99. The Committee recommends that all measures should be taken to ensure that the safety barriers are appropriately designed and constructed to withstand the impact forces generated by heavy vehicles. Also, these should be provided with sufficient height to prevent them from breaching the barrier. Increasing the height and capacity of safety barriers is

essential for maintaining the integrity of the bridge and protecting the road users, thereby minimizing the risk of fatal crashes.

Absent Signage and Hazard Markings

100. The Committee is of the view that traffic signs and hazard markers on bridge sections are necessary to ensure the safety of vehicles, pedestrians, and cyclists. They convey warnings, regulations, directions and other essential messages helping to prevent accidents, guide traffic flow and ensure safe navigation on road. Additionally, hazard markers on bridges highlight potential risks, like the presence of hard objects or sharp turns, enabling drivers to adjust their behaviour accordingly. With reflective materials, these signs enhance visibility in low-light conditions. However, it is observed that many bridge sections do not adequately account for the traffic signs and hazard markers, and even when they are present, their maintenance is often lacking.

101. The Committee recommends that bridge infrastructure planning and maintenance should prioritize the inclusion and proper maintenance of traffic signs and hazard markers to ensure the safety of road users, pedestrians, and cyclists. Regular inspections, timely repairs, and routine maintenance are essential to ensure that these vital elements effectively communicate important information, guide road users, and mitigate potential hazards, thus contributing to safer and more organized bridge crossings.

102. The Committee also recommends establishing standardized designs for road signs that comply with national or international standards, such as those set by the Manual on Uniform Traffic Control Devices (MUTCD). Also, there should be use of clear and easily recognizable symbols, colours, and fonts to improve readability and comprehension.

Inadequate Anti-glare Measures

103. Anti-glare measures are vital to road safety, especially during night time or adverse weather conditions. The Committee is of the view that glare from the vehicles coming from opposite direction at night can blur a driver's vision, causing temporary blindness or reduced visibility. This can lead to delayed reaction times, difficulty in discerning road hazards or signage, and compromised depth perception.

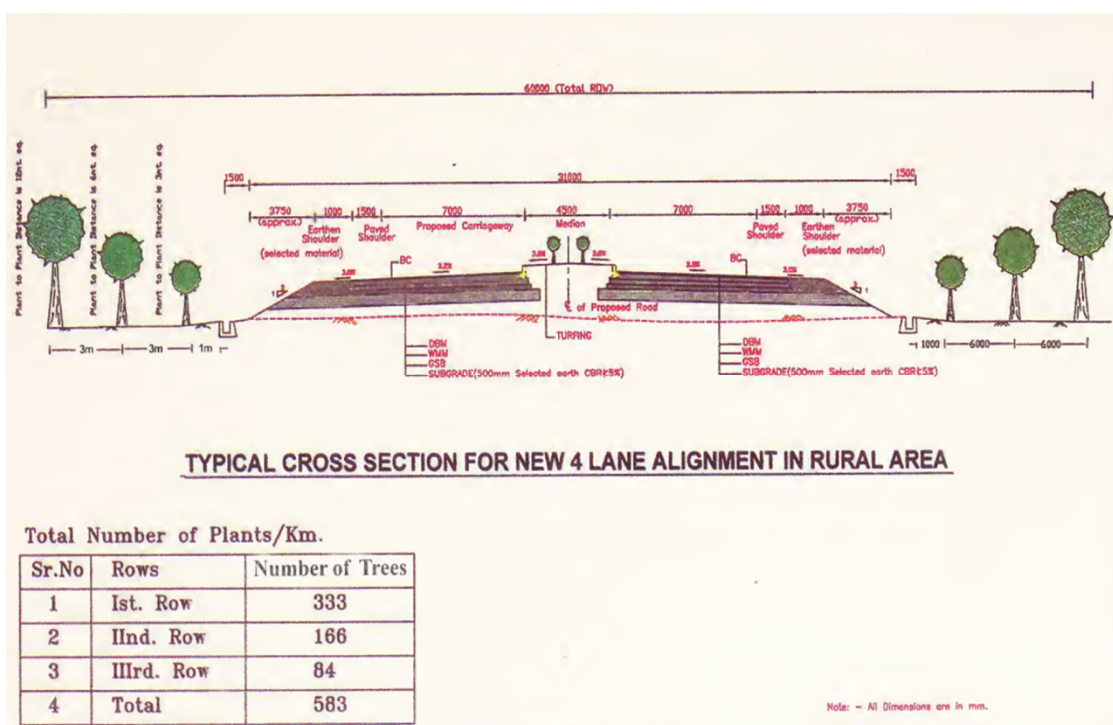
104. The Committee recommends for proper implementation of appropriate anti-glare measures on bridge sections to enhance visibility, reduce the risks associated with glare, and ensure the safety of all road users, especially during night time.

105. The Committee also recommends implementing advanced technologies, such as

adaptive lighting systems or intelligent transportation systems (ITS) in automobiles that adjust lighting levels based on real-time conditions. These systems can automatically dim or adjust lighting intensity to reduce glare during specific periods or in response to changing weather conditions. The Committee feels that the road authorities can significantly enhance road safety and reduce the risk of accidents caused by blinding glare.

Issue of vegetation/plantation

106. The Committee notes that IRC SP 021: Guidelines on Landscaping and Tree Plantation has already described the brief layout regarding vegetation and plantation along the road, which is depicted below in the image:



Courtesy: TRAX S. Society

106. The above picture clearly shows that after the paved shoulder, there must not be a tree plantation up to 8.75m, and on the divider, there must not be any plantation up to 1.5m.

107. The NGO, namely TRAX informed that maximum crashes are occurring near cuts at median, junctions, exits and entry points. Hence, near cuts and crossings, at diverging/merging, there must not be any obstacles in the clear zone up to 50m from the centre of the junction which is necessary for clear sight distance.

108. However, as per IRC: SP- 021 at median cut and grade separator, at least 5m blank space shall be left for a clear view of traffic and (1 1 .24.6) Trees planted in the median provide shade in the carriageway resulting in poor visibility especially during dawn and dusk, which is contradictory itself with IRC 066: Recommended Practice for Sight Distance on Highways which says around 50m clear sight distance from the center of the crossing i.e. around 25m.

109. CRRRI also informed that the provision of plantation up to the height of 1.5 m on the standard median width of 5.5 to 6m is essential conforming to IRC:SP 21 (2009), IRC:SP-84 (2019) and IRC:SP-87 (2019). When selecting plant species for median plantations, it is advisable to choose shrubs of low or medium height. This selection helps prevent headlight glare while still providing visual separation between the lanes. Depending on the width of the median in different sections, one to two rows of flowering shrubs can be planted. However, it is important to note that in sections where the median width is less than 1.5 meters, it is recommended to use only turf grass, as specified by IRC:SP:21-2009 article no.11.11.1. Planting of large-sized trees in the median should generally be avoided. On the other hand, wherever there is a designated median opening (provided to facilitate the cross traffic / U-Turning traffic movement), there shall be no plantation for a distance which will help to enhance the sight distance for the turning traffic.

110. The Committee, therefore, recommends that no plantation be done up to 25m at the median while approaching a crossing. Cuts in the median, and exit/ entry to or from service lane need to be ensured for clear visibility to avoid chances of crashes/accidents.

(iii) Lack of pedestrian facilities

111. The Committee observes that there is a lack of pedestrian facilities on service roads, making them vulnerable to crashes as they are forced to use the roads. The Committee identifies some of the issues related to pedestrian facilities, which are placed below:

Inadequate Pedestrian Facilities

112. To ensure safe and comfortable walking conditions, the Committee recommends that it is crucial to provide hassle-free pedestrian facilities based on the requirement. Places with high pedestrian traffic require wider footpaths. Pedestrian facilities should also consider accessibility requirements for individuals with disabilities or limited

mobility.

Absent Pedestrian Guard Rails

113. The Committee notes that the lack of pedestrian guardrails on service roads is a significant safety concern. Pedestrians face risks due to the absence of dedicated infrastructure and inadequate safety measures. In the absence of proper guardrails, pedestrians are left exposed to the dangers of vehicular traffic, especially on busy roads and intersections. A sample image showing the absent pedestrian guard rails on the service road is presented below.



Picture showing absence of guard rails

Courtesy: SaveLIFE Foundation

114. To address the lack of pedestrian guardrails on service roads, the Committee recommends the Ministry to perform thorough audits of high-traffic areas, intersections, and road segments to identify locations where pedestrian guardrails are most needed. Guard rails should be provided at all safety-critical areas with a higher concentration of vulnerable road users, such as near schools, hospitals, and areas with a significant pedestrian population. Additionally, it must be ensured that the guardrails are designed with appropriate standards, considering the height, strength, and visibility requirements for optimal pedestrian safety.

115. There is also a need to conduct public awareness campaigns to educate pedestrians and drivers about the importance of using designated pedestrian crossings, respecting guardrails, and adhering to traffic rules for pedestrian safety.

Absent Pedestrian and Cyclist Facilities

116. Pedestrian and bicycle facilities on bridge sections play a vital role in fostering sustainable transportation systems by providing safe and accessible options for non-motorized traffic. However, it is observed that many of the bridge sections do not account for the pedestrian and bicycle facilities. Without dedicated pathways for pedestrians and cyclists, these vulnerable road users are forced to navigate alongside vehicular traffic, increasing the risk of crashes and injuries.

117. The Committee recommends including pedestrian and bicycle facilities as a mandatory and integral part of bridged sections to accommodate the requirements of all road users, promoting safety, accessibility, and sustainable transportation options. Moreover, the mandatory inclusion of pedestrian and bicycle facilities on bridges promotes social equity, providing equal access to all members of the community, regardless of their mode of transportation or physical abilities.

(iv) Design-related issues

Discontinuous Service Roads

118. The Committee observes that in some sections, due to constraints like land acquisition challenges, road-owning agencies have not constructed the service roads. As a result, the service road network becomes discontinuous or inadequate, forcing local traffic to merge directly with the main highway. Such discontinuity significantly increases the risk of collisions as vehicles are forced to enter the highway to continue their journey.

119. The Committee recommends that it is important for road-owning agencies to address discontinuous service lanes to ensure the safety of local traffic and minimize the risks associated with merging the service lanes with the main highway. Continuous service roads offer a dedicated route for local traffic. This reduces the risk of collisions due to merging with the highway. Road planning and design should take into account the needs of the local traffic and ensure provisioning of appropriate infrastructure, including merging lanes, acceleration lanes, deceleration lanes, and proper signage. This will help minimize conflicts between local traffic and high-speed highway traffic, improving overall road safety.

Lack of designed U-turn facilities under the bridges

120. The Committee observes that the absence of U-turn facilities in many of the bridges section often leads to contraflow movements, where vehicles are forced to travel in the opposite direction of the through traffic. This lack of proper U-turn facilities, at times, forces the commuters to ply on the wrong side, and significantly increases the risk of crashes and fatalities on the bridge sections.

121. The Committee recommends implementing U-turn facilities under bridge sections where feasible. These U-turn facilities should have controlled access points, clear signage, and proper lane markings, allowing motorists to make use of it safely.

Inadequate Treatment of Merging and Diverging Points

122. The Committee notes that merging and diverging points serve as critical transition zones where vehicles merge into or diverge from the main flow of traffic. However, it also observes that many of the bridge sections are designed and operationalised without proper merging and diverging points. As a result, inadequate merging and diverging points lead to sudden lane changes, unsafe merging practices, and decreased driver awareness, significantly compromising safety and efficiency.

123. The Committee recommends for providing adequate length for acceleration and deceleration lanes, clear signage, and road markings. Consistent lane designations and traffic control measures, such as traffic signals or yield signs, should be implemented to guide drivers and minimize conflicts. Additionally, regular maintenance and periodic assessments of these points are essential to address any signage obstructions, pavement deterioration, or visibility issues. By implementing these recommendations, bridge sections can facilitate smooth and safe transitions for merging and diverging traffic, enhancing overall traffic flow and reducing the risk of crashes.

V Monitoring mechanisms

124. A robust monitoring mechanism is required not only to oversee the progress of ongoing ROB/RUB projects but also to identify and address any bottlenecks in the project execution.

125. The Ministry of Road Transport and Highways informed that National Highway works are being monitored regularly by Authority's Engineer/ Independent Engineer. In addition, Officers of the Ministry/NHAI/NHIDCL regularly monitor the projects at the field level as well as at the senior officer's level. For improvement in monitoring mechanism, the Ministry informed that IT-based programme management tools such as PMIS, Data Lake have been developed to enable efficient monitoring of the progress of the projects and programme across the entire project lifecycle and to generate Management Information System (MIS) reports for effective decision making.

126. The Committee recommends that a robust monitoring mechanism may be put in place not only to oversee the progress of ongoing ROB/RUB projects but also to identify and address any bottlenecks in execution.

Inter-ministerial coordination mechanism

127. The MoRTH informed that for environment & forest issues, the policy and project- specific matters are regularly taken up with the Ministry of Environment, Forest and Climate Change (MoEF&CC) to expedite clearances and removal of functional bottlenecks. MoEF&CC has taken the initiative for streamlining statutory clearances, especially for the grant of Stage-I and Stage-II forest clearance, e.g. direction for the issue of one-time Essential Details Sought (EDS), not insisting for a hard copy of the proposal. Fortnightly, Regional Coordination Meeting (FRCM) is held to monitor the clearances and expedite forest clearances. In addition, Inter-Ministerial Coordination and Monitoring Committee meetings are held to deal with policy issues and long pending proposals.

128. For ROB/RUBs clearance issues, monthly or bimonthly coordination meeting is conducted by the Chief Bridge Engineer at all Zonal Railway between the Railway Field Unit and Field Units of implementing agencies of the MoRTH. The issues related to ROB/RUBs are discussed in the meeting for early resolution.

Policy-related issues are discussed at the level of Railway Board Level. In this meeting, Senior Officers of the MoRTH and the Railways participate for resolving the issues.

129. The Ministry of Railways informed that Inter-Ministerial coordination issues were a major impediment in the infrastructure sector generally and more particularly, in the road sector. The Ministries of Railways, Civil Aviation, Ports, Shipping & Waterways and Environment, Forest & Climate Change have been participating in Group of Infrastructure (GOI) meetings which are chaired by the Minister of Road Transport & Highways. The 10th meeting of GOI was held on 24.01.2023 and a number of road projects involving issues related to environment clearances, land acquisition, ROBs/RUBs etc., were discussed and resolved.

130. The Ministry also informed that multi-tiered reviews are being undertaken for early identification and resolution of issues affecting NH projects, including ROBs/RUBs driven by digital portals like PRAGATI portal and Project Monitoring Group (PMG) portal. These portals enable monitoring of the status of the issues resolution process of the issues and allow feedback of all relevant stakeholders by conducting periodic meetings. The Secretary, the Coordination in Cabinet Secretariat periodically reviews projects listed in PMG portal with various Ministries and State Governments to resolve the issues affecting the NH and other infrastructure projects. Under PRAGATI, Prime Minister chairs the meeting wherein the status of select critical projects and their issues are reviewed and resolved.

131. The Committee notes that PM Gati Shakti- National Master Plan for Multi-modal Connectivity has provided an excellent platform for integrated planning and coordinated implementation of all infrastructure projects, including ROBs/RUBs, whether on a standalone basis or as part of corridor projects.

132. The Committee recommends that the Government should establish a Central Coordinating Body or a Committee comprising representatives from key ministries involved in road development, namely, the Ministry of Road Transport and Highways, Ministry of Finance, Ministry of Environment, Forests and Climate Change, and Ministry of Railways. This body will facilitate regular communication, coordination, and decision-making among the Ministries. Such a step will also help overcome the delay in construction due to waiting in approval of clearances.

133. The Committee also recommends that the roles, responsibilities, and mandates of each Ministry involved in road development must be clearly defined. It must be ensured that there is clarity on the specific areas in which each Ministry is responsible for and how they interact with other Ministries to ensure time-bound resolutions of issues. This will minimize delay,

overlaps, conflicts, and uncertainties in decision-making and implementation.

134. The Committee feels that there remains a communication gap among the Ministries, leading to avoidable delay. The Committee, therefore, recommends establishing effective communication channels between the Ministries, such as dedicated focal points or inter-ministerial co-ordinating officers. These officers can serve as a single point of contact for communication, coordination, and information exchange between the Ministries.

135. The Ministries should establish mechanisms for information sharing and data integration among the Ministries/ Agencies involved in road development. They can create a centralized repository or platform where relevant data, reports, and project updates can be shared among the concerned Ministries/authorities. This will enable Ministries to access and utilize comprehensive information for decision-making and project monitoring.

Maintenance and upgradation

136. The Committee notes that many service roads across the country have become unusable due to problems like faulty designs, disrepair, encroachments, etc. A thorough inspection of all service roads is needed to assess the needs for maintenance and upgradation.

137. The Ministry of Road Transport and Highways informed that periodic maintenance and upgradation of service roads are always taken up together with maintenance and upgradation of a particular section of road. Maintenance of highway sections, including the service road, during the Operation & Maintenance (O&M) period is the obligation of contractor as per the Contract Agreement. The MoRTH has issued SoP on periodic maintenance, and ordinary repair works *vide* letter dated 23.11.2020.

138. Removal of encroachments is taken up on a periodic basis in accordance with the provision of the Land and Traffic Control Act. Regular drives are conducted by field offices for identifying the encroachments along the RoW and notices are issued as per guidelines. Thereafter, the assistance of Police and State Authorities are sought for removing such encroachments. However, encroachment related activities being dynamic in nature, there is requirement for constant vigil and monitoring. Further, Incident Management Services (Route Patrol Vehicle) are deployed over the stretches/ highways under the jurisdiction of NHAI, which are available 24X7 to avoid encroachments on the highways.

139. The Committee is of the view that the Ministries should conduct regular inspections of ROBs and RUBs to identify any signs of deterioration, structural issues, or maintenance

requirements. These inspections should be carried out by qualified engineers and experts to assess the condition of the built infrastructure. The study assessment should be placed in the public domain and MPs and MLAs of the concerned area may also be apprised about the findings of the inspection report.

140. The Committee recommends the Ministries to evaluate the load-carrying capacity of ROBs/RUBs periodically and consider structural upgrades if required. This may involve strengthening the existing structure, modifying load limits, or implementing weight restrictions to ensure the safety and longevity of the infrastructure.

141. The Ministries/ Agencies must ensure proper lighting and signage along ROBs/RUBs for improved visibility and safety. Installation of adequate lighting systems and prominent signage indicating height restrictions, speed limits, and other important information benefit the road users.

142. With reference to encroachments, the Committee recommends that the Ministries should conduct a comprehensive survey and mapping of the ROB/RUB area to identify encroachments and unauthorized structures by using modern surveying techniques, such as drones or satellite imagery so that proper remedial measures can be taken to get rid of encroachments around the infrastructure.

143. The concerned authorities must ensure to take legal actions against encroachers in accordance with relevant laws and regulations. They should initiate eviction proceedings and enforce penalties for unauthorized occupation. Adequate humanitarian support and assistance should be provided to those affected by encroachment- induced eviction.

144. Further, the Committee recommends that the engagement with the local community and stakeholders should be strengthened to obviate any future encroachments. The relevant NGOs, advocacy bodies and local opinion of leaders may also be roped in to create awareness about non-encroachment of the public infrastructure spaces.

Role of CRRI

145. The Committee notes that the Central Road Research Institute (CRRI) is a premier national research lab constituted by the Council of the Scientific and Industrial Research (CSIR) under the Ministry of Science and Technology (Govt. of India). It carries out R&D in the areas of the road and transportation sector to meet the requirement of the country. It was established in 1952 as a constituent laboratory of the CSIR, pursuing research and consultancy activities related to roads,

railways and airports (runway and Taxi-lane), traffic and transportation, bridge and geotechnical aspects.

146. CRRI informed that it is actively pursuing Research and Development for highway structures, including underpasses, ROBs, RUBs, Flyovers, Road overpasses, etc. Primarily, these structures are constructed with RCC, PSC, Steel, Composites, etc. Therefore, the CRRI has been guiding their innovative design, construction, quality control, post-construction structural safety audit, distress diagnosis, rehabilitation, retrofitting, etc. The CRRI has also pioneered in developing structural health monitoring of these structures. The salient points in this regard are as follows:

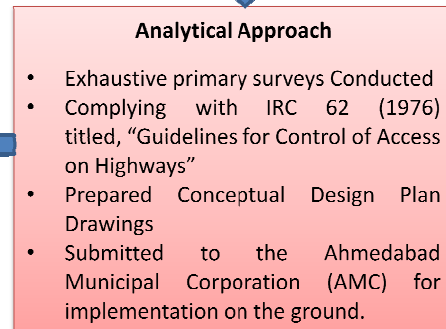
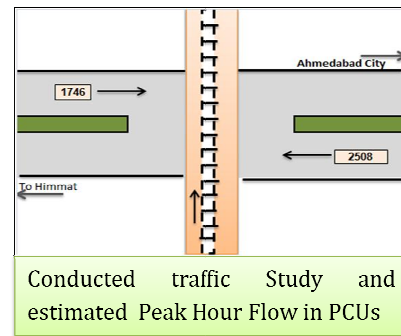
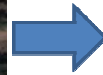
- The construction material evaluations have been done in the laboratory and on-site for various projects sponsored by National and State Highways Agencies from a long-term durability perspective.
- Quality control of elevated structures, including ROBs, Guidance and Monitoring of launching technique used for segmental construction for long-span and long-distance elevated viaducts, bridges, and flyovers.
- Load testing of the structures to verify load-carrying capacity, including ROBs. This technique has proven useful for old, distressed, or rehabilitated underpasses and ROBs.
- Development of techniques for inspection of bridges over long river spans and with very high vertical clearance.
- CRRI has developed a Mobile Bridge Inspection Unit (MBIU), used extensively for hundreds of bridges across India on many highway projects. The use of an inspection platform is also essential for closer inspection of defects in such structures.
- Structural Health Monitoring of the structures, including ROBs, for long-term performance and construction acceptability.
- Inspection of underpasses for structural soundness through non-destructive testing.
- Planning and design of retrofitting measures to enhance the service life.

147. The CRRI also undertakes scientific developments regarding sustainable materials for road construction for ROB & RUB approach embankments and service roads and other indigenous technology and patents.

148. With reference to the traffic study, the CRRI informed that it conducted traffic studies for the junction improvement of major road corridors in Ahmedabad, Gujarat. As part of this survey, the improvement of the Naroda Railway Crossing was studied. This railway crossing is located in the eastern part of Ahmedabad city on the Old NH8 Naroda approach road. A typical plan for a Road Over Bridge (ROB) at Naroda Railway Crossing was submitted to the Ahmedabad Municipal Corporation (AMC) for implementation on the ground. Subsequently, the Ahmedabad Municipal Corporation implemented the short-term and long-term plans submitted by CSIR-CRRI. The assessment and impact is shown below in the picture:



Naroda Railway Crossing, Ahmedabad (Before Study)



Naroda Railway Crossing (After Study)



Courtesy: Central Road Research Institute

ASSESSMENT AND IMPACT OF CRRI TRAFFIC STUDY AT NARODA RAILWAY CROSSING

149. The Committee appreciates the efforts made by the CRRI in the field of road development. However, the Committee is of the view that the CRRI should also come up with binding guidelines for adoption of sustainable technology and materials for road development and the road designs keeping in view the national goals and aspirations.

Role of IRC

150. Indian Roads Congress (IRC) is a self-sustained non-profit organization working for the highway sector without any grant from the Government. The objective of the IRC is to prepare codes, guidelines, manuals, etc., for the road sector. So far, the IRC has published 297 documents. The IRC also holds periodical meetings, seminars, workshops, and annual meet to discuss technical problems regarding latest cutting-edge technology in roads, bridges, etc., and also disseminate technical knowledge of experience amongst highway engineers. The IRC also publishes, or arranges for publication of proceedings, journals, periodicals, and other literature for promotion of the objectives of the IRC, besides advising on priority areas for research connected with road sector.

151. The IRC has a group of 26 Committees, broadly divided into three streams viz. Highway Specifications & Standards Committee (H1-H10), Bridge Specifications & Standards apex committee (B-1 to B-9) and General Specifications & Standards Committee (G-1 to G-7). IRC also had MoUs with international partners like JICA, PIARC, AASTHO and International Road

Federation. In addition, IRC also had collaborations with research organizations like CRRI and Highway Research Stations, Chennai and other Institutions like IITs, NITs, NATPAC, leading consultants, and contractors.

a. Important manuals related to Road, bridges

152. For planning and design of the construction and maintenance of structures like ROBs/RUBs, the IRC has prepared a document titled IRC:SP:90 'Guidelines for Grade Separators and Elevated Structures' which gives details about the Planning aspect, General Features & Geometric Standards, Environmental Considerations, Construction Methods & Constructability Issues, Safety Requirements, Inspection and Maintenance aspects, etc. In addition to this, general features and geometric design standards of ROBs, RUBs are based on numerous relevant IRC Codes/ manuals depending upon category of roads i.e. 2 lane, 4 lane, 6 lane, expressways, urban roads, hill roads, etc.

153. With respect to service roads, the IRC published IRC:SP:19 'Manual for Survey, Investigation and preparation of Road Projects' which gives details about stages in project preparation, guiding principles for route selection and alignment improvement, survey of socio-economic profile, traffic surveys and analysis, reconnaissance survey, topographic survey, environmental impact assessment & rehabilitation and resettlement study, feasibility report, staking final alignment on ground, soil and materials surveys, road inventory and condition survey, drainage studies, preparation and presentation of DPR, pre-construction activities & project clearances, etc.

154. Further, IRC:SP:09 which deals with traffic surveys has been revised in 2022 based on the latest equipment available for traffic surveys. This document also covers information regarding current traffic, generated traffic and induced traffic.

b. IRC Initiatives- training, workshops and seminars

155. With reference to the initiatives taken, IRC informed that it regularly organizes seminars and workshops both at the international and national levels in order to pool the latest knowledge from experts on various topics of importance connected with roads and bridges and to disseminate the knowledge to practising highway engineers. The IRC has organized national/ international Seminars, national/ regional workshops on various important topics and beneficial to highway engineers / professionals. The details of seminars and workshops organized by the IRC during the last 05 years are provided in **Annexure V**.

c. Compliance of IRC guidelines

156. The Committee was informed that all the implementing agencies for the road sector, especially, under the Ministry of Roads, Transport & Highways like the NHAI, NHIDCL and PWDs, are scrupulously following the IRC guidelines. However, modifications if any, are effected through administrative orders of the MoRTH as and where required.

157. IRC informed that the Compendium for Road Over Bridges (ROBs) on Indian Railways (Report BS-132)” published by RDSO, Lucknow is a compilation of good practices adopted in planning of ROBs, launching operations and to create a repository of drawings in use over Indian Railways for adoption in railway span. In this Compendium, it is mentioned that for developing design and drawings various IRC & BIS Codes and Special Publications are helpful. Details of important IRC document refereed in Indian Railways (Report BS-132) Compendium are as under.

- IRC SP:73-2018 ‘Manual of Specifications and Standards for Two Laning of Highways with Paved Shoulder’,
- IRC SP:84-2019 ‘Manual of Specifications and Standards for Four Laning of Highways’
- IRC SP:87-2019 ‘Manual of Specifications and Standards for Six Laning of Highways’,
- IRC 5-2015 ‘Standard Specifications and Code Of Practice for Road Bridges, Section -I General Features of Design’,
- IRC 6-2017 ‘Standard Specifications and Code of Practice for Road Bridges, Section-II – Loads and Stresses’,
- IRC SP:69-2011 ‘Guidelines and Specifications for Expansion Joints’,
- IRC 22-2015 ‘Standard Specifications and Code of Practice for Road Bridges, Section-VI – Composite Construction’,
- IRC 24-2010 ‘Standard Specifications and Code of Practice or Road Bridges, Section-V – Steel Road Bridges’,
- IRC 83 ‘Standard Specifications and Code of Practice for Road Bridges, Bearings’,
- IRC 112-2020 Code of Practice for Concrete Road Bridges’,
- IRC:78 - IRC 78-2014 Road Bridges Foundation and Substructure’,
- IRC: SP:105 Explanatory Handbook to IRC:112 Code of Practice for Concrete Road Bridges’,

158. IRC: SP:90 ‘Guidelines for Grade Separators and Elevated Structures’ is a separate document covering exclusive details about grade-separated structures like flyovers, interchanges, elevated structures, viaducts, underpasses / overpasses, ROB, RUB and LHSs, etc. In order to design any type of such structures, numerous IRC codes needs to be used like for planning & other geometric requirement (IRC:5), bridge loading (IRC:6), project preparation (IRC:SP:54), foundation (IRC:78), super- structure (for concrete bridges structure (IRC:112), for steel bridges structure (IRC:24) & for composite bridges structure (IRC:22), bridge bearings (IRC:81 , part 1, part 2 , part 3 & part 4), bridge Expansion joints (IRC:SP:69), quality control (IRC:SP:112), mandatory/cautionary/ incriminatory Signage (IRC:67), Marking (IRC:35), Pedestrian Facilities (IRC:103) , etc. All these publications are being periodically updated /revised based on the

experience gained and developments in technologies abroad. In doing so, the IRC Technical Committees constituted for the purpose do refer to the International Codes of Practice and Specifications.

159. RDSO (Report BS-132) Compendium is in compliance with existing IRC codes. The compendium for Road Over Bridges (ROBs) on Indian Railways (Report BS-132) published by RDSO which is based on their proven and best practices is being adhered while preparing GADs of Structures across rail tracks in the Highway Projects.

160. There is scope for bringing new technologies, introducing new materials such as GFRP, CFRP, Aluminium, Carbon Fibre Cables, Minimizing material consumption by better designs, lighter & aesthetically appealing structures with associated strength and stability issues to address.

161. The IRC has Committees for accreditation of different New Materials which could be used on Trial basis in Highway projects for a limited period. The successful ones among them could be used by the Professionals / Govt. Departments as per requirement.

162. The Committee in this regard recommends that compliance with IRC guidelines must be made a mandatory requirement for all road development projects. Further, the Committee suggests that independent third-party audits should be conducted to assess compliance with IRC guidelines. Engaging qualified auditors who are familiar with IRC guidelines can provide an unbiased evaluation of project compliance and identify any gaps or non-compliance issues that need to be addressed.

163. The Committee further notes that effective implementation of Rule 166 of the Central Motor Vehicles Rules (CMVR) can ensure road safety. Rule 166 (dealing with road, design, construction, and maintenance standards) under the Central Motor Vehicle Rules, 1989⁷, was added via G.S.R 584(E), dated 25th September 2020 (w.e.f. 1-10-2020) to give effect to Sec 198A of the Motor Vehicles (Amendment) Act, 2019. The rule states as follows:

“(1)The design, construction, and maintenance of national highways shall be in accordance with the standards and specifications of the Indian Road Congress (IRC) as may be applicable, or any other instructions or guidelines issued by the Central Government from time to time...”

164. The Committee notes that the IRC guidelines are mammoth in nature, as there are over 200 guidelines introduced and renewed by IRC since it was established in December 1934. Currently, the IRC guidelines include a range of subjects like the method of recording accidents, and practices for road users, apart from the guidelines on road, design,

construction, and maintenance. Therefore, for effective implementation of the codes pertaining to road design, construction, and maintenance by the designated authority, contractor, consultant, or concessionaire, it is imperative that such IRC guidelines be specifically called out under Rule 166 CMVR, or else there will be chances on missing out important standards at any point while implementing road safety standards at all or any of the three stages.

d. Fund allocation and support to IRC

165. IRC informed that so far IRC has not received any kind of earmarked budget for carrying out comprehensive guidelines/manual on road surveys and road development by IRC. The Ministry is sanctioning all the priority areas and the research work for R&D requirements.

166. The Committee recommends that the Ministry may consider deputing some officers having interest and inclination toward standardization, R&D to work in the IRC. Also, the Ministry may consider providing a reasonable amount of corpus seed fund to the IRC to manage the function of its Secretariat, the modalities of which may be worked out in consultation with the IRC.

167. Further, since the Technical Committees, Apex Committees, Highway Research Board and its Committees are involved in the preparation of initial drafts, reviewing critically the draft prepared, state-of-the-art reports, explanatory handbook on Codes with solved examples, etc., the Ministry may consider providing them support through budgetary allocation for their works including for bearing expenditure on intercity travels, accommodation, local travel, and honorarium.

168. The Ministry may provide budgetary allocation to the IRC to organize workshops, seminars, and webinars in order to disseminate the knowledge on latest IRC guidelines to the practicing highway engineers in the interest of creating a large pool of engineers with knowledge on the cutting-edge technology in the rapidly evolving road design and engineering sector.

The Committee may be apprised of the decision taken in these matters, giving reasons thereof.

VI

Adoption of best practices

169. As countries strive to improve their transportation networks and address increasing traffic demands, adopting best practices in the planning, design, construction, and maintenance of ROB/RUBs and service roads becomes crucial.

Global perspective

a. Entry/exit at service roads

170. The Committee suggests that entry/exit at service roads must be designed for a Single/Intermediate Lane of Entry or Exit (IRC:SP:87-2013), and the same will be applicable in the case of Slip Lane too. The picture below explains it after comparing to Switzerland:

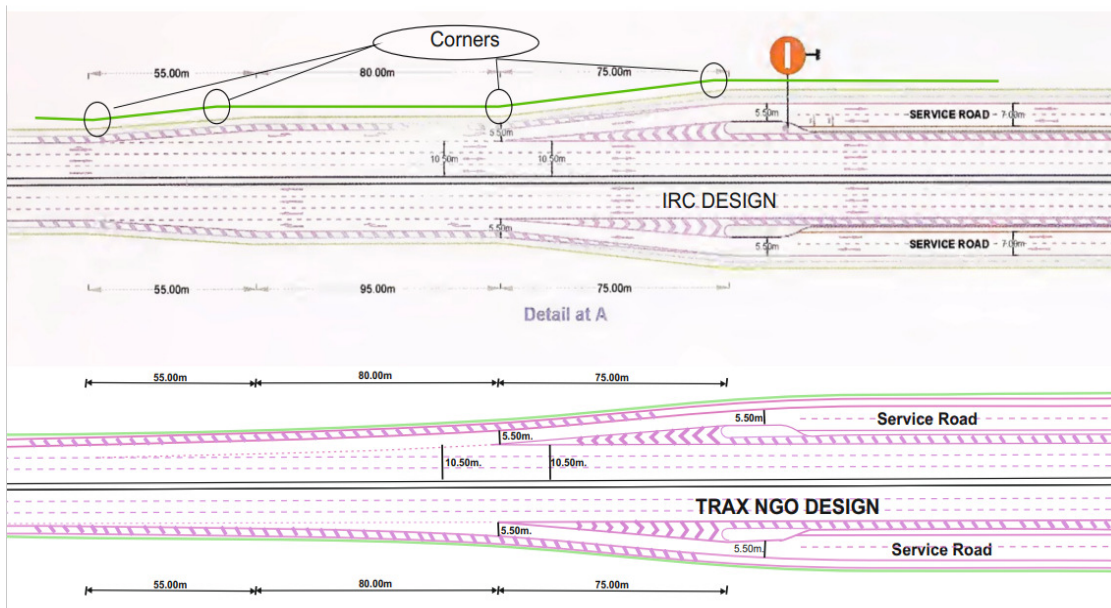


Figure showing difference in entry/exit in India and Switzerland

Courtesy: TRAX S. Society, NGO

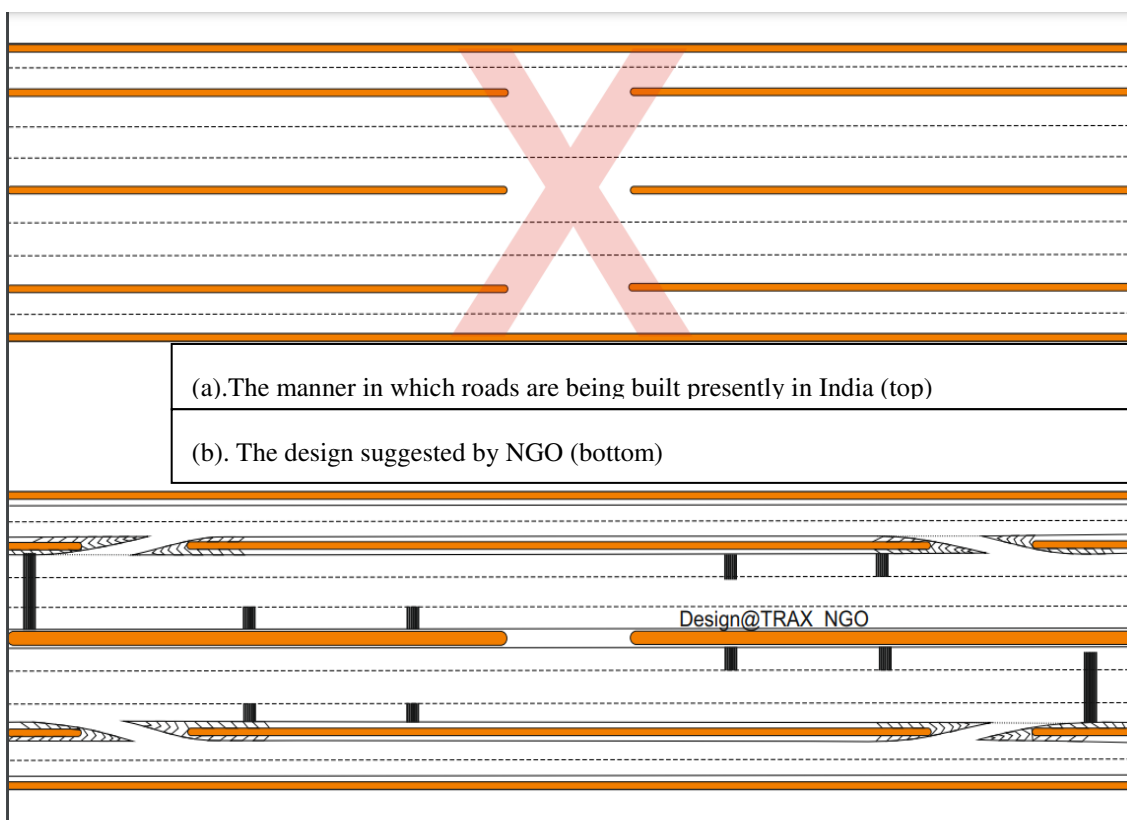
171. The Committee notes that TRAX, NGO has suggested a change in design which is provided

below:



New design as suggested by TRAX, NGO

172. The picture placed below at (a) shows how roads are being built at present in India. The image below it represents the international Standards being followed worldwide. **The Committee, accordingly, recommends that the Ministry must examine the feasibility of adopting and implementing the proposed design suggested at (b) which is based on international standards.**



(a).The manner in which roads are being built presently in India (top)
 (b). The design suggested by NGO (bottom)

Design

suggested by NGO

Courtesy: TRAX S. Society

b. Lane marking and Gore area marking

173. Lane marking, especially Shoulder Line and Gore Area Marking is generally absent in India. However, in foreign countries like Dubai, the markings are clearly done. The difference is clearly visible in the picture placed below:



Figure 1. Lane Marking and gore area marking in India



Figure 2. Lane Marking and gore marking in Dubai



Figure 3. Picture showing gore marking in Sri Lanka

Induction of new technologies

174. Technology is the mainstay in developing world-class infrastructure in the country. The Committee notes that one of the mandates of the Bridge and Structures Directorate of the RDSO is the development and adoption of new technology for bridges and related structures.

175. The Indian Railways informed that it has continuously adopted the latest technologies and has upgraded its designs and standards in line with the world's technology. This has been done in all walks of the domain of Bridges and structures, whether it is design or product or the process. A brief of all such new technologies adopted by RDSO in the field of ROB's and RUB's is given below-

- a) Adoption of Composite Steel Girders for ROB's
- b) Achieving longer span designs.
- c) New standards for RDSO approved Fabrication workshops
- d) Design innovations- Fully Welded Bow String Girder.
- e) Use of advanced bridge bearings- Spherical Bearings
- f) Adoption of the latest welding process.
- g) Adoption of latest High Strength Friction Grip Bolts.
- h) Adoption of Shear Studs in place of Shear Connectors.

176. Following Process improvements have been done by RDSO:-

- i. RDSO has issued a MODEL Quality Assurance Plan for all cases of fabrication of RDSO standard spans of Road Over Bridges to reduce time taken in approval.
- ii. Fabrication of ROB steel girders is mandatorily done in RDSO-approved workshops.
- iii. Simplification of vendor approval system for the enlistment of vendors for girder fabrication.
- iv. Various methods for launching RUB's are as follows-
 - Cut and Cover method
 - Temporary Girders
 - Box Pushing- with cutting edge and with Air Pushing
 - Segmental and single-piece launching

All of these methods are frequently used by the Zonal Railways depending upon the field conditions.

177. The Indian Railways further informed that the adoption of technology of advanced nations is taken up cautiously as these are connected with the safety of rail and road users. Only proven technologies are adopted, considering the market capability. In most cases, India is at par with the advanced nations. IR is adopting the conservative approach as rail safety is prime concern as also the priority.

178. The Committee notes the reply of RDSO, Indian railways that in most cases, India is at par with the advanced nations. However, the Committee suggests adopting Building

Information Modelling (BIM) technology which enables the creation of detailed 3D models that integrate various aspects of the ROB/RUB development process, including architectural, structural, and utility design. Further, Virtual Reality (VR) and Augmented Reality (AR) technologies can also be used to provide immersive experiences and simulations during the design and construction phases of ROB/RUBs. They allow engineers and project teams to visualize and interact with virtual models, facilitating better design review, construction planning, and stakeholder communication.

179. The Committee also emphasizes on usage of Advanced Construction Materials such as fiber-reinforced polymers (FRPs), high-performance concrete, and composite materials to enhance the durability, strength, and lifespan of ROB/RUBs. These materials offer improved resistance to corrosion, seismic forces, and other environmental stress factors.

180. Artificial Intelligence (AI) enabled Intelligent Transportation Systems (ITS) technologies can be integrated into ROB/RUBs to enhance road safety and better traffic management. These include systems for automated traffic control, real-time monitoring of road conditions, traffic signalling, and vehicle detection. ITS can improve the efficiency of traffic flow, reduce congestion, and enhance overall safety.

181. Smart Sensors embedded in ROB/RUBs can continuously monitor the structural health, detecting and alerting to any anomalies or signs of deterioration. SHM systems provide real-time data on the structural integrity, stress, vibrations, and deformation of the infrastructure, facilitating proactive maintenance and preventing failures.

182. The Committee also recommends the usage of Geospatial technologies, such as Geographic Information Systems (GIS) and remote sensing, to enable accurate mapping, analysis, and visualization of the project area. These tools assist in land surveying, route planning, environmental impact assessment, and site selection for ROB/RUB development.

Private Sector Participation

183. The RDSO informed that it is collaborating with private players with the help of the following mechanisms-

- a) Cross-Approval Policy
- b) Feedback on Draft specifications from the private industry before finalization of specification.
- c) Vendor registration system
- d) Engagement with Innovators/ Startups and Entrepreneurs to develop cost-effective,

implementable, innovative solutions.

- e) Rail exhibition event for private players to showcase their innovative products and solutions for the Railway industry.

184. The Committee is of the view that the Ministry should conduct comprehensive feasibility studies to assess the viability of implementing PPP models for ROB/RUB development. The Ministry should evaluate factors such as project size, revenue potential, market conditions, and potential private sector interest. Feasibility studies will provide valuable insights into the suitability of PPP and help in making informed decisions.

185. The Committee recommends that an assessment of legal and regulatory framework should be pursued to evaluate the existing legal and regulatory framework and to identify any barriers or limitations to implementing PPP in ROB/RUB development. The Ministry should also identify necessary amendments or new legislations required to facilitate PPP arrangements, ensure transparency, and provide a favourable business environment for private partners.

186. The Committee also suggests that the Ministries should establish transparent and competitive procurement processes to attract capable private entities. They should also implement a fair and competitive bidding process that encourages multiple private sector players to participate.

187. The Ministry should engage with various stakeholders, including local communities, transport authorities, private sector entities, and financing institutions, seeking their input and addressing any concerns or expectations they may have. The Ministry should also foster partnerships and collaboration to enhance the success and sustainability of PPP projects.

Sustainable and environment-friendly roads

188. The IRC informed that it has been making efforts to align itself to global initiatives of environmental strategy for the promotion of cleaner and energy-efficient construction techniques, resource efficient measures, use of recycled pavements, use of waste material, etc. The IRC has framed/ revised relevant code and guidelines which are very innovative and first in the world i.e., use of shredded waste plastic (IRC: SP:98) in pavement construction. This environment-friendly technology helps to achieve higher resistance to water-induced damage leading to the deformation of pavements. Numerous new/revisions are published by the IRC in the last 16 years for adoption by road user departments, are given in **Annexure VI.**

189. The CRRI informed about the usage of different waste materials like steel slag waste in

collaboration with different industries like MNS, JSW Steel, Rashtriya Ispat Limited and Tata Steel to construct a bituminous road in Arunachal Pradesh. In Odisha, Alumina waste has been utilised for road construction. Also, the CRRI works on the development of different new materials out of waste, including the waste plastic.

190. The CRRI has carried out detailed R&D studies on various industrial wastes, *viz.* Fly ash; Copper slag; Steel slag; Red mud; Chrome slag, Jarofix and Phosphogypsum; and has developed technical design specifications for their use in Embankment/granular layers; Bituminous/concrete mixes. Experimental test tracks along actual highways have been laid with the support of the waste-producing industry and concerned stakeholders. Different Indian Roads Congress (IRC) code of practices *viz.* IRC: SP-121 (2018); IRC-SP-132 (2022); have been published for their utilization by different stakeholders. The CRRI has also investigated the utilisation of urban Construction and Demolition wastes (C&D) wastes for road construction. The details of using C&D wastes (CRRI reports/case studies) are published in IRC:121-2017.

191. The CRRI has also adopted noise barrier designs in Mumbai by the usage of noise barrier materials like Honeycomb patterns, sponge patterns and grass patterns, which can reduce noise levels by 30 dB.

192. The Committee appreciates the innovative efforts made in the direction of construction of environmentally sustainable roads. However, it feels that given the national aspirations to gradually move towards a zero-waste circular economy, more measures should be taken in this regard. The Committee suggests that the Ministries should adopt features like rain gardens, bioswales, and permeable pavements to manage stormwater runoff and improve water quality. Green infrastructure can help recharge groundwater, reduce the load on drainage systems and help enhance biodiversity in roadside areas.

193. The Ministries should also implement Sustainable Drainage Systems (SuDS) to manage surface water runoff from roads. SuDS techniques include infiltration basins, constructed wetlands, and detention ponds that mimic natural hydrological processes. SuDS can reduce the risk of flooding, promote groundwater recharge, and improve water quality by removing pollutants.

194. The Ministries should also encourage road design that optimizes energy efficiency. This can include factors such as minimizing excessive grades, optimizing alignment to reduce vehicle energy consumption, and incorporating intelligent transportation systems (ITS) to

improve traffic flow and reduce congestion-related emissions.

195. The Committee also recommends that the Ministries can explore opportunities to integrate renewable energy sources into road infrastructure. This can include incorporating solar panels into noise barriers or utilizing solar-powered lighting along roads. Renewable energy integration can help reduce dependence on fossil fuels and contribute to a more sustainable transportation network.

196. The Ministries should enhance Environmental Impact Assessments for road projects to evaluate the potential ecological, social, and cultural impacts. Further, such assessments should be placed in the public domain. Assessment of the project's potential effects on ecosystems, habitats, and natural resources should also be undertaken to develop appropriate mitigation measures to minimize negative impacts.

Need for VUP/CUP

197. The Committee notes that Vehicle Underpasses (VUPs) enhance road safety by providing a dedicated passage for vehicles to pass beneath a road or highway. VUPs help maintain smooth traffic flow by eliminating the need for vehicles to cross the road at grade. VUPs optimize land utilization by utilizing the space underneath the road, which might otherwise be unused or would have required costly land acquisition. Similarly, Cattle Underpasses (CUPs) facilitate the movement of livestock, minimising stress and potential harm to them.

198. The Committee reiterates that CRRI's suggestion that wherever the highway passes through built areas, the need for VUP/ Light Vehicular Underpass (LVUP) must be built as part of Road safety Audit (RSA) report conforming to IRC: 84 (2019) or IRC: 87 (2019), including the provision of half-subway, i.e. depressed Pedestrian Under Pass (PUP).

Good Samaritan Law

199. The NGOs that appeared before the Committee, informed that currently, the promotion of the 'Good Samaritan Law' is focused on two aspects;

- (i) A Good Samaritan will not be questioned/harassed by the police or doctors and
- (ii) He or she is entitled for a reward for such a good act.

200. A 2018 study by SaveLIFE Foundation revealed that only 16% of the respondents were aware of the good Samaritan Law. Further, while 88% of the respondents were willing to become Good Samaritans in the event of a road crash, only 12% reported that they would call the police in the event of a road crash, and less than 30% of the respondents were either willing to call an

ambulance or take the victim to the hospital. The current steps to ensure awareness and training on Good Samaritan law are inadequate for law enforcement agencies and medical professionals, let alone civilians. 201. Section 134A of MVAA 2019 protects a good samaritan from any civil or criminal action while providing emergency medical care or other required assistance to a road crash victim. Still, a lot can be done under this to ensure the enforcement of the Good Samaritan Law.

202. The Committee further notes that India records more than 1.5 lakh road traffic-related deaths. As per the study conducted by the AIIMS and NITI Aayog in 2021, 98.5% of the victims are dead due to lack of pre-hospital care and injury prevention during the golden hour. The Provider Course Manual for Paramedics National Emergency Life Support, released by the Ministry of Health and Family Welfare in 2022 (post MVAA 2019), covers a comprehensive syllabus for paramedics and doctors on emergency care but does not provide comprehensive coverage on the Good Samaritan Law. It is crucial for such training materials to cover the Good Samaritan Law in greater detail to enhance the legal awareness of medical professionals on their rights and responsibilities; awareness on the risks associated with providing emergency care; the level of assistance they can provide without facing legal actions; engagement and discussion; proper communication and documentation for easy references. Training and Manuals like these form the basis of emergency care.

203. The Committee notes that the Good Samaritan may not be properly trained in handling/assisting an injured person. Medical professionals are already aware and trained in handling such situations. However, currently, there is no training available for 'Good Samaritan Law', only awareness.

204. The Committee further notes that personnel from Law Enforcement Agencies need to be trained in proper first aid procedures as they often play the role of 'first responder' in case of a road accident. They do get trained in certain kinds of training in this regard but what kind of medical equipment they carry, how effectively they implement the procedures they learn and efficacy of such training in real life situations is still questionable.

205. The Committee notes that Several state statutes in the US have the concept of liability immunity and protection. The concept of liability immunity enhances the good samaritan law a step further by providing immunity to the good samaritans from any unintended consequences that may occur while providing assistance to injured persons. Liability protection safeguards the medical, healthcare and trained emergency care professionals who voluntarily render medical

emergency services. While both these provisions vary from state to state - some states protect both civilians and trained professionals and some safeguard only one section. This approach can help the enforcement of Good Samaritan Law further by addressing the core fear of legal accountability among the potential Good Samaritans.

206. Another striking feature of the US state statutes is voluntary emergency care training provisions where civilians can get free training for emergency road accident situations. This expands the ambit of Good Samaritan Law as far as awareness and enforcement is concerned.

207. In France, the Good Samaritan Law goes by the name: Duty to rescue if the Samaritans are in a position to do so, making the Good Samaritan act a duty rather than a voluntary act. This approach may have its own issues in a country like India, where the current level of awareness and Good Samaritan actions are low. This approach, although, may be explored at a later interval when some level of success has been achieved in awareness regarding the Good Samaritan Law.

208. Incentivisation has proved worthy to encourage voluntary citizen engagement in several other countries. China awards witnesses who provide evidence of Good Samaritan's acts¹¹. The GSL Scheme grant of Award to the Good Samaritan who has saved the life of a victim of a fatal accident is a positive step in this regard. The official numbers of the grants distributed have not been released to gather any information regarding the success of the scheme.

209. The Committee recommends that first aid education for every police personnel must be mandatory along with their regular training. All Police PCRs must be equipped with the requisite first aid equipments and items, etc.

210. Further, the scope of the 'Good Samaritan Law' must be enlarged beyond helping a road accident victim. Victims of natural calamities like drought and flood, fire incidents, or victims of any medical condition, etc. must be included in the ambit of 'Good Samaritan Law', as the nature of helping victims of above situations, is identical with the road accident victims and hence must be part of Good Samaritan Law.

211. The Committee feels that for reaping the best results out of 'Good Samaritan Law'; mass training and awareness is needed. 'Scouts & Guide' system which used to be in schools earlier can be truly instrumental in this regard. 'First Aid Training' and handling and assisting a person injured in a road accident or in any natural calamity, is an essential part for every student trained under the 'Scout and Guide' System. This needs to be resurrected in all schools and the Ministry should appropriately sensitise and take up with the concerned

authorities for building citizenship rooted in sublime values.

212. The Committee also recommends sensitizing the police of its duties and responsibilities during such a situation. Increased fund allocation to public funded hospitals has the potential to establish robust emergency care units, besides creating adequate infrastructure. Police and judiciary must be adequately sensitized so that they remain alive towards the protection of Good Samaritans.

213. To provide for accountability of various Government authorities and encouragement for Good Samaritans, the Committee recommends that a “Grievance Redressal Mechanism” be instituted nationally. The new section 134A of the MVAA 2019 protects the Good Samaritans but does not guide one over the breach of the obligations of the police and the hospital. Since these subjects are a part of state lists, the states must be encouraged to come up with rules regarding the grievance mechanism in case of breach of compliance.

214. Besides, campaigns to increase the awareness of the rights of Good Samaritans must be undertaken to educate the public. Further, in pursuance to the guidelines for Good Samaritans issued by the Ministry of Health and Family Welfare mentioned therein, both public and private hospitals and police stations must publish the charter on the rights of Good Samaritans. This will go a long way in encouraging the spirited public and help greater information dissemination on right of the good Samaritans.

VII

Miscellaneous

Members of the Committee also raised following issues regarding ROBs/RUBs in the country:

- Emphasis on NHAI to provide information regarding patches for opening retail outlets on NHs so that oil marketing companies can put up their advertisements and proper guidelines regarding NoC of retail outlets for promoting Ease of Doing Business;
- Current construction status of six by-pass roads near Rajahmundry viz. Diwancheruvu ROB, Gammon India ROB, Rajanagaram ROB, Lalacheruvu ROB, Bommuru ROB and Vemagiri ROB;
- Requirement of bridge on Godavari river from Devarapalli to Maredumilli to bypass Rajahmundry city and to reduce distance;
- Construction status of the National Highway connecting Hajipur to Sonapur and NH- 527C, Muzaffarpur bypass connecting Ramdayalu to Motihari and Old NH-77 in Bihar.
- Delay in construction and bad condition of Himmat Nagar-Jaipur-Delhi highway, Ahemdabad-Radhanpur National highway, Bechraji-Mehsana highway, Hajipur-Sonpur NH, NH 527 C and Muzzafarpur Bypass etc;
- The number of surveys and investigations conducted on ROBs on NH 29 in Nagaland connecting Maligaon to Imphal, which has one ROB that was inaugurated in 1973 and the upgradation/ repair of one road from Mon headquarters to Nimonagarh, Charaideo (Assam) via Hongphoi village along with the construction of a road from Y-anner to Mundun Heritage Model village.
- Report of surveys conducted on NH-58, NH-52, NH-11, NH-10, the money spent on these surveys and the consultant monitoring them;
- The issue regarding NH16 and NH 216 A from Visakhapatnam to Vijayawada;
- Water-logging issues in RUBs in Bhandara-Gondiya constituency and other places including Minto road in New Delhi;
- Starting construction work of Mehsaul ROB in Sitamarhi to prevent the death of patients due to obstruction of ambulance movement caused by traffic blockage ;
- Need for increasing manpower at the railway crossing in Arunachal Pradesh (Murkongselek to Pasighat) along with the requirement of construction of ROBs/RUBs in the area;
- Issue of repairing of ROB at NH-29 in Manipur as also increasing the number of spans to be repaired and widening the same. In addition, traffic problem on ROB due to the absence of railways in Manipur was also flagged;
- Road accident on NH-66 Kovalam- Mukkola stretch due to unscientific road construction;
- Status of completion of upgradation on economic corridor connecting five states to a six-lane

highway and two-lane service road on either side;

- Status of 6 lane road tunnel being constructed along Wadakkanchery -Thrissur Section of NH-544 near the Kuthiran hills in kerala- the reasons for its delay and the estimated time line for its completion;
- Provision for adequate lighting arrangement inside the tunnels in Konkan Railway especially during monsoon season.
- The implementation of all the proposed provisions of the Motor vehicle Amendment Act 2019 (MVA Act 2019) needs to be made more effective.
- The National Road Safety Board should be formed as early as possible.
- Child Road Safety standards for helmet and headgear are needed to be notified by the Ministry.
- There is a need for critical analysis of reason for missing the road safety targets to reduce accidents, deaths and injuries by 50% by 2025 and further requirement of robust action plan for achieving the same by 2030.
- The speed limits on the express ways needs to be reduced up to 100 kmph instead of 120 kmph as it is the main reason for accidents, deaths and injuries. Further, the Ministry of Road Transport and Highways and States should come up with speed management guidelines or policies at the earliest.
- The relaxation in norms for pillions in Kerala wherein children who are under 12 years of age can be carried with two others on two wheelers must be withdrawn with immediate effect.

RECOMMENDATIONS AT A GLANCE

Construction of ROBs and RUBs

The Committee appreciates the increase in annual average progress in the number of Level Crossings (LCs) replaced with Road-Over-Bridges and Road-Under-Bridges. However, it also notes that the target of replacement of 1100 LCs set for 2023-24 is lower than the annual average of 1207 progress achieved during 2014-2023. The Committee is of the view that the target should be increased and the pace of replacement of LCs with ROBs/ RUBs should be expedited in the interest of greater safety and seamless mobility of the commuting public.

(Para 10)

Progress of projects under the Setu Bharatam Programme

The Committee notes that only 25% of ROB/RUB projects have been completed since the inception of the Setu Bharatam scheme in March, 2016. The construction of the ROB/RUB projects indicates staggered growth. The majority of the projects are either in progress or have not been started as yet. The Committee recommends that the Ministry makes concerted efforts to achieve the aims and targets of the Setu Bharatam Programme. If needed, Ministry should increase the allocation of funds under this programme for timely construction of ROBs/RUBs. Also, the Ministry should strive towards completing all the pending ROBs/RUBs projects in a time-bound manner to ensure safe and smooth flow of traffic besides minimising road fatalities.

(Para 12)

Construction of Service Roads

The Committee notes that the National Highways (Land and Traffic) Act, 2002 provides for control of land within the National Highways, right of way and traffic movement on the National Highways and also for removal of unauthorized occupation thereon.

(Para 16)

The Committee while taking note of the utility of service roads recommends that NHAI should put up signboards along the service roads on the highway, indicating that the traffic on these roads is two-way and not one-way. City commuters are under the impression that the traffic on the service roads is one-way. This creates hurdles for those coming from the opposite direction. Service roads should have painted arrows directing two-way traffic on the stretch.

(Para 17)

Elimination of Level crossing

The Committee notes with satisfaction that all unmanned level crossings on Broad Gauge have been eliminated by January 2019. However, existence of 559 Unmanned Level Crossings in both Metre Gauge and Narrow Gauge needs to be replaced with ROB/RUB expeditiously in a focused and time bound manner.

(Para 19)

MoU between the Ministry of Railways and the Ministry of Road, Transport and Highways regarding the construction of ROBs/RUBs on National Highways

In this regard, the Committee underscores the need for replacement of LCs with ROB/RUB on priority and recommends that the Ministry should examine whether there is proper co-ordination between the Railways and Central/ State Governments in identifying, prioritizing and allocating resources to various ROB/RUB projects sanctioned.

(Para 27)

Status of ROBs/RUBs/Level Crossings on National Highways

The Committee notes that out of total 405 Level Crossings on NHs, only 24 have been completed, and around 213 LCs, the work is under process, or the GAD approval is awaited. The Committee also observes that in around 135 cases, approval is pending on the part of NHAI. The Committee takes note of the fact that only 6% of the LCs have been successfully replaced with ROB/RUB. The Committee suggests that a dedicated inter-agency co-ordination mechanism involving railway authorities, road transportation agencies, local governments, and other relevant stakeholders may be put in place to ensure effective planning, fund allocation, and timely implementation of level crossing elimination projects in a time bound manner.

(Para 29)

The Committee recommends the Ministry/ NHAI to implement a robust monitoring and evaluation system to track the progress of level-crossing elimination projects. The Committee urges upon the Ministry/ NHAI to regularly assess the effectiveness of implemented measures and identify areas for further improvement.

(Para 30)

Status of Level Crossings (LCs) and Road over Bridges/Road under Bridges (ROBs/RUBs) on Indian Railways

The Committee notes that there are still 427 Manned Level Crossings on National Highway (NH) and 954 on State Highways. Given the unfinished task at hand, the pace of construction of ROBs/RUBs on Railway Level Crossings needs to be accelerated to avoid accidents, clear congestion and ensure dependability of road transportation. The Committee, therefore, recommends the Ministry to expedite the progress of eliminating level Crossings in a time-bound manner.

(Para 32)

Present Road Survey Guidelines

The Committee notes that the NSV data being technical in nature is of limited utility for the general public. The Committee, however, feels that the survey data must be made public so that the organizations and NGOs related to road sector can make use of it in strengthening policies.

(Para 38)

The Committee also notes that in the case of ‘New Highway Construction Projects’, ‘Compromising Stages’ along with ‘Solutions’ must be added in each survey mentioned under ‘Road Survey Guidelines’ and be a mandatory part of DPR. Further, the detailed design of highways of Merging and Diversion, Intersection, Cuts and U-Turns including drawings, etc., prepared by the Contractor must be proof checked by IIT/NIT before its approval by NHAI and must be uploaded in public domain on NHAI Portal. The Committee recommends that the road safety measures being integral to the road projects must be strictly implemented, so that the varied levels of road safety will validate or otherwise the road design and engineering, which in turn, can help develop the standard of road safety.

(Para 39)

Analysis of existing road survey guidelines

The Committee notes that community engagement plays a crucial role in road construction projects as it caters to the needs, requirements, and difficulties faced by the local communities. These communities often experience disruptions in their daily lives due to construction of highways.

(Para 43)

The Committee observes that a notable limitation of the existing guidelines, particularly for highways and expressways, is the lack of emphasis on community engagement and the impact of road projects on local communities.

(Para 44)

Incorporating the elements of community engagement into the guidelines would involve measures such as conducting public consultations, holding informational sessions, and actively seeking feedback from the affected community. By involving local residents, businesses, and other stakeholders in the decision-making process, road construction projects can better serve their specific needs and mitigate potential negative impacts. This may include implementing traffic management plans, providing alternative routes, adjusting construction schedules to meet local requirement or minimising disruption.

(Para 45)

Use of technology for inspections

Modern technology for periodic inspection of ROB/ RUBs can help in the early detection of damage, minimize human errors and lower maintenance costs. The Committee, therefore, feels that more steps should be taken to adopt modern technology for inspection of ROB/RUBs. Drones equipped with high-resolution cameras and sensors can be used to capture aerial imagery of ROB/RUBs, providing a detailed visual assessment of the structure's condition. The images can be analysed further to identify any signs of damage, deterioration, or structural weakness. Drones are particularly useful for accessing hard-to-reach areas and can significantly reduce inspection time and costs.

(Para 47)

Laser scanning technologies, such as LiDAR, can be used to generate accurate 3D models of ROB/RUBs. LiDAR sensors emit laser pulses and measure the reflected light, creating precise point cloud data. This data can be used to assess the geometry, dimensions, and deformations of the structure, detecting any irregularities or deformations that may indicate structural deficiencies.

(Para 48)

Ground Penetrating Radar (GPR) should be used to penetrate the ground or structure, allowing for subsurface inspection of ROB/RUBs. It can identify hidden defects, such as voids, delamination, or corrosion in concrete or steel elements. GPR can provide valuable information on the internal condition of the structure without the need for invasive investigations. Structural Health Monitoring (SHM) Systems should be adopted to involve the installation of sensors and monitoring devices on ROB/RUBs to continuously monitor their structural behaviour. These sensors can measure parameters like vibrations, strains, and deflections, providing real-time data on the performance and health of the structure. SHM systems enable early detection of structural abnormalities and help in proactive maintenance and intervention.

(Para 49)

Non-Destructive Testing (NDT) Techniques, such as ultrasonic testing, magnetic particle testing, and radiographic testing, can be employed for ROB/RUBs inspection. These techniques assess the integrity of structural components, detect cracks, weld defects, or corrosion, and identify potential failure points. NDT methods are typically used in combination with visual inspections to provide a comprehensive assessment of the structure's condition.

(Para 50)

Data Analysis and Visualization Software should be used to process and analyse the data collected from various inspection technologies. These tools facilitate the interpretation of data, enabling engineers and inspectors to identify anomalies, assess risks, and generate reports on the condition of ROBs/RUBs. Data Visualization software helps in presenting the raw inspection data in a clear and easily understandable format, which can be interpreted correctly to facilitate decisions.

(Para 51)

Environment clearances and land acquisition

The Committee appreciates the initiatives of the Ministry of Road Transport and Highways in addressing the most important issue of land acquisition in fast tracking the ROB/RUB projects. The Bhoomirashi portal has undoubtedly expedited the process of land acquisition for National Highways. However, the Committee urges upon the Ministry and NHAI to accord continued priority to the land acquisition issue and fails to appreciate as to why huge Government funds are parked with Competent Authority for Land Acquisition (CALAs).

(Para 55)

The Committee observes that the MoRTH/ Railways should regularly engage with the Ministry of Environment, Forest and Climate Change (MoEF& CC) to address policy and project-specific issues, ensuring swift clearances and resolution of operational challenges. The MoEF&CC has taken proactive steps to streamline the process of obtaining statutory clearances, particularly for Stage-I and Stage-II forest clearances. This includes issuing directions for the one-time submission of Essential Details Sought (EDS) and eliminating the requirement for hard copies of proposals. Fortnightly Regional Coordination Meetings (FRCM) are conducted to monitor the progress of clearances and expedite forest clearances. Additionally, Inter-Ministerial Co-ordination and Monitoring Committee meetings are held to address policy matters and address long-standing proposals.

(Para 58)

Poor contract management

The Committee notes that CAG has flagged off the issue of poor contract management, such as delays in the finalisation of the negotiated rates and grant of extensions despite poor progress by the contractor. The Committee recommends that the Ministry should look into the issue on priority as such problems have resulted in avoidable expenditures and delays.

(Para 62)

The Committee also desires to be apprised of the reasons as to why the Ministry/NHAI allows contractors to hire or lease out to sub-contractors for carrying out specific work instead of splitting the project into smaller parts so that contractors with limited wherewithals could also bid for the same and legitimately get awarded on merit as principal contractor for the assigned work.

(Para 63)

The Committee also recommends that Ministries should assign competent contract managers who have the necessary skills and expertise to effectively manage contracts. These managers should have a strong understanding of contract law, project management, and negotiation skills. Imparting them adequate skill training will enable them to fulfil their responsibilities.

(Para 64)

The Ministry may also develop a transparent and efficient payment management system. Emphasis should be laid on establishing clear protocols for verifying contractor invoices, approving payments, and addressing any payment disputes promptly. Timely and accurate payments can help maintain contractor's motivation, besides ensuring timely completion of project.

(Para 65)

The Committee suggests that the Ministry should incorporate performance incentives and penalties into the contract terms. Incentives can motivate contractors to contribute significantly to the project, exceeding expectations, while penalties can lead to poor performance or non-compliance.

(Para 66)

Flooding/ water logging issues

The Committee notes that several instances of flooding/water logging on ROBs, RUBs and service roads have been reported in the recent past. This not only results in great public inconvenience but also damages the roads for future use.

(Para 69)

The Committee recommends that a comprehensive hydrological study of the area surrounding the ROBs, RUBs and service roads should be undertaken to understand the flood patterns, including the frequency, duration, and intensity of floods. Such a study will help determine the design requirements that address the issues of flood mitigation for the ROBs/RUBs.

(Para 70)

The Ministry can also construct flood barrier walls or embankments around the RUBs to prevent floodwater from entering into the underpass. These barriers can be designed to withstand the anticipated flood levels and provide protection to the RUBs during flood occurrences.

(Para 71)

The Railways should look for a cost-effective and durable solution to the problem of water-logging by modifying embankment height, providing suitable cross and longitudinal drains, cutting off the ingress of water from the catchment area into the subway, etc.

(Para 72)

The Committee recommends conducting regular inspections and maintenance of the drainage systems, pumps, and flooding barriers to ensure their proper functioning, especially during monsoon season. Debris or obstructions that may hinder the flow of water during floods should be cleared regularly.

(Para 73)

Delay in construction

The Committee recommends that Ministries should adopt digitalization of GAD approval as it will help the stakeholders to check online the status of the approval. This can reduce the undue delay in the construction of ROBs/RUBs. Further, there is a need for an inter-ministerial co-ordination mechanism to bring all the stakeholders on one platform for better discussion and understanding.

(Para 77)

The Ministry should also come up with an expected timeline of events along with the deadline, and the updated status should be brought into the public domain for better information of MPs,

MLAs and other citizens. Further, the charter shall also have the details of contractors, engineers and officers involved. This will set the accountability of all the stakeholders involved.

(Para 78)

Shortage of manpower

The Committee notes that the issue of the shortage of staff is a concern at a time when the country is moving ahead with a huge number of road networking projects. Since the time factor is of paramount importance, every effort should be made to complete the ongoing projects on time. The role of human resources in the project management, being critical, the Committee may be apprised about the staff requirement. The Committee expresses the view that in case of any shortage, recruitment process must be rolled out. In the case of consultants, the Committee seeks to know the total number of consultants with the Ministries and the basis for their appointment.

(Para 79)

The Committee recommends that recourse be taken to five R's - (i) Revive or create posts, (ii) Restructure the organization to bring in efficiency, (iii) Recruit young talent, (iv) Reframe policy/processes, (v) Refresh minds by giving interim professional training and also to revive and create posts.

(Para 80)

Budgetary Allocation

The Committee notes that the provisioning and utilization of funds for the construction of ROBs/ RUBs could be better. There needs to be more co-ordination between the Railways and the State Governments in providing a budget and executing the works. Further, the large chunk of unspent amount under the Setu Bharatam programme is an overarching concern. There is a need for proper channelization and utilization of the earmarked funds.

(Para 82)

(ii) Road Safety related issues

The Committee notes that the Motor Vehicles Amendment Act (MVAA), 2019 creates adequate accountability framework to ensure that road-owning agencies, contractors and concessionaires are held accountable for faulty road design and construction. To operationalise this at the State level, the Act provides discretionary powers to States to create Rules under Section 210D. The Section 210 D authorizes State Governments to make rules for design, construction and maintenance standards for National Highways and roads other than National Highways, respectively.

(Para 84)

The Committee, therefore, recommends that the Ministry of Road Transport and Highways should persuade State Governments to frame such rules under Section 210D of the MVAA Act at the earliest. The Committee may also be kept apprised of the matter.

(Para 85)

The Committee recommends that the Ministry of Railways should relook into 'Gate Mitra' scheme and ensure that these personnel are being provided with all basic amenities. In the Committee's view, proper implementation of the Gate Mitra scheme will promote the safety of road users, besides generating employment.

(Para 87)

Damaged Pavement Surface

The Committee recommends that timely repair and maintenance of damaged pavement surfaces

on service roads should be undertaken on priority in the interest of road safety. Routine inspection should be carried out at regular intervals to identify and address any issues such as waterlogging, potholes, cracks, or uneven surfaces. Adequate resources and manpower need to be allocated for timely repairs, including resurfacing, relaying or patching of service roads as needed. The safety of all road users needs to be prioritized by maintaining smooth and well-maintained service roads.

(Para 90)

Lane Drop

The Committee observes that lane drops with poorer site geometrics have higher conflict rates. The Committee is of the view that there is a need to revise existing guidelines/criteria to ensure that bridge sections are designed with consistent geometry, including the same number of lanes, similar to those of the through road for fast and long distance traffic. Lane drops must be designed properly from the outset, in as much as traffic control devices are not as effective in reducing conflicts as are proper site geometrics.

(Para 92)

Absent Shoulders

The Committee recommends that the Ministry may re-examine the existing guidelines/criteria relating to paved and unpaved sections of the road. If needed, the Ministry should come out with revised guidelines/criteria to ensure that bridge sections are designed with shoulders so that they can be used for emergency stopping of vehicles. Further, these guidelines must be strictly followed during the construction of the roads.

(Para 94)

Inadequate Illumination

The Committee takes note of the technological advances made in the field of streetlighting and recommends that installation of street lights, preferably with automatic sensors, retro-reflectors may be undertaken for proper road illumination. In the case of power supply failure or damage to the street lights, the retro-reflectors act as reliable visual guides, reflecting light from headlights and assisting drivers in manoeuvring safely and staying on the correct path.

(Para 96)

The Committee recommends conducting comprehensive lighting audits to assess the adequacy of current lighting conditions on roads. Areas with inadequate lighting should be identified and prioritized based on factors such as traffic volume, accident history, and visibility requirements.

(Para 97)

Inefficient Safety Barriers

The Committee recommends that all measures should be taken to ensure that the safety barriers are appropriately designed and constructed to withstand the impact forces generated by heavy vehicles. Also, these should be provided with sufficient height to prevent them from breaching the barrier. Increasing the height and capacity of safety barriers is essential for maintaining the integrity of the bridge and protecting the road users, thereby minimizing the risk of fatal crashes.

(Para 99)

Absent Signage and Hazard Markings

The Committee recommends that bridge infrastructure planning and maintenance should prioritize the inclusion and proper maintenance of traffic signs and hazard markers to ensure the safety of road users, pedestrians, and cyclists. Regular inspections, timely repairs, and routine

maintenance are essential to ensure that these vital elements effectively communicate important information, guide road users, and mitigate potential hazards, thus contributing to safer and more organized bridge crossings.

(Para 101)

The Committee also recommends establishing standardized designs for road signs that comply with national or international standards, such as those set by the Manual on Uniform Traffic Control Devices (MUTCD). Also, there should be use of clear and easily recognizable symbols, colours, and fonts to improve readability and comprehension.

(Para 102)

Inadequate Anti-glare Measures

The Committee recommends for proper implementation of appropriate anti-glare measures on bridge sections to enhance visibility, reduce the risks associated with glare, and ensure the safety of all road users, especially during night time.

(Para 104)

The Committee also recommends implementing advanced technologies, such as adaptive lighting systems or intelligent transportation systems (ITS) in automobiles that adjust lighting levels based on real-time conditions. These systems can automatically dim or adjust lighting intensity to reduce glare during specific periods or in response to changing weather conditions. The Committee feels that the road authorities can significantly enhance road safety and reduce the risk of accidents caused by blinding glare.

(Para 105)

Issue of vegetation/plantation

The Committee, therefore, recommends that no plantation be done up to 25m at the median while approaching a crossing. Cuts in the median, and exit/ entry to or from service lane need to be ensured for clear visibility to avoid chances of crashes/accidents.

(Para 110)

Inadequate Pedestrian Facilities

To ensure safe and comfortable walking conditions, the Committee recommends that it is crucial to provide hassle-free pedestrian facilities based on the requirement. Places with high pedestrian traffic require wider footpaths. Pedestrian facilities should also consider accessibility requirements for individuals with disabilities or limited mobility.

(Para 112)

Absent Pedestrian Guard Rails

To address the lack of pedestrian guardrails on service roads, the Committee recommends the Ministry to perform thorough audits of high-traffic areas, intersections, and road segments to identify locations where pedestrian guardrails are most needed. Guard rails should be provided at all safety-critical areas with a higher concentration of vulnerable road users, such as near schools, hospitals, and areas with a significant pedestrian population. Additionally, it must be ensured that the guardrails are designed with appropriate standards, considering the height, strength, and visibility requirements for optimal pedestrian safety.

(Para 114)

There is also a need to conduct public awareness campaigns to educate pedestrians and drivers about the importance of using designated pedestrian crossings, respecting guardrails, and adhering to traffic rules for pedestrian safety.

(Para 115)

Absent Pedestrian and Cyclist Facilities

The Committee recommends including pedestrian and bicycle facilities as a mandatory and integral part of bridged sections to accommodate the requirements of all road users, promoting safety, accessibility, and sustainable transportation options. Moreover, the mandatory inclusion of pedestrian and bicycle facilities on bridges promotes social equity, providing equal access to all members of the community, regardless of their mode of transportation or physical abilities.

(Para 117)

Discontinuous Service Roads

The Committee recommends that it is important for road-owning agencies to address discontinuous service lanes to ensure the safety of local traffic and minimize the risks associated with merging the service lanes with the main highway. Continuous service roads offer a dedicated route for local traffic. This reduces the risk of collisions due to merging with the highway. Road planning and design should take into account the needs of the local traffic and ensure provisioning of appropriate infrastructure, including merging lanes, acceleration lanes, deceleration lanes, and proper signage. This will help minimize conflicts between local traffic and high-speed highway traffic, improving overall road safety.

(Para 119)

Lack of designed U-turn facilities under the bridges

The Committee recommends implementing U-turn facilities under bridge sections where feasible. These U-turn facilities should have controlled access points, clear signage, and proper lane markings, allowing motorists to make use of it safely.

(Para 121)

Inadequate Treatment of Merging and Diverging Points

The Committee recommends for providing adequate length for acceleration and deceleration lanes, clear signage, and road markings. Consistent lane designations and traffic control measures, such as traffic signals or yield signs, should be implemented to guide drivers and minimize conflicts. Additionally, regular maintenance and periodic assessments of these points are essential to address any signage obstructions, pavement deterioration, or visibility issues. By implementing these recommendations, bridge sections can facilitate smooth and safe transitions for merging and diverging traffic, enhancing overall traffic flow and reducing the risk of crashes.

(Para 123)

The Committee recommends that a robust monitoring mechanism may be put in place not only to oversee the progress of ongoing ROB/RUB projects but also to identify and address any bottlenecks in execution

(Para 126)

Inter-ministerial coordination mechanism

The Committee notes that PM Gati Shakti- National Master Plan for Multi-modal Connectivity has provided an excellent platform for integrated planning and coordinated implementation of all infrastructure projects, including ROBs/RUBs, whether on a standalone basis or as part of corridor projects.

(Para 131)

The Committee recommends that the Government should establish a Central Coordinating

Body or a Committee comprising representatives from key ministries involved in road development, namely, the Ministry of Road Transport and Highways, Ministry of Finance, Ministry of Environment, Forests and Climate Change, and Ministry of Railways. This body will facilitate regular communication, coordination, and decision-making among the Ministries. Such a step will also help overcome the delay in construction due to waiting in approval of clearances.

(Para 132)

The Committee also recommends that the roles, responsibilities, and mandates of each Ministry involved in road development must be clearly defined. It must be ensured that there is clarity on the specific areas in which each Ministry is responsible for and how they interact with other Ministries to ensure time-bound resolutions of issues. This will minimize delay, overlaps, conflicts, and uncertainties in decision-making and implementation.

(Para 133)

The Committee feels that there remains a communication gap among the Ministries, leading to avoidable delay. The Committee, therefore, recommends establishing effective communication channels between the Ministries, such as dedicated focal points or inter-ministerial coordinating officers. These officers can serve as a single point of contact for communication, coordination, and information exchange between the Ministries.

(Para 134)

The Ministries should establish mechanisms for information sharing and data integration among the Ministries/ Agencies involved in road development. They can create a centralized repository or platform where relevant data, reports, and project updates can be shared among the concerned Ministries/authorities. This will enable Ministries to access and utilize comprehensive information for decision-making and project monitoring.

(Para 135)

Maintenance and upgradation

The Committee is of the view that the Ministries should conduct regular inspections of ROBs and RUBs to identify any signs of deterioration, structural issues, or maintenance requirements. These inspections should be carried out by qualified engineers and experts to assess the condition of the built infrastructure. The study assessment should be placed in the public domain and MPs and MLAs of the concerned area may also be appraised about the findings of the inspection report.

(Para 139)

The Committee recommends the Ministries to evaluate the load-carrying capacity of ROBs/RUBs periodically and consider structural upgrades if required. This may involve strengthening the existing structure, modifying load limits, or implementing weight restrictions to ensure the safety and longevity of the infrastructure.

(Para 140)

The Ministries/ Agencies must ensure proper lighting and signage along ROBs/RUBs for improved visibility and safety. Installation of adequate lighting systems and prominent signage indicating height restrictions, speed limits, and other important information benefit the road users.

(Para 141)

With reference to encroachments, the Committee recommends that the Ministries should

conduct a comprehensive survey and mapping of the ROB/RUB area to identify encroachments and unauthorized structures by using modern surveying techniques, such as drones or satellite imagery so that proper remedial measures can be taken to get rid of encroachments around the infrastructure.

(Para 142)

The concerned authorities must ensure to take legal actions against encroachers in accordance with relevant laws and regulations. They should initiate eviction proceedings and enforce penalties for unauthorized occupation. Adequate humanitarian support and assistance should be provided to those affected by encroachment- induced eviction.

(Para 143)

Further, the Committee recommends that the engagement with the local community and stakeholders should be strengthened to obviate any future encroachments. The relevant NGOs, advocacy bodies and local opinion of leaders may also be roped in to create awareness about non-encroachment of the public infrastructure spaces.

(Para 144)

The Committee appreciates the efforts made by the CRRI in the field of road development. However, the Committee is of the view that the CRRI should also come up with binding guidelines for adoption of sustainable technology and materials for road development and the road designs keeping in view the national goals and aspirations.

(Para 149)

The Committee in this regard recommends that compliance with IRC guidelines must be made a mandatory requirement for all road development projects. Further, the Committee suggests that independent third-party audits should be conducted to assess compliance with IRC guidelines. Engaging qualified auditors who are familiar with IRC guidelines can provide an unbiased evaluation of project compliance and identify any gaps or non-compliance issues that need to be addressed.

(Para 162)

The Committee further notes that effective implementation of Rule 166 of the Central Motor Vehicles Rules (CMVR) can ensure road safety. Rule 166 (dealing with road, design, construction, and maintenance standards) under the Central Motor Vehicle Rules, 1989⁷, was added via G.S.R 584(E), dated 25th September 2020 (w.e.f. 1-10-2020) to give effect to Sec 198A of the Motor Vehicles (Amendment) Act, 2019. The rule states as follows:

“(1)The design, construction, and maintenance of national highways shall be in accordance with the standards and specifications of the Indian Road Congress (IRC) as may be applicable, or any other instructions or guidelines issued by the Central Government from time to time...”

(Para 163)

The Committee notes that the IRC guidelines are mammoth in nature, as there are over 200 guidelines introduced and renewed by IRC since it was established in December 1934. Currently, the IRC guidelines include a range of subjects like the method of recording accidents, and practices for road users, apart from the guidelines on road, design, construction, and maintenance. Therefore, for effective implementation of the codes pertaining to road design, construction, and maintenance by the designated authority, contractor, consultant, or concessionaire, it is imperative that such IRC guidelines be specifically called out under Rule 166 CMVR, or else there will be chances on missing out important standards at any point while implementing road safety standards at all or any of the three stages.

(Para 164)

Fund allocation and support to IRC

The Committee recommends that the Ministry may consider deputing some officers having interest and inclination toward standardization, R&D to work in the IRC. Also, the Ministry may consider providing a reasonable amount of corpus seed fund to the IRC to manage the function of its Secretariat, the modalities of which may be worked out in consultation with the IRC.

(Para 166)

Further, since the Technical Committees, Apex Committees, Highway Research Board and its Committees are involved in the preparation of initial drafts, reviewing critically the draft prepared, state-of-the-art reports, explanatory handbook on Codes with solved examples, etc., the Ministry may consider providing them support through budgetary allocation for their works including for bearing expenditure on intercity travels, accommodation, local travel, and honorarium.

(Para 167)

The Ministry may provide budgetary allocation to the IRC to organize workshops, seminars, and webinars in order to disseminate the knowledge on latest IRC guidelines to the practicing highway engineers in the interest of creating a large pool of engineers with knowledge on the cutting-edge technology in the rapidly evolving road design and engineering sector.

(Para 168)

The Committee, accordingly, recommends that the Ministry must examine the feasibility of adopting and implementing the proposed design suggested at (b) which is based on international standards.

(Para 172)

Induction of new technologies

The Committee notes the reply of RDSO, Indian railways that in most cases, India is at par with the advanced nations. However, the Committee suggests adopting Building Information Modelling (BIM) technology which enables the creation of detailed 3D models that integrate various aspects of the ROB/RUB development process, including architectural, structural, and utility design. Further, Virtual Reality (VR) and Augmented Reality (AR) technologies can also be used to provide immersive experiences and simulations during the design and construction phases of ROB/RUBs. They allow engineers and project teams to visualize and interact with virtual models, facilitating better design review, construction planning, and stakeholder communication.

(Para 178)

The Committee also emphasizes on usage of Advanced Construction Materials such as fiber-reinforced polymers (FRPs), high-performance concrete, and composite materials to enhance the durability, strength, and lifespan of ROB/RUBs. These materials offer improved resistance to corrosion, seismic forces, and other environmental stress factors.

(Para 179)

Artificial Intelligence (AI) enabled Intelligent Transportation Systems (ITS) technologies can be integrated into ROB/RUBs to enhance road safety and better traffic management. These include systems for automated traffic control, real-time monitoring of road conditions, traffic signalling, and vehicle detection. ITS can improve the efficiency of traffic flow, reduce

congestion, and enhance overall safety.

(Para 180)

Smart Sensors embedded in ROB/RUBs can continuously monitor the structural health, detecting and alerting to any anomalies or signs of deterioration. SHM systems provide real-time data on the structural integrity, stress, vibrations, and deformation of the infrastructure, facilitating proactive maintenance and preventing failures.

(Para 181)

The Committee also recommends the usage of Geospatial technologies, such as Geographic Information Systems (GIS) and remote sensing, to enable accurate mapping, analysis, and visualization of the project area. These tools assist in land surveying, route planning, environmental impact assessment, and site selection for ROB/RUB development.

(Para 182)

Private Sector Participation

The Committee is of the view that the Ministry should conduct comprehensive feasibility studies to assess the viability of implementing PPP models for ROB/RUB development. The Ministry should evaluate factors such as project size, revenue potential, market conditions, and potential private sector interest. Feasibility studies will provide valuable insights into the suitability of PPP and help in making informed decisions.

(Para 184)

The Committee recommends that an assessment of legal and regulatory framework should be pursued to evaluate the existing legal and regulatory framework and to identify any barriers or limitations to implementing PPP in ROB/RUB development. The Ministry should also identify necessary amendments or new legislations required to facilitate PPP arrangements, ensure transparency, and provide a favourable business environment for private partners.

(Para 185)

The Committee also suggests that the Ministries should establish transparent and competitive procurement processes to attract capable private entities. They should also implement a fair and competitive bidding process that encourages multiple private sector players to participate.

(Para 186)

The Ministry should engage with various stakeholders, including local communities, transport authorities, private sector entities, and financing institutions, seeking their input and addressing any concerns or expectations they may have. The Ministry should also foster partnerships and collaboration to enhance the success and sustainability of PPP projects.

(Para 187)

Sustainable and environment-friendly roads

The Committee appreciates the innovative efforts made in the direction of construction of environmentally sustainable roads. However, it feels that given the national aspirations to gradually move towards a zero-waste circular economy, more measures should be taken in this regard. The Committee suggests that the Ministries should adopt features like rain gardens, bioswales, and permeable pavements to manage stormwater runoff and improve water quality. Green infrastructure can help recharge groundwater, reduce the load on drainage systems and help enhance biodiversity in roadside areas.

(Para 192)

The Ministries should also implement Sustainable Drainage Systems (SuDS) to manage surface water runoff from roads. SuDS techniques include infiltration basins, constructed wetlands, and detention ponds that mimic natural hydrological processes. SuDS can reduce the risk of flooding, promote groundwater recharge, and improve water quality by removing pollutants.

(Para 193)

The Ministries should also encourage road design that optimizes energy efficiency. This can include factors such as minimizing excessive grades, optimizing alignment to reduce vehicle energy consumption, and incorporating intelligent transportation systems (ITS) to improve traffic flow and reduce congestion-related emissions.

(Para 194)

The Committee also recommends that the Ministries can explore opportunities to integrate renewable energy sources into road infrastructure. This can include incorporating solar panels into noise barriers or utilizing solar-powered lighting along roads. Renewable energy integration can help reduce dependence on fossil fuels and contribute to a more sustainable transportation network.

(Para 195)

The Ministries should enhance Environmental Impact Assessments for road projects to evaluate the potential ecological, social, and cultural impacts. Further, such assessments should be placed in the public domain. Assessment of the project's potential effects on ecosystems, habitats, and natural resources should also be undertaken to develop appropriate mitigation measures to minimize negative impacts.

(Para 196)

Need for VUP/CUP

The Committee reiterates that CRRI's suggestion that wherever the highway passes through built areas, the need for VUP/ Light Vehicular Underpass (LVUP) must be built as part of Road safety Audit (RSA) report conforming to IRC: 84 (2019) or IRC: 87 (2019), including the provision of half-subway, i.e. depressed Pedestrian Under Pass (PUP).

(Para 198)

Good Samaritan Law

The Committee recommends that first aid education for every police personnel must be mandatory along with their regular training. All Police PCRs must be equipped with the requisite first aid equipments and items, etc.

(Para 209)

Further, the scope of the 'Good Samaritan Law' must be enlarged beyond helping a road accident victim. Victims of natural calamities like drought and flood, fire incidents, or victims of any medical condition, etc. must be included in the ambit of 'Good Samaritan Law', as the nature of helping victims of above situations, is identical with the road accident victims and hence must be part of Good Samaritan Law.

(Para 210)

The Committee feels that for reaping the best results out of 'Good Samaritan Law'; mass training and awareness is needed. 'Scouts & Guide' system which used to be in schools earlier

can be truly instrumental in this regard. ‘First Aid Training’ and handling and assisting a person injured in a road accident or in any natural calamity, is an essential part for every student trained under the ‘Scout and Guide’ System. This needs to be resurrected in all schools and the Ministry should appropriately sensitise and take up with the concerned authorities for building citizenship rooted in sublime values.

(Para 211)

The Committee also recommends sensitizing the police of its duties and responsibilities during such a situation. Increased fund allocation to public funded hospitals has the potential to establish robust emergency care units, besides creating adequate infrastructure. Police and judiciary must be adequately sensitized so that they remain alive towards the protection of Good Samaritans.

(Para 212)

To provide for accountability of various Government authorities and encouragement for Good Samaritans, the Committee recommends that a “Grievance Redressal Mechanism” be instituted nationally. The new section 134A of the MVAA 2019 protects the Good Samaritans but does not guide one over the breach of the obligations of the police and the hospital. Since these subjects are a part of state lists, the states must be encouraged to come up with rules regarding the grievance mechanism in case of breach of compliance.

(Para 213)

Besides, campaigns to increase the awareness of the rights of Good Samaritans must be undertaken to educate the public. Further, in pursuance to the guidelines for Good Samaritans issued by the Ministry of Health and Family Welfare mentioned therein, both public and private hospitals and police stations must publish the charter on the rights of Good Samaritans. This will go a long way in encouraging the spirited public and help greater information dissemination on right of the good Samaritans.

(Para 214)

Miscellaneous

Members of the Committee also raised following issues regarding ROBs/RUBs in the country:

- Emphasis on NHAI to provide information regarding patches for opening retail outlets on NHs so that oil marketing companies can put up their advertisements and proper guidelines regarding NoC of retail outlets for promoting Ease of Doing Business;
- Current construction status of six by-pass roads near Rajahmundry viz. Diwancheruvu ROB, Gammon India ROB, Rajanagaram ROB, Lalacheruvu ROB, Bommuru ROB and Vemagiri ROB;
- Requirement of bridge on Godavari river from Devarapalli to Maredumilli to bypass Rajahmundry city and to reduce distance;
- Construction status of the National Highway connecting Hajipur to Sonapur and NH- 527C, Muzaffarpur bypass connecting Ramdayalu to Motihari and Old NH-77 in Bihar.
- Delay in construction and bad condition of Himmat Nagar-Jaipur-Delhi highway, Ahemdabad-Radhanpur National highway, Bechraji-Mehsana highway, Hajipur-Sonpur NH, NH 527 C and Muzzafarpur Bypass etc;
- The number of surveys and investigations conducted on ROBs on NH 29 in Nagaland

connecting Maligaon to Imphal, which has one ROB that was inaugurated in 1973 and the upgradation/ repair of one road from Mon headquarters to Nimonagarh, Charaideo (Assam) via Hongphoi village along with the construction of a road from Y-anner to Mundun Heritage Model village.

- Report of surveys conducted on NH-58, NH-52, NH-11, NH-10, the money spent on these surveys and the consultant monitoring them;
- The issue regarding NH16 and NH 216 A from Visakhapatnam to Vijayawada;
- Water-logging issues in RUBs in Bhandara-Gondiya constituency and other places including Minto road in New Delhi;
- Starting construction work of Mehsaul ROB in Sitamarhi to prevent the death of patients due to obstruction of ambulance movement caused by traffic blockage ;
- Need for increasing manpower at the railway crossing in Arunachal Pradesh (Murkongselek to Pasighat) along with the requirement of construction of ROB/RUBs in the area;
- Issue of repairing of ROB at NH-29 in Manipur as also increasing the number of spans to be repaired and widening the same. In addition, traffic problem on ROB due to the absence of railways in Manipur was also flagged;
- Road accident on NH-66 Kovalam- Mukkola stretch due to unscientific road construction;
- Status of completion of upgradation on economic corridor connecting five states to a six-lane highway and two-lane service road on either side;
- Status of 6 lane road tunnel being constructed along Wadakkanchery -Thrissur Section of NH-544 near the Kuthiran hills in kerala- the reasons for its delay and the estimated time line for its completion;
- Provision for adequate lighting arrangement inside the tunnels in Konkan Railway especially during monsoon season.
- The implementation of all the proposed provisions of the Motor vehicle Amendment Act 2019 (MVA Act 2019) needs to be made more effective.
- The National Road Safety Board should be formed as early as possible.
- Child Road Safety standards for helmet and headgear are needed to be notified by the Ministry.
- There is a need for critical analysis of reason for missing the road safety targets to reduce accidents, deaths and injuries by 50% by 2025 and further requirement of robust action plan for achieving the same by 2030.
- The speed limits on the express ways needs to be reduced up to 100 kmph instead of 120 kmph as it is the main reason for accidents, deaths and injuries. Further, the Ministry of Road Transport and Highways and States should come up with speed management guidelines or policies at the earliest.
- The relaxation in norms for pillions in Kerala wherein children who are under 12 years of age can be carried with two others on two wheelers must be withdrawn with immediate effect.

ANNEXURES

Annexure I

Sr. No.	Name of the state	No. of ROB/RUBs			
		Existing	Under construction	RoBs/ RUBs sanctioned but in bidding stage/ appointed date to be declared	No of Level Crossings yet to be sanctioned for replacement as RoBs/RUBs
1	Andhra Pradesh	62	36	27	10
2	Andaman and Nicobar	0	0	0	0
3	Arunachal Pradesh	0	0	0	0
4	Assam	28	14	6	8
5	Bihar	50	41	25	15
6	Chhattisgarh	11	7	10	5
7	Chandigarh	0	0	0	0
8	Goa	2	2	0	0
9	Delhi	0	0	0	0
10	Haryana	25	13	8	5
11	Gujarat	22	16	5	3
12	Jammu	3	4	9	0
13	Jharkhand	11	12	19	6
14	Himachal Pradesh	2	2	3	2
15	Kerala	8	10	2	2
16	Karnataka	47	29	28	11
17	Lakshadweep	0	0	0	0
18	Madhya Pradesh	43	33	28	27
19	Maharashtra	79	39	22	31
20	Manipur	0	0	0	0
21	Meghalaya	0	0	0	0
22	Mizoram	0	0	0	0
23	Nagaland	1	0	0	0
24	Odisha	21	10	14	2
25	Puducherry	0	0	0	0
26	Punjab	50	29	22	12
27	Rajasthan	58	41	8	5
28	Sikkim	0	0	0	0
29	Srinagar	0	0	0	0

30	Tripura	2	0	2	0
31	Tamil Nadu	69	28	14	7
32	Telangana	23	7	23	10
33	Uttar Pradesh	73	47	44	37
34	Uttarakhand	10	2	5	2
35	West Bengal	65	30	8	18
	TOTAL	765	452	332	218

Annexure II

Sr. No.	Name of the state	Length of Service Road (In Km)		
		Single Lane	Intermediate Lane	2-Lane
1	Andhra Pradesh	21.86	120.32	1225.27
2	Andaman and Nicobar	0	0	0
3	Arunachal Pradesh	0	0	0
4	Assam	0	131.03	19.01
5	Bihar	23.01	143.59	881.09
6	Chhattisgarh	0	109.31	79.12
7	Chandigarh	0	0	0
8	Goa	51.62	3	26.24
9	Delhi	16.13	0	67.00
10	Haryana	26.10	188.26	813.77
11	Gujarat	4.78	0	78.32
12	Jammu	21.57	33.45	0
13	Jharkhand	2.8	113.26	279.24
14	Himachal Pradesh	7.9	22.42	6
15	Kerala	84.236	116.9	143.11
16	Karnataka	186.02	140.34	1806.32
17	Lakshadweep	0	0	0
18	Madhya Pradesh	24.51	260.20	633.53
19	Maharashtra	470.51	537.63	1868.38
20	Manipur	12.16	0	1.5
21	Meghalya	0	0	7.5
22	Mizoram	0	0	0
23	Nagaland	0	0	4.15
24	Odisha	5.92	31.21	564.03
25	Puducherry	0	0	0
26	Punjab	98.33	350.85	622.50
27	Rajasthan	27.76	128.38	1556.51
28	Sikkim	0	0	0
29	Srinagar	0	0	0
30	Tripura	0	6.25	0

31	Tamil Nadu	32.12	693.12	1448.25
32	Telangana	37.34	186.62	455.19
33	Uttar Pradesh	406.67	928.66	1440.35
34	Uttarakhand	2.22	186.41	30.52
35	West Bengal	50.03	60.38	448.48
	Total	1614	4492	14505

Annexure III

S N	RI y	LC s on N H	Work Comple ted(LC NOT closed)	Work in progr ess	GA D app rov ed but wor k not star ted	GAD under proces s	Proposal yet to come from NHAI	Diversio n Planned by NHAI
1	CR	9	0	0	6	1	2	0
2	ER	28	0	1	11	0	16	0
3	ECR	38	1	18	1	1	17	0
4	ECO R	10	0	3	6	0	1	0
5	NR	47	3	4	6	0	34	0
6	NCR	8	1	4	1	0	1	1
7	NER	38	0	12	9	0	17	0
8	NFR	58	8	7	7	1	15	20
9	NWR	28	5	11	6	1	3	2
10	SR	33	1	3	11	0	9	9
11	SCR	37	2	19	12	0	4	0
12	SER	22	1	8	9	0	3	1
13	SEC R	15	0	7	2	1	5	0
14	SWR	21	1	0	13	1	6	0
15	WR	10	1	5	2	0	2	0
16	WCR	3	0	3	0	0	0	0
IR		405	24	105	102	6	135	33

Annexure IV

S N	STATES	MLC s	UML Cs	S N	RLY	MLCs	UMLCs
1	Andhra Pradesh	935	0	1	CR	449	6
2	Assam	871	0	2	ER	1015	0
3	Bihar	1759	0	3	ECR	1508	0
4	Chandigarh	3	0	4	ECoR	683	0
5	Chattisgarh	191	0	5	NR	2777	0
6	Delhi	26	0	6	NCR	662	0
7	Goa	8	0	7	NER	1451	32
8	Gujarat	1594	262	8	NFR	1460	163
9	Haryana	473	0	9	NWR	947	96
10	Himachal Pradesh	53	0	10	SR	1737	0
11	Jammu & Kashmir	28	0	11	SCR	1173	0
12	Jharkhand	392	0	12	SER	782	0
13	Karnataka	643	0	13	SECR	359	0
14	Kerala	388	0	14	SWR	688	0
15	Madhya Pradesh	639	0	15	WR	1811	262
16	Maharashtra	737	6	16	WCR	416	0
17	Manipur	0		Total (Manned + Unmanned)		17918	559
18	Mizoram	1	0	Total (Manned + Unmanned)		18477	
19	Nagaland	1	0				
20	Odisha	675	0				
21	Puducherry	20	0				
22	Punjab	1022	0	Gauge		MLCs	UMLCs
23	Rajasthan	955	96	BG		17720*	0
24	Tamilnadu	1335	0	MG		120	288
25	Telangana	289	0	NG		78	271
26	Tripura	15	0	Total		17918	559
27	Uttar Pradesh	3040	32	*Manned LC on BG- 17720 and All UMLCs on BG have been eliminated on 31.01.2019			
28	Uttarakhand	153	0				
29	West Bengal	1672	163				

	Total	1791 8	559	
	Total (MLC+UMLC)	18477		

Seminars:

- 1) International Seminar on "Advance in Design, Construction and Operation of Tunnels" on 19th - 20th April 2023 at Dehradun (Uttarakhand).
- 2) International Conference on "New Technologies and Innovations in Rural Roads" on 24th -26th May 2022 at Pragati Maidan, New Delhi.
- 3) International Seminar on "Design and Construction on Sustainable Road and Bridges in Hill Roads" on 22nd & 23rd April 2022 at Itanagar (Arunachal Pradesh)
- 4) International Seminar on "Road Safety: Current Scenario & Way Forward" scheduled on 28th - 29th October 2022 at Indore (Madhya Pradesh).
- 5) International Webinar on Road Tunnel: Recent Trends, Innovations and Way Forward on 5th - 6th May 2021.
- 6) International Seminar on "Construction and Rehabilitation of Rigid Pavement-Current Practice and Way Forward" on 18th & 19th January 2019 at New Delhi.

Workshops:

- 7) "Quality control, New Materials & Techniques in Road Sector" on 7th & 8th February 2020 at IIT Roorkee.
- 8) "Quality control, New Materials & Techniques in Road Sector" on 26-27 July 2019 at Hyderabad (Telangana).

Research Activity:

IRC does not receive any grant or funding from Government department for road research. However, IRC has stimulated interest in road research and taken active interest in setting-up of road research laboratories in the country way back as in 1944. Detailed scheme was worked out by one of its committees for setting-up Central Road Research Institute, New Delhi, and a chain of research laboratories in the States, in addition to the work of gathering, correlating and disseminating information concerning road research within the country.

In October 1973, the Highway Research Board (HRB) was set up under the auspices of the IRC for giving undivided attention to road research and development activities. The Board aimed to Identify highway research needs, recommend priorities and schedules of research, set up Committees consisting of experts who are concerned with the problems of roads and road transport. Within its limited resources and capability of IRC concerted efforts are also being made to summarise and make available the significant results of road research and to guide and coordinate road research work in our country with a view to avoid duplication of effort.

Further, as per advice/ directive from the Hon'ble Court (one order by Madras High Court) and Vigilance agency (one case by Kerala State) IRC has sent team of Experts for investigation of specific road and bridge project and submit its reports.

IRC is also involved in preparation & revision of 'Specification of Road & bridge Works' for Ministry of Road Transport & Highways and 'Specification for Rural Roads' for NRIDA, Ministry of Rural Development.

Simultaneously, IRC provides technical inputs / assistance to NDMA, NGT, BIS, Ministry of Environment, and forest, etc. whenever sought.

During Year 2017:

- IRC:15-2017 “Code of Practice for Construction of Jointed Plain Concrete Pavements”
- IRC:44-2017 “Guidelines for Cement Concrete Mix Design for Pavements
- IRC:121-2017 “Guidelines for Use of Construction and Demolition Waste in Road Sector”
- IRC:122-2017 “Guidelines for Construction of Precast Concrete Segmental Box Culverts”
- IRC:65-2017 “Guidelines for Planning and Design of Roundabouts”
- IRC:70-2017 “Regulation and Control of Mixed Traffic in Urban Areas”
- IRC:92-2017 “Guidelines for Design of Interchanges in Urban Areas”
- IRC:124-2017 “Bus Rapid Transit (BRT) Design Guidelines for Indian Cities”
- IRC: SP:110-2017 “Application of Intelligent Transport System (ITS) for Urban Roads”
- IRC: SP:111-2017 “Capacity Building of Road Agencies in Charge of Implementation of Road Projects in Urban Areas”
- IRC:7-2017 “Recommended Practice for Numbering Culverts, Bridges and Tunnels”
- IRC:123-2017 “Guidelines on Geophysical Investigation for Bridges”
- IRC:125-2017 “Guidelines on Dozers for Highway Works”
- IRC:126-2017 “Guidelines on Wet Mix Plant”
- IRC: SP:93-2017 “Guidelines on Requirements for Environmental Clearances for Road Projects”
- IRC: SP:112-2017 “Manual for Quality Control in Road and Bridge works”

During the year 2018

- IRC:83-2018 Part II “Standard Specifications and Code of Practice for Road Bridges, Section IX – Bearings (Elastomeric Bearings)”
- IRC:83-2018 Part III “Standard Specifications and Code of Practice for Road Bridges, Section IX – Bearings, Part III: POT, PIN, Metallic Guide and Plane Sliding Bearings”
- IRC:99-2018 “Guidelines for Traffic Calming Measures in Urban and Rural Areas”
- IRC: SP:65-2018 “Guidelines for Design and Construction of Segmental Bridges”
- IRC: SP:71-2018 “Guidelines for Design and Construction of Precast Pre-Tensioned Girders for Bridges”
- IRC: SP:89 (Part II) – 2018 “Guidelines for the Design of Stabilized Pavements”
- IRC: SP:113-2018 “Guidelines on Flood Disaster Mitigation for Highway Engineers”
- IRC: SP:114-2018 “Guidelines for Seismic Design of Road Bridges”
- IRC: SP:115-2018 “Guidelines for Design of Integral Bridges”
- IRC: SP:116-2018 “Guidelines for Design and Installation of Gabion Structures”
- IRC:57-2018 “Recommended Practice for Sealing of Joints In Concrete Pavements”
- IRC: SP:63-2018 “Guidelines for the Use of Interlocking Concrete Block Pavement
- IRC: SP:83-2018 “Guidelines for Maintenance, Repairs & Rehabilitation of Cement Concrete Pavements”
- IRC: SP:121-2018 “Guidelines for Use of Iron, Steel and Copper Slag in Construction of Rural Roads”
- IRC:86-2018 “Geometric Design Standards for Urban Roads and Streets”
- IRC: SP:117-2018 “Manual on Universal Accessibility for Urban Roads and Streets”
- IRC: SP:118-2018 “Manual for Planning and Development of Urban Roads and Streets”
- IRC: SP:119-2018 “Manual of Planting and Landscaping of Urban Roads”
- IRC: SP:54-2018 “Project Preparation Manual for Bridges”
- IRC: SP:120-2018 “Explanatory Handbook to IRC:22-2015 “Standard Specifications and Code of Practice for Road Bridges, Section VI-Composite Construction”
- IRC:87-2018 “Guidelines for Formwork, Falsework and Temporary Structures for Road Bridges”

- IRC: SP:36-2018 “Guidelines for IRC Standards”
- IRC: SP:73-2018 “Manual of Specifications and Standards for Two Laning of Highways with Paved Shoulder”
- IRC:127-2018 “Guidelines on Skill Development of Workmen in Road Sector”
- Pocket Book for Road Construction Equipment

During the year 2019:

- IRC:52-2019 “Guidelines for the Alignment Survey and Geometric Design of Hill Roads”
- IRC:79-2019 “Recommended Practice for Road Delineators”
- IRC: SP:16-2019 “Guidelines on Measuring Road Roughness and Norms”
- IRC: SP:17-2019 “Guidelines for Concrete Overlays on Concrete Pavements”
- IRC: SP:40-2019 “Guidelines on Repair, Strengthening & Rehabilitation of Concrete Bridges”
- IRC: SP:59-2019 “Guidelines for Use of Geosynthetics in Road Pavements and Associated Works”
- IRC: SP:84-2019 “Manual of Specifications & Standards for Four Laning of Highways”
- IRC: SP:87-2019 “Manual of Specifications & Standards for Six Laning of Highways”
- IRC: SP:88-2019 “Manual on Road Safety Audit” (*First Revision*)
- IRC: SP:122-2019 “Guidelines for Green Rating of Highways”
- Pocket Book for Highway Engineers,
- IRC:128-2019 “Guidelines on Training of Highway Professionals”
- IRC:112-2019 “Code of Practice for Concrete Road Bridges”
- IRC:129-2019 “Specification for Open-Graded Friction Course”
- IRC: SP:101-2019 “Guidelines for Warm Mix Asphalt”
- IRC:105-2019 “Specifications for Dense Bituminous Macadam and Bituminous Concrete for Airfield Pavements”
- IRC: SP:123-2019 “Guidelines for the Construction of Two-Layer Concrete Pavements”
- IRC: SP:124-2019 “Model Contract for Maintenance of Roads” (Based on Single Percentage Rate)
- IRC: SP:125-2019 “Guidelines for Cement Grouted Bituminous Mix-Surfacing for Urban Roads”
- IRC: SP:91-2019 “Guidelines for Road Tunnels”
- IRC:89-2019 “Guidelines for Design and Construction of River Training & Control Works for Road Bridges”
- IRC: SP:30-2019 “Manual on Economic Evaluation of Highway Projects in India”
- IRC: SP:126-2019 “Guidelines for Design and Construction of Low Volume Rural Roads using Jute Geotextiles

During the year 2020

- IRC:78 (Part II)-2020 “Code of Practice for Limit State Design for Foundations”
- IRC: SP:19-2020 “Manual for Survey, Investigation and Preparation of Road Projects”
- IRC: SP:98-2020 “Guidelines for the Use of Waste Plastic in Hot Bituminous Mixes (Dry Process) in Wearing Courses”
- IRC: SP:127-2020 “Manual for Performance Assessment of Highway Assets during Operation and Maintenance Stage”
- IRC: SP:128-2020 “Urban Roads Manual”
- IRC:130-2020 “Guidelines for Road Asset Management System”

During the year 2022.

- IRC:9-2022 “Traffic Census for Non-Urban Roads”
- IRC:67-2022 “Code of Practice for Road Signs”
- IRC:80-2022 “Typical Designs for Pick-Up Bus Stops on Rural (i.e. Non-Urban) Highways”
- IRC:103-2022 “Guidelines for Pedestrian Facilities”
- IRC:131-2022 “Guidelines for Identifying and Treating Blackspots”
- IRC: SP:43-2022 “Guidelines on Traffic Management Techniques for Urban Areas”
- IRC: SP:129-2022 “Guidelines for the Design and Construction of Roads Using Coir Geotextiles”
- IRC: SP:131-2022 “Guidelines for Design and Evaluation of Public and Non-Motorised Transport Systems for Sustainability”
- IRC: SP:132-2022 “Guidelines on Use of Industrial Wastes for Road Embankment and Subgrade Construction”
- IRC: SP:13-2022 "Guidelines for the Design of Small Bridges and Culverts”
- IRC: SP:130-2022 “Guidelines on Design and Installation of Noise Barriers for Roads”
- IRC: SP:133-2022 “Guidelines on Reducing Carbon Footprint of Road Projects”
- IRC: SP:134-2022 "Guidelines for Assessment of Wave Effects on Bridges”
- IRC: SP:135-2022 “Manual for the Design of Hot Bituminous Mixes”
- IRC: SP:68-2022 “Guidelines for Construction of Roller Compacted Concrete Pavements”
- IRC:134-2022 “Guidelines on Skid Resistance of Pavement Surfacing”
- IRC:102-2022 “Planning for Bypasses Around Towns” (*First Revision*)
- IRC:137-2022 “Guidelines on Use of Fibre-Reinforced Polymer Bars in Highway Projects”
- State-of-the-Art-Report “Design of Safer Highways based on Lessons from Past Earthquakes”.

Regarding State/UTwise details of accrual, Unspent Balance as on 01.04.2022 and Maximum Possible Release under CRIF during FY 2022-23

Amount in Rs. Crore

No.	State/UTs	Existing Accrual for the FY 2022-23	Existing Accrual for ROBs/RUBs/Bridges on State Road under "SETU BANDHAN" for the FY2022-23	Unspent Balance as on 01.04.2022	Maximum Possible release in FY 2022-23 (3+4+5)
1	Andhra Pradesh	344.73	35.46	374.13	754.32
2	Arunachal Pradesh	133.88	13.77	213.34	360.99
3	Assam	153.82	15.82	92.63	262.27
4	Bihar	205.35	21.12	0	226.47
5	Chhattisgarh	254.90	26.22	387.6	668.72
6	Goa	14.74	1.52	47.32	63.58
7	Gujarat	461.81	47.50	215.74	725.05
8	Haryana	179.29	18.44	291.36	489.09
9	Himachal Pradesh	106.75	10.98	51.32	169.05
10	Jharkhand	167.71	17.25	707.37	892.33
11	Karnataka	465.27	47.86	4.99	518.12
12	Kerala	133.46	13.73	1.5	148.69
13	Madhya Pradesh	573.96	59.03	0	632.99
14	Maharashtra	710.15	73.04	300.96	1084.15
15	Manipur	38.17	3.93	195.58	237.68
16	Meghalaya	43.08	4.43	25.34	72.85
17	Mizoram	34.64	3.56	89.6	127.80
18	Nagaland	28.39	2.92	7.63	38.94

19	Odisha	309.15	31.8	8.56	349.51
20	Punjab	160.46	16.5	0	176.96
21	Rajasthan	649.05	66.76	1287.27	2003.09
22	Sikkim	12.78	1.31	20.26	34.35
23	Tamil Nadu	365.12	37.55	4	406.67
24	Telangana	275.89	28.38	2.92	307.19
25	Tripura	19.25	1.98	0.17	21.40
26	Uttar Pradesh	636.91	65.51	6.63	709.05
27	Uttarakhand	103.38	10.63	274.79	388.80
28	West Bengal	217.90	22.41	0	240.31
	Sub Total (States)	6800.00	699.41	4611.03	
	UTs with Legislatures				
29	Delhi	29.07	2.99		32.06
30	Jammu & Kashmir	102.89	10.72		113.61
31	Puducherry	7.83	2.56		10.39
	Sub Total (UTs with Legislature)	139.79	16.27		
	UTs without Legislature				
32	A&N Islands	15.81	1.68		17.49
33	Chandigarh	5.08	1.47		6.55
34	Dadra & Nagar Haveli and Daman & Diu	5.09	0.65		5.74
35	Ladakh	261.34	27.72		289.06
	Sub Total (UTs without Legislature)	287.33	31.51		
	Total reserve				
	Grand total for State & UTs	7227.12	747.19		
