GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS
(RAILWAY BOARD)

No. 2023/Track-III/TK/9 **New Delhi, Dated: 23 .01.24**

Chairperson &CEO,
Railway Board,
Ministry of Railways,
New Delhi.

Sub: One man Expert Committee to draw Road Map for improvement of Track Inspection and Maintenance on Indian Railways.

Ref: Board's order No. ERB-I/2023/23/54 dated 19.09.2023 & 20.11.2023

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The Expert Committee nominated vide Railway Board's letter under ref has examined various aspects of track inspection and system of maintenance. The committee held several rounds of discussion among its Associates Members, with officers of several zonal railways and divisions, officers of Railway Board and RDSO besides ascertaining practices on world railways. The process is ongoing.

Based on the discussion and deliberations so far, a presentation was given to Railway Board (CRB&CEO, MI, MF) on 03.01.24. After detailed discussions it was decided that reports on different topics may be submitted progressively in parts.

Accordingly, **Interim Report –Part-1: "Alternatives to Trolley Inspection"** is submitted herewith for consideration and further necessary action by Railway Board.

DA: Interim Report- Part 1 in 5 Copies

(Anil Kumar Lahoti)
One man Expert Committee
Ex-Chairman & CEO, Railway Board

One Man Expert Committee

On

Improvement of Track Inspection and Maintenance on Indian Railways

Interim Report – Part-1

Alternatives to Trolley Inspections

PREFACE

One-man Expert Committee of Shri Anil Kumar Lahoti was constituted by Ministry of Railways on 19.09.2023 vide Order No. ERB-I/2023/23/54 to draw a road map for improvement of Track Inspection and Maintenance on Indian Railways.

Following are the terms of reference of the Committee,

- To review the present status of track inspection and maintenance practices;
- To suggest ways and means for improving track inspection and draw a road map for the same;
- To review existing organizational structure of track maintenance and suggest ways and means for improving it, including mobility of track maintenance staff and draw a road map for the same
- Identify areas of pilot project(s) and prepare implementation scheme for the same;
- Periodically review the implementation of pilot projects and advise on corrective measures.

Following Officers were appointed as assisting officers to the One-man Committee having domain knowledge,

i. Shri Parmeshwar Funkwal, PCE/WR
ii. Shri Vivek Gupta, PED/GS/RB
iii. Shri Ashish Bansal, PED/TK(M&MC)/RB- Secretary
iv. Shri Rajeev Srivastava, CAO/C/SER
v. Shri Anil Choudhary, Sr Prof/TM/IRICEN
vi. Sri Rahul Singh, Director/TM/RDSO

Subsequently, in view of Shri Anil Chaudhary's deputation as Member NHAI, Shri C.M. Gupta/Dean/IRICEN was appointed as an assisting officer to the Committee vide Railway Board's Order no ERB/I/2023/23/54 dated 20.11.2023 vice Shri Anil Choudhary.

The committee examined various aspects of track inspection and maintenance such as Alternative to Push Trolley Inspection, Organization Structure for Track maintenance, Potential pilot projects, Inspection and Monitoring of Track, Track maintenance and Track Structure.

Detailed discussions were held with assisting officers and Officers of Zonal Railways of Central Railway, Western Railway, Eastern railway, South Eastern Railway, Metro Railway Kolkata, Northern Railway (USBRL project& Ferozepur division) and North Western Railway.

Based on detailed discussions and deliberations, a presentation was given to Railway Board on 03.01.2024. During the presentation, it was decided that reports on different topics may be submitted progressively in parts.

With this background the present report is Interim Report, Part-1, on the subject "Alternatives to Trolley Inspection"

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1. **Trolley Inspection**,

(i) Push trolley:

Push trollies have been used on Indian Railways since Railways started in India for carrying out inspection of track. The frequencies with which the Permanent Way officials are required to conduct inspection by Push trolley are laid down in Indian Railways Permanent Way Manual.

Push Trolley

The current stipulations of frequencies of inspections to be done by push trolley / foot inspection by Permanent Way officials of the rank of Assistant Divisional Engineers (ADENs) and below are summarised in following table:

Schedule of Inspection for various P-Way officials
(with reference para of IRPWM)

Official	Routes with speed above 110 Kmph and Multiple Line	Other Routes
ADEN (Para 103)	Once in 4 months by Push Trolley / Foot inspection	Entire section including loops and yards once in 3 months. One block section per SSE/Pway (In-charge) each quarter by foot inspection.
SSE/Incharge (Para 106)	Entire section including loop lines and yard lines once in 2 months by Push trolley /Foot Inspection	Entire section including loop lines and yard lines, once in 2 months by push trolley. Entire section including loop lines and yard lines, once a year by Foot inspection.
JE/Sectional (Para 109)	Entire section including loops and yards once in fortnight by Foot Inspection	Entire section including loop lines and yard lines, once in fortnight by push trolley. Entire section including loop lines and yard lines, once in 6 months by foot inspection.

Note :All form of trolley inspections in sections with speed 110 kmph and above are preferably to be done under block protection.

Push trollies were useful at times when traffic density was less, there were lesser number of trains on track, and block was not required for operation of push trolley. Thus, there was an ease in operation of trollies.

With increase in traffic density and speed of trains, the push trolley has lost its utility as means for inspection as operation of push trolley in block requires occupancy of track by the push trolley for a longer duration of time and non-block movement in high speed, multi-track electrified section is not safe.

(ii) Motor Trolley/Moped Trolley,

Motor Trolley and Moped Trollies are motorised version of Push Trolleys.

	
Motor Trolley	**Moped Trolley**

These trollies were introduced as alternatives to Push Trolley and are not required to be pushed. These trollies are faster and heavier as compared to Push Trolley and are to be operated under block only. Following are some of the shortcomings of Motor Trollies and Moped Trollies;

a) These are non-engineered vehicles and are manufactured locally.
b) There have been serious accidents in the past leading to injuries and fatalities due to malfunctioning of these trollies.
c) The occupants of these trollies are exposed to environmental conditions.
d) As the occupants are exposed, during trolley movement, flying objects have also caused injuries.
e) These are unsafe when due any reason sudden break application is required. In such a situation occupant can fall on track due to momentum and the trolley can ride over them.

(iii) Issues with trollies,

With Increase in Traffic Density, higher sectional speeds and multiple lines, the operation of any type of trollies have following issues;

i. Non block movement of push trollies is not advisable due to safety reasons on higher speed sections and multiple lines sections.
ii. Block movement of push trollies is also not a feasible option due to slow speed of Push trollies as it will adversely affect line capacity.
iii. Manual pushing of inspection trolley is an in-efficient old system.

2. Uses of Trollies,

Generally, following activities/inspections are done by using push trollies by various Permanent Way officials;

i. Reaching to work site
ii. General Inspection of section including Inspection of works of other agencies such as, Construction, RVNL etc.
iii. Inspection of Curves.
iv. Inspection of gang working.
v. Inspection of Switch Expansion Joints (SEJs) / Long Welded Rails (LWRs).
vi. Inspection of Machine working in section.
vii. Inspection of Level Crossings (LCs).
viii. Inspection of Hot weather/Monsoon Patrolling.
ix. Inspection of Land Boundary Pillars /markings and encroachment.
x. Inspection of track on girder bridges.
xi. Inspection of special works

3. Alternatives of Trollies,

Committee ascertained practices on various World Railways to explore suitable replacement of trolley inspections and to understand the inspection and maintenance practices followed by them.

Network Rail (UK), Japanese Railways, Austrian Railways (OBB), German Railways (DB), Federal Railways Administration (FRA) and Australian Rail Track Corporation (ARTC) were consulted and it was learnt that none of these railways use push trollies or any other trollies for inspection. They use a combination of inspection by foot, rail-borne inspection vehicles and instrumented or non-instrumented Rail – cum-Road inspection vehicles.

Rail Borne inspection vehicles would result in occupancy of track for a longer duration of time as they will move only on rails whereas the Rail Cum Road inspection vehicles would require lesser occupancy of track as they can move to nearest point by road before occupying track.

As on Indian Railways, there is heavy traffic density, a combination of foot inspection with Rail Cum Road Inspection Vehicle (RCRIV) may be used as an alternative for Push Trolley.

Rail Cum Road Inspection Vehicle (RCRIV) will have following facilities :-

a. Ability to run on road and railway track.

b. Facility to house a team of 5-6 P-way officials with small tools

c. Able to go on and off track from a suitable location with level platform (in future mid-section also)

Rail Cum Road Inspection Vehicle

Rail cum road vehicles are already being used on Indian Railways by different departments for various purposes;

RCRV in Vande Bharat Maintenance Depot Shakur Basti, New Delhi

RCRV used in MCF Raebareli

In Konkan railways trial USFD testing is being done by deployment of an instrumented Rail cum road inspection vehicle.

RCRV used in KRCL

4. Important Information/aspects of RCRIVs

(i) Rail cum road vehicles are heavy duty road vehicles in which rail wheels, lifting and lowering arrangement is fitted to enable its movement on track. In order to fit the rail wheel assemblies in standard SUV type road vehicles, the rail wheel diameter may be of the order of 300-450 mm.

(ii) In Rail cum road vehicles the rail wheels installed can be for guidance only with tractive forces coming from the tyres or rail wheels can be used for tractive force also.

(iii) Based on the expected load on inspection vehicles it is proposed that the rail wheels will be for guidance only.

(iv) Specialised kits are made for attaching the rail compatible wheels on these road vehicles and for providing lifting and lowering arrangement of wheels so that on-tracking and off-tracking can be done. Suitable vendors are to be explored for this activity.

(v) Suitable vehicles of Reputed Indian Make are to be explored for converting them into intended RCRIV. Few examples are as below :-

	
Tata Yodha Pickup	**Bolero camper Pickup**

(vi) In the suitable vehicles special emphasis should be given on quality of tyres, as the tyres will have to move both on road and on rail.

(vii) In addition to providing RCRIV to P-way officials for routine inspections, instrumentation of a pool of few vehicles per division is also to be explored so that every division of IR has instrumented Rail Cum Road inspection vehicle capable of carrying out various inspections such as Turn-out inspections, Video Inspection of track components, inspection of ballast by Ground Penetration Radar (GPR) etc. Provision of necessary instrumentation of RCRIV provided to ADENs/ SSE(P.Way) can also be considered.

(viii) In past an attempt was made to introduce Rail cum road maintenance vehicle which were truck based. As these vehicles were not detected by axle counters and their movement on line clear was not possible and there were no suitable provisions of their entry and exit mid-section, these vehicles were not successful on Indian Railways.

(ix) To overcome above issues, it is recommended that RCRIVs be introduced by working in block only. RCRIVs to enter on track from one station and exit on another station only in block. For this purpose, at each station a siding/loop on each side (Down/UP) should be designated for on-tracking/off-tracking of RCRIV and provided with level surface at suitable location for this purpose. This location should be accessible by Road.

(x) Suitable modification in design of axle counters should also be explored in long term so that in future the movement of RCRIVs can be done on line clear also, this will lead to more convenient operation of the RCRIVs.

(xi) RCRIVs are proposed to be given to Assistant Divisional Engineers (ADENs) and Senior Sectional Engineers (SSEs) Incharges (total nos 1692) and it is also proposed to be utilized by construction officials of important projects and for future scope of instrumentation in RCRIVs as discussed above, thus the total requirement would be approximately 2000 numbers.

(xii) The operation of RCRIVs should be done by departmental drivers and therefore proper training for the drivers regarding driving of the vehicle, safe operation on track, safety features of the vehicle etc. has to be ensured. They should also be

trained in routine upkeep of the vehicle. These drivers are to be posted under Senior Sectional Engineer (SSE)/Incharges.

5. Inspection Alternatives in Lieu of Push Trolley,

Following inspection alternatives may be done in lieu push trolley,

Objective	**Existing mode**	**Mode and Alternatives methodology**
Reaching to Worksite	**Push Trolley**	**RCRIV**
General Inspection of section, including inspection of works of other agencies such as RVNL, construction etc.	By DEN, ADEN, SSEs and JEs by Push Trolley/Foot plate	RCRIV
Inspection of Curve.	By DEN, ADEN, SSEs and JEs by Push Trolley	Frequency to be reduced in view of Track recording Cars (TRC) and Oscillation Measurement System (OMS) inspections and to be done by foot inspection or reaching site by RCRIV.
Inspection of gang working.	Push trolley	Not Required – as all the manpower working in sections will be headed by JEs as in 3 Tier structure of Track Maintenance, the track maintenance is to be done by mobile maintenance unit instead of sectional gangs.
Inspection of Switch Expansion Joints (SEJs)/ Long Welded Rails (LWRs).	Push Trolley	RCRIV/Foot
Inspection of Machine working in section	Push trolley	RCRIV, by accompanying machine
Inspection of Level Crossings (LCs).	Push trolley	RCRIV/Foot (also numbers of LCs are reducing)
Inspection of Hot weather/Monsoon Patrolling.	Push trolley/Foot Plate	RCRIV/ Foot/Foot Plate, now patrolmen have GPS trackers.
Inspection of track on Girder bridges	Push trolley	RCRIV/Foot
Inspection of Land Boundary Pillars /markings and encroachment.	Push trolley	RCRIV/Foot
Points and Crossings	By ADEN, SSEs and JEs by manual methods, push trolley	RCRIV, Instrumented vehicles and portable trollies.

6. Recommendations of the committee;

Based on above discussion following are the recommendations of the committee;

i) Push Trolley/Motor trolley and Moped Trolley may be replaced with Rail Cum Road Inspection vehicles.

ii) Implementation to begin with sections having low traffic density to gain experience.

iii) RCRIV to generally start from nearest station approachable by road and proceed on block.

iv) Proper facility for on-tracking and off-tracking at stations to be created at each station such as sidings and level platforms for on-tracking and off-tracking of the RCRIV.

v) Improvement in design of Axle counters to be explored in the long term so that in future the movement of RCRIV can be done on line clear.

vi) In future suitable provisions to be done so that RCRIV can enter and exit from track mid-section also. This will require protocols for taking /clearing blocks from mid-section and suitable level surfaces. An IT based system should be designed for App based demanding, granting and clearing of block.

vii) Total requirement of RCRIVs would be approximately 2000 numbers.

viii) Based on discussions held with RDSO officers, draft technical specifications have been made by RDSO and EOI has been called, specifications to be finalized at the earliest.

ix) RCRIVs will be normal road vehicle with suitable modifications for attachment of rail wheel assembly. The rail wheel diameter may be of the order of 300-450 mm.

x) Rail wheel assembly, fixing as well as lifting and lowering arrangements to be suitably designed and should be very reliable and durable.

xi) Sufficient fund should be available with Zonal railways for running of these vehicles for various expenses such as fuel, consumables and day to day maintenance. Suitable imprest to be created with each of the RCRIV owner.

xii) They should also have a running maintenance contract so that these critical inspection vehicles remain in good fettle.

xiii) As these RCRIVs will move on track only in blocks, movement of these must be included in the rolling block program and blocks must be strictly ensured. Uncertainties in granting and timing of the block need to be eliminated.

xiv) Drivers of these RCRIVs to be of technician grade, posted under SSE/Incharge.

xv) Proper training of these drivers on driving of the vehicle on track and safety features etc. is to be arranged. They should be competent to take or clear the block for occupation of track by RCRIV.

xvi) AMC of these RCRIVs is to be done preferably with OEM or with reputed garages if OEMs facility is not available nearby.

xvii) The introduction of RCRIVs as an alternative to push trolley, may be started from sections with less traffic density. (A list of sections identified by CE Directorate is at Annexure-1).

Annexure-1

List of Sections having GMT generally less than 10

S.N	Major section	Railway	Division	Total length of Major section		Annual GMT of Major Section
				Route km	Track km	
1	Amla – Chhindwara.	CR	Nagpur	113	113	3
1	Belapur - Seawood - Uran	CR	Mumbai	27	54	0.3
2	Ahmednagar - Beed - ParliVaijanath	CR	Solapur	261	261	0.2
3	Hansdiha - Godda	ER	Malda	32	39	2.6
4	Sakri - Harnagar	ECR	Samastipur	44	44	1.7
5	Kanwar - Maheshmunda	ECR	Dhanbad	25	25	1.6
6	Raxaul - Narkatiaganj	ECR	Samastipur	41	41	11.2
7	Saharsa - Saraigarh	ECR	Samastipur	52	52	4.6
8	Banmankhi - Bihariganj	ECR	Samastipur	27	27	1.7
9	Sakri - Jhanjharpur	ECR	Samastipur	20	20	2.6
10	Islampur - Natesar	ECR	Danapur	21	21	6.9
11	Ghoswar - Vaishali	ECR	Sonpur	30	36	0.2
12	Nirmali - Saraigarh	ECR	Samastipur	20	20	3.0
13	Saraigarh - Forbesganj	ECR	Samastipur	59	59	0.9
14	Jhanjharpur - Nirmali	ECR	Samastipur	32	32	2.6
15	Balangir - Khurda Road	ECoR	Sambalpur/ Khurda Road	289	289	0.9
16	Talcher - Bimlagarh	ECoR	Khurda Road	153	153	NA
17	Angul - Sukinda	ECoR	Khurda Road	117	117	2.2
18	Rohtak-Meham-Hansi	NR	Delhi	69	69	1.4
19	Sirhind - Nangal Dam - Daulatpur chowk	NR	Ambala	163	163	8.2
20	Virbhadra - Karanprayag	NR	Moradabad	126	126	1.4
21	Rohtak-Panipat	NR	Delhi	71	71	3.8
21	Bhandai – Etawah	NCR	Agra	125	125	Bhandai - UdiMor- 112.26 km, GMT- 8.38 UdiMor – Etawah - 12 km, GMT- 11.75

S.N	Major section	Railway	Division	Total length of Major section		Annual GMT of Major Section
				Route km	Track km	
22	Durandha - Mahrajganj - Mashrakh	NER	Varanasi	43	43	1.3
23	Gonda - Mailani	NER	Lucknow	266	266	2.3
24	Aishbagh - Mailani	NER	Lucknow	194	194	6.6
25	Pilibhit - Shahjahanpur	NER	Izzatnagar	83	83	0.4
26	Agartala - Sabroom	NFR	Lumding	76	95	3.0
27	Gauripur - Abhayapuri	NFR	Rangiya	36	44	0.2
28	Gauripur - Abhayapuri	NFR	Rangiya	85	98	0.2
29	Mavli - Bari Sadri	NWR	Ajmer	83	83	0.2
30	Ringus - Sikar	NWR	Jaipur	50	50	8.3
31	Jaipur - Ringus	NWR	Jaipur	60	60	6.6
32	Udaipur - Himmat Nagar	NWR	Ajmer	209	209	0.2
33	Thiruvarur Jn - Karaikkudi Jn	SR	Tiruchchirappalli	76	76	0.6
34	Madurai - Bodinayakkanur	SR	Madurai	90	90	0.4
35	Nandyal - Yerraguntla	SCR	Guntakal	123	123	6.8
36	Akhola - Khandwa	SCR	Nanded	206	206	0.1
37	Bhadrachalam Road - Sathupalli	SCR	Secunderabad	54	54	4.0
38	Durg - Antagarh	SECR	Raipur	129	181	Marauda - Dalli-Rajhara -29.18, Dalli-Rajhara - Antagarh - 0.92
38	Jabalpur-Nainpur-Gondia	SECR	Nagpur	232	254	Jabalpur - Nainpur: 14 Nainpur - Balaghat: 9 Balaghat - Gondia : 21
39	Chhindwara - Itwari	SECR	Nagpur	146	179	5.6
40	Balaghat - Nainpur	SECR	Nagpur	76	96	11.8
41	Nainpur - Mandlafort	SECR	Nagpur	43	49	4.8
42	Tirodi - Katangi	SECR	Nagpur	16	16	7.4
43	Munirabad (Ginigera) – Raichur	SWR	Hublli	165	165	1.2

S.N	Major section	Railway	Division	Total length of Major section		Annual GMT of Major Section
				Route km	Track km	
44	Vishvamitri - Alirajpur	WR	Vadodara	151	151	Vishvamitri - Dabhoi - 3.82, DabhoiChhuchhapura- 1.32, Chhuchhapura - Alirajpur - 0.1
45	Mahasana - Patan - Bhildi	WR	Ahmedabad	91	91	Mahasana-Patan:- 12.04 Patan-Bhildi:-10.64
46	Ahmedabad - Himmatnagar	WR	Ahmedabad	87	87	2.2
47	Mahesana - Taranga hill	WR	Ahmedabad	56	56	0.9
48	Ratlam - Indore - Khandwa	WR	Ratlam	266	266	RatlamFathebad- 8.31, Fathebad- Indore- 7.29, Indore-Dr.Ambedkar nagar-7.06, Dr.Ambedkarnagar- Khandwa- 6.03 Khandwa B cabin- Mathela =6.03
49	Dabhoi - Ektanagar	WR	Vadodara	51	51	2.4
50	Fatehabad - Ujjain	WR	Ratlam	22	24	5.2
51	Sabarmati - Botad	WR	Bhavanagar	165	196	2.5
52	Dhasa - Jetalsar	WR	Bhavanagar	104	114	0.9
52	Sabarmati-Botad	WR	Bhavnagar	165	205	2.49
52	Guna- Gwalior	WCR	Bhopal	223	238	5.77
Total				**5839**	**6150**	