

**SETTING THE POINT FOR APPROPRIATE
DECISIONS LEVERAGING THE WAY FOR
EXTENSIVE RAIL-TRACK REHABILITATION,
REENGINEERING, STRENGTHENING,
MODERNISATION AND UPGRADING OF ALL
ROUTES IN INDIA**

**Underfunding of Safety related Rail-Track Works – the
main underlying Factor for the recent Spate of fatal
Derailment-Disasters**

**The Need to catch-up the Investment Backlog
Vision of modern sound and healthy Rail-Tracks for a
World-Class Railway**

By Dr. F.A. Wingler, March 2018



Setting the Point for appropriate Decisions

SYNOPSIS:

Let's hope that the new leadership will overcome the deficiency in making decisions in favour of modern, safe, sound and healthy rail-tracks on all routes of high track-quality for close-to-zero derailments and for overall low life cycle costs. India must invest by far more in track infrastructure and assets than in the past to catch up the accumulated investment back-log of the past decades.

As far as track quality is concerned, the demands and the realities differ widely.

An Audit elaborated by the Comptroller and Auditor General of India (CAG) covering the period from April 1, 2016, to 31 March, 2017, and focusing on maintenance of tracks on selected 29 sections of high-density network routes (HDN) and eight sections of non high-density (HDN) routes, reveals **multiple lapses in the railway-track maintenance plans**; see **ANNEXURE III**.

The new leadership want to ***“CHANGE THE FUTURE OF INDIAN RAILWAYS”*** in order to ***“TAKE INDIAN RAILWAYS TO THE LEAGUE OF WORLD-CLASSRAILWAYS”***. The Railway has been declared as ***“LIFE-LINE OF THE COUNTRY”***.

However, a **WORLD-CLASS RAILWAY** needs **MODERN WORLD-CLASS RAILWAY-TRACKS OF HIGH QUALITY**. In this respect, expectations of the new leadership and track-realities differ widely.

In the past decades, IR has not invested enough to keep the quality of all its rail-tracks in compliance with the increased traffic load, they have to carry. The Indian Government is pushing in front a huge investment and organisation/performance backlog for keeping all its rail-tracks in sound and healthy condition.

A backlog of track-renewal, rehabilitation, reengineering, upgrading, modernization and strengthening has accumulated over the years. Now, it will cost a huge amount of capital investment schemes to catch up this backlog. The accrued debts will not be paid off with the annual renewal of 3500 km rail tracks from about 115 000 km total length of tracks. To renew 3500 km rail-track per year even does not compensate the present ageing of ailing rail-tracks, ageing under the strain of the increased traffic load.

What ails IR mostly:

- ◆ Fragile LWR/CWR tracks composed of short 13 m long Rails, poorly AT welded and in need to be bandaged with joggle-fishplates - often repaired by botch-up, tinkering and patch works;

- ◆ poor bearing and yielding sub-structure constituents (subgrade, subsoil and formation);
- ◆ poor/insufficient drainage and water-surface management.

The problem of formation failure is quite severe on several Indian tracks, most laid at a time, when substructure bearing capacity had been not much under consideration; see paper No. 23 of T. Anil Kumar and U. Sarath presented on the International Technical IPWE (India) Seminar, Guwahati, 23/24th February 2018. The memory for track misalignments is buried mostly in the poor bearing and yielding sub-structure constituents and in poor drainage of the track-bed.

As a frequent rail-traveller with open eyes I can state that several routes age under the increased traffic load and speed faster than they are renewed, rehabilitated, reengineered or strengthened. This is one of the main underlying factors for the recent spate of nasty and unwanted derailment-disasters of high injury and mortality rates:

Prof. Dr. P. Veit, Technical University Graz, Austria, quotes: **“A Rail-Track behaves like an Elephant”!** A track can tolerate a lengthy period of overuse, carelessness, neglect and ill-treatment until it will react. Like an Elephant, a Track has a memory for neglected care and ill-treatment. But be sure, suddenly the track remembers missing care, and it will run berserk like an Elephant throwing off the train:



Mahakaushal Express Derailment Spot, 30th March 2017. Obviously the Quality of the neglected Track did not match the Traffic Load.

On the website

<http://www.drwingler.com>

a series of papers are published dealing with the un-balance of traffic load and track quality on the IR network, dealing with the importance of sound and healthy rail tracks, with optimising the all-important interacting wheel-rail system and with guidelines for improving India`s rail-roads to ensure “**Close-to-Zero**” fatal derailment-disasters and accident free rail travel.

The topic and the presented papers of the last IPWE Guwahati, February 2018 International Technical Seminar, have inspired the author to elaborate the technical paper on

**LEVERAGING DEVELOPMENTS IN MONITORING TECHNOLOGY
HELP TO ACHIEVE SOUND AND HEALTHY RAIL-TRACKS FOR A
MODERN “WORLD-CLASS” RAIL-SERVICE,**

published free for download on the above mentioned website.

Reviewing the technical papers presented on the recent 2018 Guwahati IPWE International Technical Seminar (“**Leveraging Developments in Monitoring Technology for Optimising Track, Bridge and Tunnel Maintenance.**” Date: 23rd and 24th February 2018. Venue: BKB Auditorium, Gauhati University, Guwahati, Assam 781013) as well the papers of elder IPWE Seminars creates the impression that the Indian Engineers “know their onions”, how, by which methodology/technology and what to monitor and how to achieve sound and healthy modern rail-tracks fit for the increased traffic load and speed.

The great challenge is to come to relevant consequences with the result in bringing more quality on the rail-roads for fewer derailments. But this will need a high amount of money and vast restructurings in the organization with a paradigm shift. Let`s hope that the new leadership will be aware of the **LESSONS TO BE LEARNED FROM MONITORING.**

Leadership must ensure that the necessary long-term funds of long-term certainty are made available and that the necessary structural reforms are carried out, with the aim of eliminating the backwardness and back-logs in track quality as soon as possible.

3769 Rail Fractures in the past one year on IR speak their own language about the poor condition of IR tracks (paper No. 13 of P. Mittal and A.V. Mittal, page 116-125).

IR must get rid of its 13 m rails, often of poor steel quality and AT welded to LWR/CWR-tracks, which are in need to be bandaged with joggle fish-plates.

If the LWR/CWR-tracks are composed with factory delivered 240 m rails of high steel quality and with robotic flash-butt welds, there will be nearly zero rail fractures, and hence, nearly no monitoring of rail fractures will be needed.

The decisions of the leadership are in favor of glossy and prestigious programmes aiming to transform IR to a **World-Class Railway** with "**World-Class Standards**" and to take IR to the "**World-Class League**".

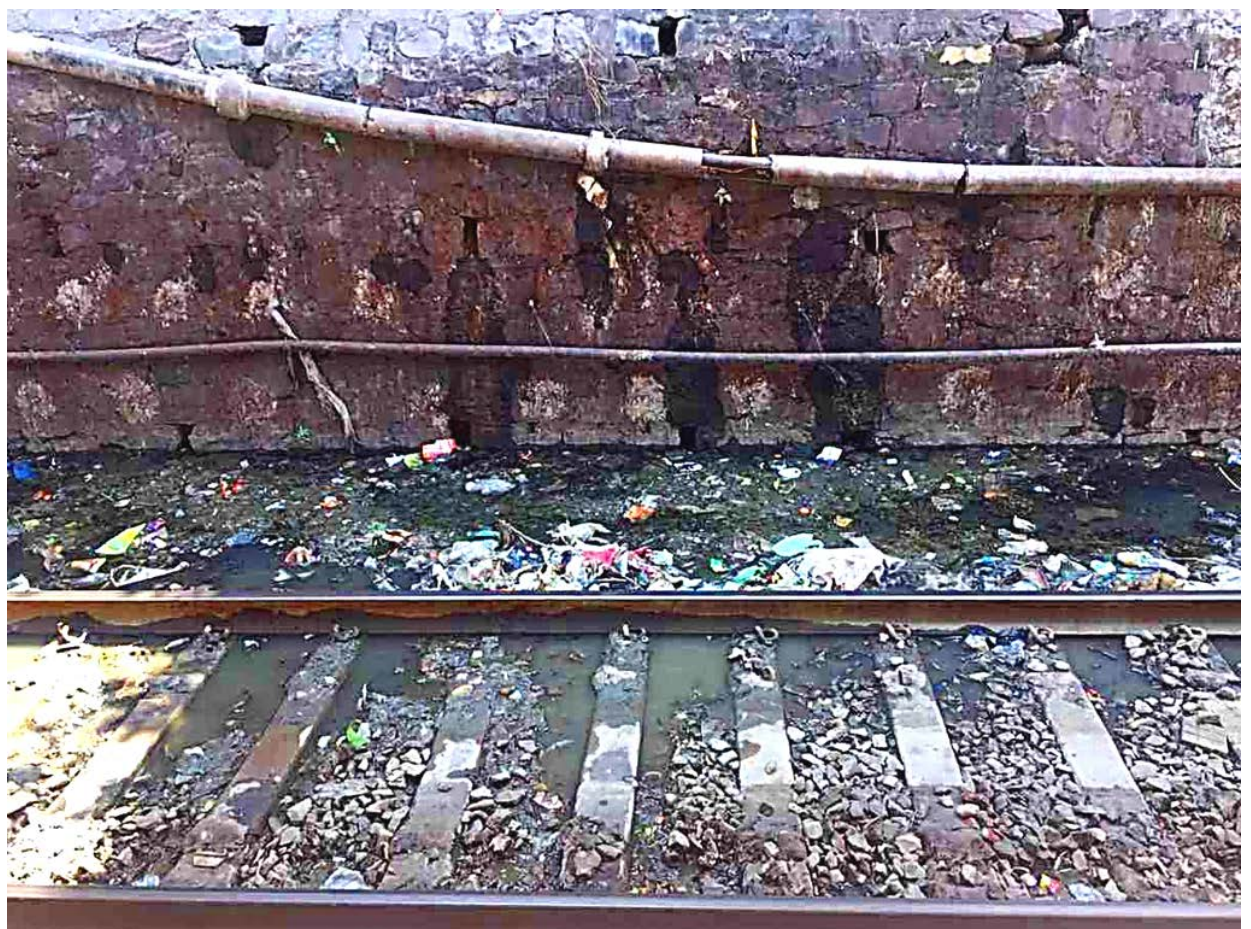
However, the decisions have not been in favor of allocating sufficient funds for **SOUND AND HEALTHY RAIL TRACKS on all routes** according world-class standards. One has to look only on the plight of the tracks in the sub-urban Division of CR, Mumbai; see the message of the Paper No. 39, page 338-345, presented by R.K. Goel and P.K. Naga, about maintaining the sub-urban section of the Mumbai CR Division, soiled, full of muck, mud and garbage, which cannot be removed to make place for a well drained unfouled and clean ballast bed for a stable rail-road. This plight is really heart-breaking and depicts the acute dilemma, that presently Indian Railways are facing. The full paper is attached as **ANNEXURE II**.



Rail/Weld Fracture **prone Track**; Kalyan 2016



Reality on CR Mumbai-Division sub-urban Rail-Tracks



The Plight of soiled and Mud-pumping sub-urban Rail-Tracks of CR Mumbai-Division.
Is this a Track for a "World-Class Railway Service"?



Flooding of Tracks, inadequate City Drainage and Surface Water Management

A **"World-Class Railway"** with **"World-Class Rail-Service"** needs **World Class High Quality Rail-Tracks**; and in this respect India is lagging far behind advanced railways.

There should not only be **LEVERAGING DEVELOPMENTS IN MONITORING**, there should also be **LEVERAGING ACTIONS TO BE TAKEN RESULTING IN HIGH TRACK QUALITY ON ALL ROUTES FOR CLOSE-TO-ZERO TRAIN-DERAILMENTS** and for **OVERALL LOW LIFE CYCLE COSTS** inclusive **LOW AGGREGATED HINDERANCE COSTS**.

Technology and engineering guidance how to achieve modern sound and healthy rail-tracks of high quality had been given through the pen of the authors D. B. Lichtberger and Prof. P. Veit (Austria), C. Esveld (Netherlands) and last not least of J.S. Mundrey and M.M. Agarwal (India). Fundamentals of modern Rail-Track Technology and Engineering are summed up in the attached paper.

Engineering parameters for tracks with high inherent quality, Indian Track Engineering Experts have revealed on the January 2017 International Technical IPWE Seminar at New Delhi.

Around the globe Austrian Federal Railway, ÖBB, is world-leader in advanced rail-tracks of high quality and hence of low overall life cycle costs.

In Conclusion:

The higher the Track-Quality the less Monitoring is necessary. High Track-Quality on IR can be achieved with long milled and flash-butt

welded Rails of high Steel Alloy Quality and by comprehensive Sub-Grade/Formation/Drainage Rehabilitation, Reengineering, Modernization, Upgrading and Strengthening.

Let's hope that the new leadership will set the point for appropriate decisions paving the way for extensive rehabilitation, reengineering, strengthening, modernization and upgrading of all routes in India in order to catch-up the accumulated investment backlog in safe, healthy and sound rail-tracks, matching the traffic load they have to carry.

ANNEXURE I:

Quotations for Fundamentals of Rail-Road Technology & Engineering

“A TRACK IS ONLY AS GOOD AS WHAT IS UNDERNEATH”;

“A TRACK IS ONLY AS GOOD AS ITS WEAKEST SPOT, BECAUSE A TRAIN MIGHT DERAIL ON SUCH A SPOT”;

“WITHOUT PROPER WELL BEARING AND WELL DRAINED SUB-STRUCTURE (SUBSOIL, SUB-GRADE, FORMATION AND BLANKET) NO STABLE RAIL-ROAD”;

“THE LONGIVITY DEPENDS ON DRAINAGE AND IF THE WATER CAN BE TAKEN OUT AND KEPT AWAY FROM THE TRACK-BED”;

“WATER IS THE ENEMY OF THE RAIL-TRACK”;

“CLEAN AND UNFOULDED BALLAST IS THE BLOOD OF THE RAIL TRACK”;

”TRACK QUALITY IS NO LUXURY”;

”A LOWER QUALITY TRACK DETERIORATES FASTER THAN A HIGHER QUALITY TRACK AND IS THEREFORE BY FAR MORE COSTLY TO MAINTAIN”;

“ONE HAS TO MANAGE EFFECTIVELY THE ALL-IMPORTANT WHEEL – RAIL SYSTEM”;

“WITHOUT SOUND AND HEALTHY RAIL-TRACKS OF HIGH QUALITY, MATCHING THE TRAFFIC-LOAD/VOLUME, NO MODERN RAILWAY SERVICE WITH CLOSE-TO-ZERO MORTALITY RATE IS POSSIBLE!!!”



Vision of sound and healthy modern World-Class Standard Rail-Tracks for a World-Class Railway

ANNEXURE II:

Paper No. 39 by R. K. Goel, OSD (Services) BB Division, C-Rly., CSMT, and P. K. Garg, CE (Track Machines), C-Rly., CSMT, on ***“Issues and Challenges in Maintenance of Track in sub-urban Sections of Mumbai Division of Central Railway”***, presented on the International Technical IPWE (India) Seminar, Guwahati, 23/24th February 2018:



**International Technical Seminar
on
Leveraging Developments in Monitoring Technology
for Optimising Track, Bridge and Tunnel Maintenance**



INSTITUTION OF PERMANENT WAY ENGINEERS (INDIA)

23rd and 24th February, 2018

GUWAHATI



ISSUES AND CHALLENGES IN MAINTENANCE OF TRACK IN SUB-URBAN SECTIONS OF MUMBAI DIVISION OF CENTRAL RAILWAY

R. K. Goel*

P. K. Garg**

Synopsis:

Maintenance of track in suburban section of Mumbai has always been a challenging task. Suburban network provides cheap mode of transportation to commuters and is the lifeline of Mumbai. Due to trains running at close intervals, every maintenance activity requires traffic block and the actual availability of blocks is gradually reducing due to increased number of services. On the other hand, the damaging effects are on increase due to more trains passing over the same track. There are large outside interferences with limited support from law enforcing agencies, creating conditions that make the track maintenance more difficult. Un-authorized settlements, municipal discharges, inadequate capacities of cross drains, flooding of tracks during monsoons, frequent and heavy trespassing, threats of "Rail Roko" on technical failures etc. are some of the issues, being faced daily by the maintenance staff. Most of the yards were not designed keeping in view the present day requirements of the passenger services. The yard capacities have been increased incrementally as and when forced by the public demand but is insufficient due to space constraints. This has led to the non-standard layouts with in-built violations of prescribed instructions. An attempt has been made in this paper to identify all such issues and analyze their implications on track maintenance. Short term and long term remedial measures have been suggested to improve the situation.

1.0 INTRODUCTION :

- 1.1 Mumbai Division of Central Railway is having a wide network of track with 567.94 route km. The total track km are 1879.3, which include two Ghat sections on North East side (16 km) and South East side (29 km). The Ghat sections are having three lines with middle line as bi-directional line. All the long distance trains to and from north and east side are passing through these Ghats.
- 1.2 Besides, the long distance trains from four coaching terminals i.e. Chhatrapati Shivaji Maharaj Terminal (CSMT), Dadar, Lokmanya Tilak Terminus (LTT) and Panvel, the division caters to the demand of 45 lakhs of daily sub-urban commuters on an average. The main corridor from CSMT to Kalyan is highly congested and serves the old city areas of Fort, Byculla, Dadar, Sion, Kurla, Ghatkopar, Mulund and Thane.

* OSD (Services) BB Division, C Rly, CSMT, **CE (Track Machines), C Rly, CSMT



- 1.3 The stations between Thane and Kalyan e.g. Mumbra, Diwa, Thakurli and Dombivili do not have proper road connectivity due to creek at Thane. Therefore, sub-urban railway is the most preferred transport for the public residing in these areas. The un-controlled and un-authorized growth of these regions have led to tremendous increase in demands for additional trains.
- 1.4 The track in Mumbai suburban network is conventional ballasted track laid on PSC sleepers. The ballast is fully soiled with the muck creating the problem of water stagnation and mud pumping in the track at many locations. The track can't be lifted to provide ballast cushion due to inadequate clearance of OHE wires and also due to limited clearance available at series of ROBs & FOBs in the section. Deep screening of the track is also not the option available since the track is lower than the surrounding ground creating a saucer like situation. The PSC sleepers develop deep notches below the rail seats due to less resiliency rendering the sleepers unserviceable.
- 1.5 Kalyan is the biggest and the busiest yard of the division from the point of view of operations and it segregates the traffic towards NE or SE Ghats. Yard remodelling at Kalyan is a big challenge and it has been long overdue. A work has been proposed recently to segregate the long distance traffic from sub-urban trains. Division is also having Electric Loco and Diesel Loco Sheds at Kalyan with a separate goods yard. There are 7 no. of passenger platforms and all the Mail/Express trains are sharing the platforms with fast local trains. The 5th & 6th line between Diwa & Thane and Kurla to Parel is under construction. The work of passenger terminal at Parel is presently under construction. Every traffic block is planned keeping in view the least inconvenience to general public. The on going construction activities demand diversion of maintenance resources and traffic blocks which are to be given on over-riding priority.
- 1.6 There are new corridors of Navi Mumbai on Harbour line and Trans Harbour line which have been extended from Mankhurd and Thane respectively to provide connectivity to Vashi, Airoli, Belapur and Panvel. An additional corridor Belapur- Seawood - Uran is also under construction which will increase the traffic further.

2.0 GEOMETRICAL CONSTRAINTS:

2.1 Yard layouts involving too many Cross-Overs: Cross-overs have been provided in yards when lines were used primarily for goods traffic. In most of the yards the goods traffic has reduced over a period of time but the passenger traffic has increased. Although, the movements taking place on these cross-overs have reduced but these cross-overs are still to be maintained to allow movements during emergent situations. Requirement of each cross-over is therefore to be critically reviewed for their present day utility and maintainability.

2.2 Non-standard Diamond Crossings: Ordinary Diamonds (OD)/Diamond with Single Slip (DSS)/



Diamond with Double Slip (DDS) are existing in yards since olden days, when such switches and crossings used to be built at local level. As on date fabricated switches and CMS crossings only from RDSO approved sources are permitted. All such layouts needs to be reviewed either to eliminate them or replace them with standard arrangements.

2.3 Non-Standard glued Joints: Yards initially laid with conventional signaling, have been now provided with automatic signaling. The turnouts have been earlier laid back to back and continuing as on date without having sufficient space in between the two turnouts. There is no adequate space to provide standard length of glued joints. Additional joints are created very near to Stock Rail Joint (SRJ) or Back of Crossing (BOX) in violation of provisions of IRPWM. The maintenance of such joints is always an issue. Such locations have been listed and special instructions are required to be issued for inspection and maintenance.

3.0 INFRINGING PSC SLEEPERS OF TURNOUTS:

3.1 Turnouts in yards were originally laid on wooden sleepers and have been later on replaced with PSC sleepers of RDSO design. At many locations, the PSC sleepers of adjoining line have been observed infringing, leaving no space for insertion of tamping tool during machine packing. The manual packing is done in all such cases, which is not effective leading to poor retention. Apparently, there is no solution for such type of situations in IRPWM.

4.0 CONSTRAINTS DUE TO MONSOON:

4.1 On Mumbai Division, no systematic maintenance to track is possible during the 4 months of monsoon (June to Sept.) and only limited attention is given during the 2 months of pre-monsoon (April to May), when staff is mostly engaged in cleaning of drains. Due to inadequate city drainage system, many locations get flooded during heavy rains bringing lot of additional muck in the track.

5.0 EFFECT OF INCREASED TRAFFIC/ SERVICES:

5.1 Over the last 20 years, the total no. of passenger coaches running over the sub-urban sections have doubled. The total no. of services have increased from 1618 to 1660 in last one year and additional services are planned this year. Moreover, the length of all the EMU trains have been increased from 9 cars to 12 cars. This has the following implications:

- (1) There is no margin available to attend to any failure. The system is bound to have some failures in spite of all the efforts. Many trains gets cancelled and bunching of trains take place in case of failures spanning more even few minutes.



- (2) 33 % more wear & tear to sleeper rail seat, rubber pad, rails/welds and damage to track fittings takes place. Any surface defect will get extra battering and fatigue failure will take place earlier. Thus, early replacement of fittings, rubber pads, rails, welds, fish bolts, stud bolts, tongue rails and stock rails is required as compared to previous years.
- (3) Due to larger impact and reduced maintenance, the frequency of USFD of rail and weld is required to be reviewed.
- (4) Additional manpower & efforts are required for attending to failures, replacement of fittings etc. for maintaining the track in safe condition.
- (5) Even proper inspection of tracks is an issue. Trolley inspection is not possible and hence, not permitted. Foot inspection is prescribed but it is also difficult due to lesser availability of time for inspection. Sub-urban trains are there every 3-5 minutes, and for proper inspection additional time is consumed by inspecting officials as only piece meal inspection is feasible in between the smaller time duration between two scheduled trains. In fact, the personal safety of inspecting officials is very important and the inspection becomes secondary.
- (6) Lesser availability of maintenance margins/traffic blocks for even attention of loose fittings.
- (7) Additional stress on maintenance staff resulting in unsafe working conditions.
- (8) Rapid pulverization of ballast, choking drainage and reducing resiliency of track.
- (9) Loss of resiliency of ballast bed again results in additional stresses on Rubber pads and frequent loosening of fittings needing additional maintenance particularly on turnouts where stresses are more.
- (10) Requirement of deep screening is felt earlier than scheduled. There are already large arrears of deep screening on sub-urban system as the progress of BCM is much less due to large obstructions and various fixtures provided by S&T/ OHE departments.
- (11) Machine working is required to be done in co-ordination with S&T & OHE staff. The associating staff is often busy in their own maintenance issues. Thus, minor issues are often piled up and remain unresolved for long as progress of track machines is also watched and they are withdrawn if progress achieved is much less than specified. The machine output norms for congested sections should be specified differently on lower side.

6.0 MUNICIPAL DISCHARGES TOWARDS TRACKS:

- 6.1 There are number of locations where the municipal discharges are diverted towards railway land. Most of the buildings adjacent to track leave their drain discharge towards the track. This creates slushy conditions due to track being in saucer and makes the job of track maintenance very difficult. The mud pumping takes place regularly and the locations become prone to rail/weld fractures. The photographs below can be seen for appreciating the problem.



7.0 GENERATION AND REMOVAL OF MUCK:

- 7.1 Lot of city muck is thrown on the track or dumped by the side of track. Removal of muck is a regular process of maintenance in conventional ballasted track. The maintenance operations of shallow screening, deep screening are essential to provide clean cushion of ballast under sleepers for track resiliency and proper drainage. The muck generated, if not removed, blocks the free outflow of storm water during monsoon. The problem is compounded at locations where municipal discharges are diverted towards tracks. It makes the track slushy and restricts any maintenance input creating unsafe conditions. Arrears of last several years are accumulated in the form of heaps due to difficulties in removal of muck and released sleepers from the yards. For clearance, it requires frequent traffic blocks and dedicated rakes with power and crew arrangements on regular basis which are not easily available. Dedicated power & crew is required to be nominated for faster clearance. Obviously, the available resources are diverted for removal of muck rather than deploying these for track maintenance.
- 7.2 Process of removal is through filling the muck manually in gunny bags. The process is slow as it involves working in yards with running lines. The gunny bags are then loaded into muck specials during the traffic blocks. There are constraints due to space availability and safety of workmen while filling the bags.
- 7.3 Traffic block is a valuable item and always scarce as all maintenance activities are dependent on it. Such blocks are normally available in night only and availed for loading the muck at the cost of some other maintenance activity. Recently, Mumbai division has planned two extra rakes of 4 BRN each with JCB machines for loading of muck and garbage on Main and Harbour line sections. However, quantities accumulated are huge and still remain piled up in yards & along the lines. A total quantity of about 35,000 cubic meter has been removed in last six months and about 1,15,000 cubic meters of muck is still estimated to be balance. In fact, the fresh dumping of garbage is faster than the removal.
- 7.4 Disposal of muck is also a problem as there is no place for dumping in the city. The muck specials are generally emptied along the track for widening the embankment near the creeks. In order to reduce the generation of muck in long term renewal of existing tracks with ballast less track with tested designs of proven manufacturers to be considered. However, it may require traffic blocks of longer durations for which public perceptions have to be created in a systematic manner.

8.0 GARBAGE DUMPING NEAR RAILWAY TRACKS:

There is a tendency of people residing in nearby colonies and slum dwellers to throw their waste and garbage in railway area. The regular pursuance with municipal authorities are done with little improvements. Although railway has planned boundary wall all along the track, the problem is not likely to be solved. Effective co-ordination with local Municipalities/State Govt., to help the Railway authorities in curbing the menace of garbage dumping/Municipal discharges towards railway track to be done at higher level.



9.0 TRANSPORTATION OF P WAY MATERIAL TO WORKSITE:

- 9.1 Unlike material for maintenance of other departments, track material such as rails and sleepers are quite heavy and need specialized labour for handling. Transportation for long lead requires BCNs, BFRs and machines such as UTV under proper supervision. Until the material is transported, the maintenance work remains held up.
- 9.2 Motive power & crew is required for transportation of material to the work spot. There is limited availability of supporting machines, rolling stock and compatible staff. Additional supervisors are required to follow up the movements of stocks and machines.

10.0 SAFETY OF WORKMEN AND DETERIORATING WORK CULTURE:

- 10.1 Safety of workmen during daily inspection and maintenance has become an area of concern. Every year, railway men lose their life due to unfortunate incidences of run over. The fact remains that trackmen are not willing to act as key-men.
- 10.2 The newly recruited staff for track maintenance is well educated and is unwilling to work in difficult and harsh conditions. There is a tendency of newly recruited staff to avoid work in sub-urban sections of Mumbai. It is suggested that the track-men in suburban section should be considered for category upgradation.

11.0 NIGHT MAINTENANCE:

- 11.1 Since no maintenance can be possible during the day, the track maintenance is done only during the nights. It leaves scope for overlooking of many maintenance aspects. Defects left, cannot be attended before the next maintenance block. It is not a safe practice and the situation demands a review. Flood lighting of complete section in a systematic manner needs to be planned. Moreover, the efficiency of labour working during night as also effective supervision and control is an issue. There are no additional supervisors sanctioned for night maintenance and there are growing demands of supervision.

12.0 LACK OF SKILL WITH CONTRACT LABOUR:

- 12.1 Shortage of trained labour with contractor has always been an issue. In recent Public Accounts Committee meeting, the issue of ensuring safety of contract labour has also been raised. There are also provisions of Contract Labour & Minimum Wages Act, which need to be ensured by Railways, being the principal employer. There is no mechanism of training the contractor's labour or the staff employed by the contractor. A serious thought needs to be given to have registration of contractors for track maintenance works and training to their supervisors and staff.



12.2 The outsourcing based on minimum number of labour can be considered to frame the estimates as per minimum wages act so as to effectively comply with the stipulated laws.

13.0 ISSUES OF GHAT SECTION AND TUNNELS:

- 13.1 Mumbai Division of Central Railway (unlike Western Railway) is maintaining two Ghats on north-east and south-east. The NE and SE Ghats are having the steepest ruling gradient of 1 in 37 on broad gauge in the country. Besides it, every section is having tunnels which have ballasted track. Additional attention is required to maintain the issues related with Ghats and Tunnels. Deep screening in tunnels is difficult with BCM due to side clearances and other obstructions, and only manual deep screening is possible. The ballast cushion is quite often hardened, and extra manual effort is needed. The problem of boulder falling is common in every monsoon. Additional traffic blocks are required to run boulder specials and transportation of materials for repair to bridges etc.
- 13.2 The third lines on these Ghats were constructed some 40 years ago, and the increased traffic over four decades, has made it difficult to get adequate maintenance blocks. Lot of released rails, sleepers and debris are lying on the cess or in side drains in the entire Ghat section as there is no road approach, and the traffic blocks for picking up the material by rail are not easily available. Self propelled Engineering machines also need a banker engine for movement in the section. As per GR & SR inspection even on push trolley is required to be done under block protection. There is an immediate need to construct 4th line in both Ghats to make available the maintenance blocks.

14.0 DEFICIENCY OF ALTERNATIVE MODE OF MASS TRANSPORT:

- 14.1 Mass rapid transport system for the city has never been planned taking into consideration the capacity and need of suburban rail network by the state authorities. The services over the existing sub-urban network in the last 20 years have almost doubled, and the demand for additional services is still increasing. The increased traffic has affected the track maintenance in two ways. Firstly, by giving more damages to track and fittings, and secondly, by lesser availability of maintenance blocks.
- 14.2 There is a need to develop additional modes of transport for the city with support of Govt. of Maharashtra, MRVC etc. to decongest the existing routes. The public perception for same is to be created.

15.0 CONCLUSIONS:

- 15.1 Maintenance of suburban section/network is a challenging task and need to be dealt separately. Separate norms for calculating requirement of manpower, allotment of resources, periodical track renewals, USFD testing etc. are to be considered. Inspection schedules of supervisors and officers also need to be stipulated in a realistic manner.



- 15.2 Alternative design of track sleeper with material such as fibre reinforced plastic, rubber and composite material has to be thought for providing additional resiliency. Rubber pad design to be revised for controlling the incidences of rail fractures. Meantime, as an instant relief, provision of under sleeper pad should be considered for better resiliency.
- 15.3 Addition of new trains in sub-urban system should only be done after assessing the implications of technical failures and the public responses in such events. No new trains should be added without the personal approval of PCE, PCEE, and PCSTE who should substantiate their decision with data on rail fractures, maintenance backlog of deep screening, CTR, TWRs, TFR etc., OHE failures and other failures of track circuits and signals.
- 15.4 The State Govt. should be impressed upon the need of developing additional modes of transport for providing alternatives to commuters so as to reduce their dependency on suburban railway network. The transport planning should precede the city development plans.



Organised by:
INSTITUTION OF PERMANENT WAY ENGINEERS (INDIA)

ANNEXURE III:

CAG Audit Report reveals multiple Lapses in Railway Track Maintenance Plans

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<https://www.outlookindia.com/website/story/cag-audit-reveals-lapses-in-rly-track-maintenance/309461>

An Audit elaborated by the Comptroller and Auditor General of India (CAG) covering the period from April 1, 2016, to 31 March, 2017, focused on maintenance of tracks on selected 29 sections of high-density network routes (HDN) and eight sections of non high-density (HDN) routes. The audit reveals multiple lapses in the railway-track maintenance plans.



Railways needs to strengthen track safety measures as an audit has revealed several lapses in maintenance plans, inspection-schedules and usage of high-end machines procured to detect track defects, according to a CAG report tabled in Parliament on Tuesday, 13th March 2018.

The Comptroller and Auditor General of India (CAG) report said that during 2014-2015 to 2016-2017 16 accidents or derailments took place due to deficient track maintenance in five zonal railways (South Western Railway, North Central Railway zone (NCR), East Central Railway zone (ECR), South Eastern Railway zone (SER) and Southern Railway) it audited.

It said that 294 permanent speed restrictions (PSR) were imposed on select sections because of track vulnerability.

The audit covered the period from April 1, 2016, to 31 March, 2017, focusing on maintenance of tracks on selected 29 sections of high density network routes (HDN) and eight sections of non-HDN routes.

The Audit on 37 selected sections of the Indian Railways showed that track maintenance activities needed to be strengthened and undertaken following the laid down instructions and guidelines.... “Inspections were not being done as per laid down frequency by railway officials”, the report said.

The report said that while in North Central Railway zone (NCR) and East Central Railway zone (ECR) maintenance plans were not prepared, South Eastern Railway zone (SER) was rectifying deficiencies on inspection and not as a preventive measure as is the norm.

It also said that patrol men were not equipped with any communication equipment to report any failure, fracture or damage immediately from the sections, where they have been observed.

"Audit noticed shortfalls and deficiencies in inspections carried out at different levels...Testing of rails using Ultrasonic Flaw Detection (USFD) machines was not carried out as per the prescribed norms", the report stated.

The report also stated that deep-screening of ballast, which is required to restore the resiliency and elasticity of the ballast bed and for improving running quality of track, are significantly backlog, and in some sections it was overdue for 22 years.

The audit noticed 274 cases of rail-fractures and 465 cases of weld-fractures during the periods of 2015-2016 and 2016-2017 in the selected zones. During this time, seven accidents occurred due to rail-fractures, it said.

The report also stated that there was shortage of staff in different safety categories responsible for track maintenance ranging from 9 to 22 per cent in different railway zones.

"The situation was made worse by diverting available track maintainers to works other than track maintenance... More track maintainers have been posted to bigger cities than remote locations though the requirements for the whole section may be uniform", the report said, adding that there was a shortage of about 50 per cent blocks against the block demanded by engineering department for maintenance works.

The report said that zonal railways impose speed restrictions on various sections due to poor track structure.

"Each speed restriction has a cost attached to it, and prolonged imposition would also have a financial impact in addition to the operational impact. It is therefore necessary to ensure completion of works within a set time frame so that speed restrictions are removed at the earliest", CAG said.

The report also said that all zonal railways should prepare an integrated track maintenance plan for day to day activities as well as periodical maintenance and condition-monitoring using machines such as the ultrasonic flaw detection systems (USFD) and track recording cars. The national transporter has recently procured some such devices, which are being used in certain sections, officials said.

It also said that patrolling and inspection of tracks should be done as per norms, and the teams should be equipped with GPS enabled devices.

The Railways has allocated Rs 7,267 crore in the 2018-19 budgets for safety-related works -- including track inspection, repair and maintenance -- a

massive jump from Rs 1,933 crore in 2017-18, underlining the priority it is giving to accident prevention measures.

ANNEXURE IV:

Picture Gallery of "archaic" Rail-Track Works in India







