Chapter 3 - Utilisation of resources and infrastructure for track maintenance

Audit Objective 2: Whether the resources/infrastructure required for maintenance of tracks were available and used efficiently and effectively?

For effective and efficient day to day maintenance of tracks, resources and infrastructure in the form of necessary machines/equipment, blocks, budget, trained manpower and a mechanism to monitor and control various track parameters is the basic requirement. The availability and adequacy of such infrastructure was reviewed in audit of the selected sections. Audit findings are discussed in the paragraphs that follow:

3.1 Development of infrastructure for track maintenance as envisaged in Vision 2020

As per Indian Railway Vision 2020 Document of Ministry of Railways tabled in Parliament (December 2009), the following actions were proposed to be taken with regard to track maintenance**:**

(i) Para 8 (a) of the Vision 2020 document stated that 'Track structure will be standardized with 60 kg, 90 Ultimate Tensile Strength (UTS) rails and concrete sleepers with elastic fastenings. Improvements in specifications of materials, new types of elastic fastenings, economical designs of concrete sleepers and modern mechanized methods of track-laying and maintenance will be progressively adopted.'

The issue was examined in the selected five Zonal Railways (NCR, ECR, SER, SR and SWR) and it was observed that in all the selected zones, concrete sleepers with elastic fastenings were being used. Track structure was yet to be standardized. Over NCR rails were changed manually and track laying activities were still not mechanized. Track maintenance activities such as deep screening and de-stressing were carried out both manually and with machines. However, modern mechanized methods for track maintenance are being used in heavy traffic sections of all the other selected zones.

(ii) Para 8 (b) of Vision 2020 document states that 'Tracks on identified, segregated routes would be made fit for running passenger trains at speeds up to 160- 200 kmph and freight trains at speeds up to 100 kmph.'

During examination of the records of the selected five Zonal Railways (NCR, ECR, SER, SR and SWR), it was noticed that

- Tracks were identified and segregated route-wise over Allahabad Division. However, maximum speed of passenger trains was up to 130 kmph and goods trains with load at speeds up to 80 kmph and empty up to 100 kmph only.
- In selected sections of ECR, SWR, SR and SER, no tracks were identified and route-wise segregation was not made for running of passenger trains and freight trains speed wise. However, in SER, planning for increase in speed to 130/ 160 kmph on A and B routes was under process.

(iii) Para 8 (c) of Vision 2020 Document envisages that 'Rails will be procured in long panels of 120 metres and would be welded in flash-butt plants and laid with lengths ranging from 250 meters to 500 meters. Such continuously welded rails would eliminate a large number of rail joints and, in turn, would improve rail metallurgy i.e. minimal residual stress, higher wear resistance, higher elongation and better fracture toughness and maintenance and riding comfort. Joints will be welded *in situ* by portable flash butt welding plants and in exceptional circumstances by Alumino-Thermite (AT) welding. Rail life will be extended by rail grinding and rail lubrication. Improved types of switch expansion joints (SEJ) would be used in place of the conventional switch expansion joints.'

Further, Corporate Safety Plan (2003-13) stipulates that as the Alumino Thermite weld are weak links in track, its population need to be gradually reduced and replaced by Flash Butt welds to be executed with the help of Mobile flash butt welding plants. Railway also stated (December 2015) that Tender for Mobile Flash Butt Welding Plant should be called for improvement of quality of welding.

Rails are procured from Steel Authority of India Ltd., Bhilai (SAIL) on the basis of requisitions placed by the Zonal Railways on Railway Board. Railways send their yearly requirement in metric tonne to Railway Board. The length of rails to be supplied to respective Railways is decided by Railway Board on the basis of Rolling Stock Programme of the SAIL. During the examination of records of the selected sections of five Zonal Railways, it was noticed that

- Over NCR, Rails of 13m long panels were procured. Long welded rails panel up to 260 meter length (20 rails x 13 meter) were used in LWR section. Mobile Flash Butt Welding Plant was not introduced in open line and in general maintenance welding was carried out using AT welding technology.
- In ECR, SER and SWR, rails were not being procured in long panels of 120 metres. In ECR and SER, rails were being procured in 13/26 metre length and welded by Flash Butt to make the rail panels and supplied to the fields for laying. However, in ECR, rails were not being welded in Flash Butt welding

plants for being laid with lengths ranging from 250 metres to 500 metres. In SWR, 260 m long rail panels are being used.

- In SR, rails were being laid as per the prescribed procedure.
- Though use of improved types of switch expansion joints was initiated over selected sections of NCR, proper monitoring/supervision of assembling activities was not carried out and concerned supervisors were not conversant with improved SEJ assembling and its maintenance. In ECR, improved types of switch expansion joints were not used. However, in SR, SER and SWR, improved types of switch expansion joints were being used.

(iv) Para 8(d) of Vision 2020 Document envisaged that 'Cost effective options for mechanized track maintenance, including through remote satellite control, shall be explored. There will be complete mechanization of track maintenance activities. A decision support system such as TMS will be in place to optimize material, machine and equipment and manpower inputs for track recording-cum-monitoring on the entire IR network (including USFD cars capable of recording precisely the location of track irregularities). P-way engineers shall also be provided with personal digital assistance (PDAs) for recording inspection inputs. All the maintenance and construction activities related to track shall be mechanized. Trackmen will be equipped with small track machines also. Human dependence in the form of push trolley inspection, foot-plating, patrolling, etc. for detection of flaws and deficiencies in track parameters will be eliminated. It is envisaged that by 2020, the health monitoring of assets should be completely mechanized. Vehicle mounted USFD would be stabilized by 2020 to achieve a sharp reduction in the number of rail fractures and increased reliability of assets.'

During examination of records of selected sections of five Zonal Railways, it was seen that

- In NCR, ECR, SER, track maintenance activities in selected sections were not completely mechanised. Deep screening of ballast, rail change, and de-stressing of track was carried out manually. However, in SWR, track maintenance activities were completely mechanised. In SR, track maintenance activities were mechanised in selected sections except that deep screening in platform stretches of track and de-stressing of rails were being done manually.
- In ECR, SER and SR, Personal Digital Assistants (PDAs) were provided to Permanent Way Engineer's for recording inspection inputs. However, during examination it was found that none of the PDAs were in proper working condition. In NCR and SWR, PDAs were not provided but computer note book/ laptops were provided to Permanent Way Engineer's.

- Track maintainers were equipped with small track machines available in the gang, but no communication equipment was provided to trackmen to report any failure, fracture or damage immediately from the section where short comings/defects in track were observed**.** In ECR, Trackmen were not equipped with small track machines. However, in SWR and SR, small track machines were available with all SSEs (P-way).
- Human dependence in the form of push trolley inspection, foot-plating, patrolling, etc**.** for detection of flaws and deficiencies in track parameters were not eliminated/reduced in NCR, ECR, SWR, SER and SR due to absence of mechanisation of maintenance activities and absence of utilisation of advance monitoring tools viz**.**, Wheel Impact Load Detector (WILD), Geo Positioning System (GPS) – based Foot plate inspection device.
- One of the objectives of installation of TMS was to maximise the benefit of material, equipment and utilisation of assets without impairing the safety. However, Asset module of TMS was not functioning over selected sections of NCR and ECR, and hence health monitoring of assets remained to be mechanised**.** In SWR, efforts/steps/initiatives were taken for progressive and complete mechanized health monitoring of assets. Track parameters were measured and corrective action was taken. In SR and SER, the assets module over TMS was functional over the selected sections.

Thus, infrastructure and other arrangements, as envisioned in 2020 document with respect to track maintenance, are yet to be put in place. Further, manual dependence in the form of push trolley inspection, foot plating, patrolling etc. continued for detection of flaws and deficiencies in the tracks.

3.2 Budget Allotment and Expenditure on Path way maintenance

Details of Budget Grant (BG), Final Grant (FG) and Actual Expenditure (AE) for the year 2015-16 and 2016-17 under Demand No 4 Abstract 'B': Repairs & Maintenance of Permanent Way & works and Minor Head 200- Maintenance of Permanent way are as under:

Table 17– Budget Allotment and Expenditure (₹ in crore)

Zonal Railway	BG	FG	AE	Savings (BG- AE)
2015-16				
NCR	489.4	483.33	474.87	-14.53
SER	411.43	454.39	454.56	43.13
ECR	203.58	225.01	220.66	17.08
SWR	268.99	260.73	251.69	-17.3
SR	461.54	478.7	484.13	22.59
2016-17				
NCR	633.99	578.44	527.34	-106.65
SER	552.91	559.09	570.38	17.47

Table 17– Budget Allotment and Expenditure (₹ in crore)				
Zonal Railway	BG	FG	AE	Savings (BG- AE)
ECR	570.55	559.02	563.32	-7.23
SWR	328.53	319.48	307.68	-20.85
SR	581.51	592.23	584.5	2.99

It is seen that from 2015-16 to 2016-17 the Budget grant had increased from 22.13 *per cent* to 180.26 *per cent* for the selected Zonal Railways with mean increase of 45.37 *per cent*. The actual expenditure has also increased during the period by 11 *per cent* to 155.32 *per cent* with mean increase of 35.38 *per cent* in these selected Zonal Railways. The savings were significant at 16.82 *per cent* in 2016-17 for NCR and 6.43 *per cent* in 2015-16 and 6.35 *per cent* in 2016-17 for SWR. The maintenance activities need to be accelerated to ensure utilisation of budgetary allocations.

3.3 Availability of manpower for track maintenance and their training

3.3.1 Sanctioned Strength and Men on Roll of track maintainers

A maintenance gang consist of 10-15 track maintainers[63]who are responsible for protecting the line in an emergency and during work affecting the track. Patrolling of track is also carried out by the track maintainers. As per Rules[64], the strength of each maintenance gang shall be decided by the Chief Engineer. A register should be maintained by each SSE and in office of ADEN with details of sanctioned strengths of gangs, Gatemen, Watchmen, Lookout men, Trolley men and other staff. No deviation from the sanctioned strength of gangs and other staff shall be permitted without the approval of the Chief Engineer.

In this regard, Audit reviewed the data regarding the length of jurisdiction of various SSEs, sanctioned strength of track maintainers and the track maintainers available in the selected sections of five Zonal Railways. Audit also reviewed the data on total manpower available for track maintenance in the selected five Zonal Railways. The audit observations are discussed below:

(i) The line capacity utilisation of the selected sections is more than 100 per cent (except four sections, where it is between 90 *per cent* and 100 *per cent*). As such, there should not be wide variations in length of the jurisdiction of SSEs in these sections, mainly because the line capacity utilisation in a section would be same for all the SSEs under the section. It was however seen that the jurisdiction of SSEs varied from 16.65 kms (Santragachi) to 149 kms (Tamluk) in various selected sections. It was further seen that the sanctioned strength of track

[63]including Gangmate (Head of the group), Keymen, Gangmen and Blacksmith.
[64]Para 213 of Indian Railway p-way manual

maintainers per km also had wide variations. The same ranged from 2.01 per km (Tamluk) to 18.56 kms (Gaya). This indicated that that the criteria on the basis of which the sanctioned strength had been assessed was not objective and scientific. As mechanised means of track maintenance are being used gradually and increasingly, there is an urgent need to re-assess the requirement of manpower in respect of track maintainers.

Review of men-in-position under the jurisdiction of various SSEs in the selected sections further showed that the men-in-position per km was significantly high as compared to the other parts of the sections in places like Allahabad, Washermanpet (very close to Chennai), Santragachi (very close to Howrah) and Gaya among others. Thus, more track maintainers have been posted to bigger cities than remote locations though the requirement for the whole section may be uniform.

Annexure 3

In 2006, Railway Board approved a report of the Committee on 'Manpower and Cost Norms for Track Maintenance' (MCNTM), which laid down a formula for calculation of strength of track maintainers/ gang strength on the basis of manual and mechanised track maintenance activities being undertaken by the railways in 2000[65].

In December 2013, Railway Board directed ZRs to undertake regular exercise for working out the required strength of trackmen as per MCNTM formula for maintenance of all running section of the railway. The exercise was to be carried out jointly by PCE, FA&CAO and CPO every year on 1 April to work out surrender/creation/ re-distribution of post of trackmen every year. This was to ensure zero based review, as per actual traffic and other related conditions every year. The resultant status with w.r.t total requirement of Trackman on Zonal Railways as a whole (for surrender or creation or re-distribution) was to be worked out every year in a systematic manner. This exercise was to serve following purposes.

- Possible redistribution on Zonal Railways.
- Managing gap between actual Trackman on Roll and requirement of total trackman by a rational deployment of contractual agencies till requisite posts as needed were created and vacancies filled up.
- Identify and account for loss of actual man-days beyond what is provided (accounted) for.

[65] The Committee Report was finalized in May 2000

- The identified resources for deployment of contractual agencies was to be utilised to provide sufficient funds for the purpose.

The matter was reviewed in five selected Zonal Railways and the following was observed:

- In NCR, the exercise was undertaken only in two years, (April 2014 and 2015) but no action was taken on the re-assessed requirements. No re-assessment was done thereafter.
- In SER and SR, the assessment of sanctioned strength of trackmen was undertaken every year in April (2014, 2015 and 2016) as per MCNTM formula and forwarded to Railway Board. However, the gaps between actual trackmen on rill and requirement of total trackmen were not being filled by outsourcing.
- In ECR and SWR, no such annual assessment was done. However, in ECR recently (in September 2017), sanctioned strength was assessed as per MCNTM formula and information sent to Railway Board.

It was also seen that the criteria on the basis of which the formula was prepared included mix of activities (manual and mechanised) as of 2000. The same may not be relevant after 17 years due to significant changes in methods of track maintenance and introduction of mechanised means in a larger number of activities.

Thus, there was an urgent need to re-work the formula and re-assess the requirement of manpower for undertaking the work of track maintenance in view of the changed scenario, wherein, more and more mechanised means are going to be used for track maintenance. In addition, equitable distribution of manpower in accordance with workload was also needed to be carried out.

(ii) Review of total manpower available for track maintenance works in selected five Zonal Railways showed that there were shortages of staff in different safety categories in selected Zonal Railways viz. NCR, SER, ECR, SWR and SR ranging from nine to 22 *per cent* as given below:

Table 18 – Manpower availability for track maintenance

Zonal Railway	Sanctioned Strength	Men on Roll	Vacancy	Percentage of Vacancy	No. of staff deputed in other works (viz. other official Est., officers residence, etc.)
NCR	2972	2325	645	22	90
SER	3390	2884	506	16	381
ECR	3449	2762	687	20	0
SWR	1698	1553	145	9	70
SR	782	659	123	16	0
Total	**12291**	**10183**	**2106**	**17**	**541**

Though no deviation from the sanctioned strength of gangs and other staff is permitted without the approval of the Chief Engineer, 541 (five *per cent*) staff was deputed for other duties.

During Exit Conference (30 August 2017), Railway Board stated that there were acute shortages in the safety category staff relating to track maintenance. It was also stated that staff recruited as track maintainers are over-qualified and do not want to do physical work on tracks. It was further stated that due to very lenient eligibility criteria for Physical Efficiency Test for women, a large number of women with inadequate physical ability are also recruited, many of whom do not want to work as track maintainers in the field. Railway Board however, did not provide any reasons for wide variations in the sanctioned strength of track maintainers under the jurisdiction of various SSEs.

Annexure 4

Thus, despite a shortage in manpower position vis-à-vis sanctioned strength, the situation was made worse by diverting available track maintainers to works other than track maintenance. Due to shortage of track maintainers, the length covered by them had increased which can impact the quality of maintenance. Recruitment of overqualified staff who are not willing to undertake physical work at tracks indicated that the selection criteria for track maintainers is not aligned with their job requirement. This issue needs to be resolved.

(iii) The minimum educational qualification prescribed for recruitment of Track Maintainers is 10th pass or ITI or equivalent[66]. Check of records of attendance of Track Maintainers in selected sections of NCR, SER, SWR and ECR revealed that Track Maintainers and other safety category staff of the Gang, were not signing the Attendance Register in token of their presence at the work location. Only P'' for present and A'' for absent were being marked by the supervisors **.**The attendance of staff deputed to other locations was also marked as 'P' and 'A' in the Gang Attendance Register. Non-signing in the Attendance Register by the Track Maintainers facilitated such incorrect marking of attendance.

An effective system of marking attendance is needed to be put in place in order to ensure optimum utilisation of available manpower. Railways need to streamline the system of attendance marking of track maintainers on priority.

[66] As per Railway Board Railway Board letter no. E(NG)-II/2009/RR-1/10 pt. dated 09 December 2010 minimum educational qualification prescribed for recruitment in Pay Band – 1 of Rs.5200 -20,200 grade pay of ₹1800/- was 10th pass or ITI or equivalent

3.3.2 Training for permanent way staff

Rules[67] require that P-way staff should be imparted training at regular interval. The following four types of training courses should be organized in the Training Institutes run by the Railway Administration :

- Initial/Induction Courses
- Promotional Courses
- Refresher Courses
- Special Courses

Arrangements for training of all Permanent Way staff working on LWR /CWR sections shall be made by Chief Engineer by holding special /regular courses in Zonal Training centres and by Sr.DEN/DEN in Divisional Training Center[68]. Further, only staff trained in laying and maintenance of LWR /CWR shall be posted on LWR /CWR sections[69]. In case of Keyman, Gangmate & PWM, only such staff, who possess valid competency certificate issued by Zonal /Divisional training centre shall be posted on LWR /CWR section. The competency certificates shall be valid for five years from the date of issue[70]. Check of competency certificate in selected sections of NCR, SER, ECR and SWR revealed that no system existed to ensure that only trained staffs were posted in LWR / CWR section. The position of trained staff posted in these sections is mentioned below:

Table 19 - Number of Staff working in LWR/CWR sections without training

Zonal Railway	Number of staff posted in LWR/CWR section	Number of staff not trained (percentage)
NCR	1728	638 (37)
SER	2865	450 (15.7)
ECR	1993	0
SWR	1452	67 (4.6)
SR	659	0
TOTAL	**8697**	**1155**

It was seen that 37 *per cent*, 15.7 *per cent* and 4.6 *per cent* of the total staff of NCR, SER and SWR respectively, deployed in LWR/CWR section had not been imparted training. Deployment of staff for laying and maintenance of LWR without training/ competency certificate has a bearing on the safety. It was, however seen that in ECR and SR, 100 *per cent* of staff deployed in LWR/CWR sections had been trained. Competency certificate for working on LWR/ CWR section was also not obtained for Keyman, Gangmate.TMS report of training of staff was also not updated and consequently monitoring of training programme at higher level was not carried out. ***Annexure 5***

[67] Para 1501 to 1505 of IRWPM
[68] Para 9.2.1 of Manual of instructions on Long Welded Rails
[69] Para 9.2.2 of Manual of instructions on Long Welded Rails
[70] Para 9.2.3 of Manual of instructions on Long Welded Rails

Thus, untrained staff handling track maintenance could compromise the quality of track maintenance. There was no mechanism to ensure that trained staff was posted to LWR/CWR sections.

3.3.3 Training for Operating and Maintenance of Small Track Machine

Rules[71] provide that Sr. Divisional Engineer (Co-ord) shall organize training of staff for operation and maintenance of Small Track Machines /tools through the machines /tools manufactures. It shall also be ensured that adequate training facilities are made available in Divisional Training School at Divisional Level and Zonal Training Schools at Zonal Level.

Further, centralized training for operation, maintenance and repair of small track machines /tools shall be organized at Zonal Railway Training Centre / Divisional Training Centre[72].

Review of records of training for staff deployed on working of small track machines over the selected zones revealed that about 60 *per cent* staff were not trained. The position is given as under:

Table 20 - Number of staff deployed in operation of Small Track Machines during 2016-17

Zonal Railway	Number of staff deployed in STMs	Number of staff trained	Number of staff not trained
NCR	294	139	155
SER	57	38	19
ECR	Need Based	Trained/certified track maintainers are utilized for operation of small track machine.	
SWR	164	0	164
SR	28	22	6
TOTAL	**543**	**215**	**328**

In SWR, no separate Training Centre was established for imparting training to staff attending to Small Track Machines/Tools. The Training Schedule of Civil Engineering Training Centre, Hubli Division, was analyzed for the three years from 2014-15 to 2016-17. No separate training slots were provided for operation and maintenance of Small Track Machines. Thus, Track Maintainers were not trained in operation and maintenance of small Track Machines.

Thus, 60 per cent of the staff deployed in working of STMs was not trained. Deployment of untrained staff for operation of STMs undermines the quality of maintenance.

Annexure 6

[71] Para 1.6 of Indian Railway Small Track Machine Manual
[72] Para 1.6.1 of Indian Railway Small Track Machine Manual

3.4 Utilisation of track machines including small track machines

SSE in-charge of a section is responsible to undertake and assist in maintenance activities which include Alumino Thermite welding of rails, spot attention in yards, distressing and fracture repair. This is carried out by the section in-charge through use of small track machines such as abrasive disc cutter, rail drilling machine, rail profile grinder, weld trimmer, hydraulic jacks, etc. Besides, the officer section in-charge is required to assist in work of mechanized maintenance carried out through track machines. These activities are required to be carried out in a well-planned and scientific manner.

(a) Utilisation of track machines

The utilisation of track machines over the selected sections of these five Zonal Railways was reviewed and noticed that

- Out of 6878 machine days, 2341 machine days were not utilised by Allahabad Division. The major reasons were non-availability of block, machines under repair/breakdown/shifting, staff rest, site not ready, etc. The target fixed in the annual plan for various track machines for the year 2016-17 was not achieved and maintenance of track was hampered. During the year, as against the target of 11717 km, only 5041 km (43 *per cent*) was achieved. Comparison of block time made available for track maintenance and networking time of track machines revealed that the track machines could not be utilized effectively due to time loss in travelling, setting, windings of machines, OHE failure, non-availability of P-way staff at site, failure of assets, etc. The detailed review of availability of block time and its utilisation by 25 track machines during 2016-17 revealed that on an average 33 *per cent* time of block could not utilised by these track machines. Audit also noticed that 46 *per cent* loss of block time of the track machine was attributable to travelling time i.e. shifting of track machines.
- In selected non-HDN sections of Danapur Division of ECR, during the year 2016-17 as against the target of 6856.25 kms, only 2824.86 kms was achieved resulting in shortfall of 58.79 *per cent*. In selected HDN section of Mughalsarai Division, the achievement was 29826 kms against the target of 43886 kms, leaving short fall of 32 *per cent*. The reasons for shortfall was attributed to shortfall in granting of block by operating department, base shifting of machine and idling of machines on account of maintenance .

- In SER, Track Management System (TMS) data revealed that against 19276 machine days of the availability of track machines, the machines worked for 10031 days in 2016-17 and remaining idle for 9245 machine days. The reason for non-utilization was stated as non-availability of block, under repair/breakdown/ maintenance, no fuel, machine under shifting, etc.
- In SWR, no instances were noticed in short achievement of targets of available track machines in the selected sections.

(b) Utilisation of small track machines

As per the Integrated Railway Modernization Plan 2005-2010, issued in November 2004, Indian Railways had planned to achieve complete mechanization of track maintenance and relaying by 2012. Due to growing traffic and introduction of heavier track structure, faster and more efficient methods of maintenance are needed to be evolved[73]. Thus, the role of small track machines has increased for quality maintenance of track. Different types of small machines such as Abrasive Rail cutter, Rail Drilling machine, Rail Creep Adjuster, Hydraulic Track Jack, Rail Profile Weld Grinder, etc. have been developed for various activities on track. These small track machines are to be used for day-to-day maintenance, laying and casual repair of track.

Figure 8: Abrasive Rail cutter

Figure 9: Hydraulic Track Jack

Figure 10: Rail Creep Adjuster

During the check of records of SSEs of selected sections over the five Zonal Railways it was seen that

- Adequate numbers of essential small track machines were not available with each SSE offices in all the selected sections of NCR, SER, ECR, SWR and SR. 33 *per cent* of the available small track machines were found out of order during Audit.

[73]Para 1.1 of Indian Railway Small Track Machine Manual

- In NCR, it was seen that various track repairing activities such as drilling of rails, chamfering of holes[74], cutting of rails, maintaining proper gap for welding (using tensors), welding, chipping of extra metal after de-molding, grinding of weld, painting of weld, etc. are being done both manually as well as using small track machines. The small track machines were not used optimally due to sub-optimal maintenance practices. There were operational constraints in movement of these machines to work site as these machines weighed 20 to 375 kgs and could not be carried without the help of a utility vehicles. In selected sections, 62 out of 110 Abrasive rail cutters and 10 out of 52 rail drilling machines were out of order. Besides, there was shortfall of 186 hydraulic track jacks against prescribed norms. This hampered maintenance work in these sections. Non-availability of spares locally, absence of workshops at decentralized locations (only one centralized workshop over Allahabad Division at Allahabad is present for repair and maintenance of Small Track Machines) and absence of imprest for repair and maintenance were the main reasons for such a large number of machines remaining out of order.
- In SER, one PWI/STM was posted in non-HDN route dealing with an average 12 Express trains per day where an imprest of ₹ 3500/- pm was sanctioned to meet the emergency repair of faulty STMs. In contrast to this, neither any PWI/STM nor imprest was sanctioned in HDN route handling an average of 150 Express trains per day indicating misplaced priority. Non-availability of imprest and shortfall of machines impacted various aspects of track maintenance like de-stressing, squaring, reconditioning, toe load measuring, lifting & packing, trolling work, packing and screening work.
- All small track machines and tools shall be purchased under at least two years manufacturer's warranty and negotiations for AMCs after warranty period shall be held & finalised at the time of initial purchase[75]. AEN shall carry out inspection of all the small track machines once in six months, while the SSE shall inspect all his machines/tools once in a fortnight. This was not being done in SR.

Annexure 7

Track maintenance work were also hampered due to non-availability of material. Audit noticed the following cases over selected section of five Zonal Railways during 2016-17.

[74] Chamfering means cut way (right-angled edge or corner) to make a symmetrical sloping edge. Chamfering of rail holes gives substantial increase in fatigue life of rail at the hole (an increase of three to four times). Chamfering of bolt holes also delays the formation of cracks.
[75] Para 1.4(h) and 1.5 of IRSTMM

- In SER, track maintenance works was hampered in all selected sections due to non-availability of materials like SEJ Bolt, crossing Bolt, Point Crossing Rubber Pad, Plate screw, SEJ sole pad, SEJ sleeper, Cast Manganese Steel (CMS) crossing, Grooved Rubber (GR) Pad, SEJ GR Pad, Glass Filled Nylon (GFN) Liner, Turn out GR pads, check rail bolt, GFN liner 3706, etc. in all PWI offices in the selected HDN and Non-HDN sections.
- In SWR, non-availability of Hacksaw Blades, Simplex Jacks, Insulated Gauge-cum-Level, Banner Flag Red, etc., impacted track maintenance works.
- Due to shortage of material the PWI offices had to manage the maintenance work by taking recourse to material from other PWIs or use second hand material which had been retrieved during track renewal works.
- In other three Zonal Railways (NCR, ECR and SR) no instance of hampering of maintenance work due to non-availability of materials was noticed.

There was sub-optimal utilisation of track machines due to reasons such as non-availability of block, under repair/breakdown/ maintenance, no fuel, machine under shifting, etc. Further, the small machines were not available in the selected sections as per requirements. Where available, these could not be used optimally due to various constraints such as frequent breakdowns, non-availability of blocks, non-availability of utility vehicles for transportation of these machines at work sites, non-availability of spares, non-availability of imprest to handle repair and maintenance of these machines etc.

3.5 Allotment of blocks for track maintenance

Track maintenance by machines requires line occupation and availability of blocks for their working[76]. It is desirable for these machines to be given a single block of at least four hours per day or two separate blocks of 2½ hours each, for better working. It is necessary to have longer blocks, so that the net available time for working on the line is as high as possible. On the double line section, temporary single line working may be introduced whenever possible. Diversion of some trains along alternative routes may also be resorted to, wherever possible. An ideal situation would be to provide for time allowance for working the machines in the Working time table. The block time should be interpolated in the master chart for passenger and goods trains that is prepared with every change in time table. It is as much the responsibility of the Operating Department as that of the Engineering Department to ensure provision of adequate time for economical

[76]Para 226 of Indian Railway P-way Manual

working of machines. For this purpose it is desirable to frame a programme of working the machines in consultation with the Operating Department.

Maintenance of track is done after availability of blocks as demanded by the Engineering department since it is a safety item. Passenger train and target for loading of goods for the last three years shows an increasing trend. But the scope of maintenance work is less due to non-availability of required block (as demanded by Engineering department), though increase in operation of traffic requires more maintenance.

The availability of block against demand for the selected five Zonal Railways was as follows:

Table 21– Availability of blocks against demand for track maintenance

Zonal Railways	Division	Block demanded (in hours)	Block made available (in hours)	Shortage (%)
NCR	Allahabad	27648.00	10921.00	60.50
ECR	Danapur	4538.65	1767.80	61.05
	Mughalsarai	5553.60	3689.78	33.56
SWR	Hubli	13591.00	9942.00	26.85
SR	Chennai	1326.15	1102.19	16.89
SER	Kharagpur	1042.75	566.50	45.67
	Chakradharpur	4147.50	1176.00	71.65
	Ranchi	487.33	238.00	51.16
TOTAL		**58342.00**	**29411.00**	**49.60**

Zonal Railways wise audit findings are discussed below:

In NCR, line capacity utilisation of the selected sections was more than 100 *per cent.* It was observed that there was huge gap between the blocks demanded and blocks made available by the railway administration. Audit further noticed that

- Only 40 *per cent* block of the block demanded were given by operating department for maintenance of track. Less availability of block in heavy traffic section may lead to poor maintenance of track.
- Review of corridor block provision made in working time table of Allahabad division for the selected sections revealed that corridor block was provided in the range of 90 minutes to 120 minutes for maintenance work, which was less than 2.5 hours as per the norms.
- Check of block register maintained in engineering control offices revealed that block was not provided as per provision made in Working Time Table. The prime reasons of deviation from corridor block was late running of train, introduction of new/special train and running of all goods trains without any scheduled timing.

- During the time of provision of corridor block for maintenance (which was less than the required time), some scheduled trains time falls under the corridor block. This further hampered the maintenance work, as corridor block could not be utilised due to running of these trains during the time of availability of corridor block.

In SWR, Working Time Table of Hubli Division provided for blocks to facilitate maintenance works. It was further observed that

- During 2016-17, in Hubli Division as against 13591 hours of line blocks demanded by the Engineering Department, only 9942 hours were provided by the Operating Department (73 *per cent*).
- Due to non-availability of blocks, SSEs (P-way) reduced the target of inspections of tracks.
- In respect of 14 Track Machines, out of the available net block hours of 8021 hrs and 15 min, only 5359 hrs and 40 min were utilized (66.82 *per cent*) for maintenance works.

In SR, it was seen that though the Working Time Table had tentative provision for maintenance blocks, actual provision of line block icould only be decided by the Operations department on a day to day basis based on the prevailing position of movement of traffic. It was seen that

- In the three selected sections in Chennai Division, as against the total 1326.15 hours of line block sought for maintenance during 2016-17, 1102.19 hours of line block was provided.
- In the sections checked, there was no instance of non-utilisation of line block provided.

In ECR, it was observed that

- Maintenance block was provided by the operating department (provision in Working Time Table was 7331 hrs in Mughalsarai Division and 7400 hrs in Danapur Division) during the review period. The main reason for not providing corridor block was late running of trains, lack in co-ordination between operation and engineering departments, etc. Therefore, all the track maintenance work was conducted during maintenance block granted by the operating department.
- In Mughalsarai Division (selected HDN Route), there was a shortfall of 33.56 *per cent* in grant of block for maintenance of track (3689.78 hour granted against demand of 5553.60 Hrs). In Danapur Division (selected non-HDN section), there was a shortfall of 61.05 *per cent* in grant of block for maintenance work.

In SER, it was seen that despite a provision in the Working Time Table to provide minimum hours of block per day, the same was not being followed. Adequate number of blocks was not provided to ensure economical and gainful working of machines. It was further seen that

- In Kharagpur Division (Rajgangpur-Tatanagar, Mecheda-Panskura, Howrah-Tikiapara-Santraganchi sections), the block made available was about 54 *per cent* by operating department.
- In the selected sections of Chakradharpur and Ranchi Division, the shortage of block made available by the operating department against the block demanded during 2016-17 was 72 *per cent* and 51 *per cent* respectively.

During Exit Conference (30 August 2017), Railway Board stated that availability of assured maintenance block need to be ensured by operating department for undertaking timely track maintenance works. It was further stated that as per the practice being followed in foreign railways, adequately long hours of blocks are dedicated for track maintenance. Audit is of the view that Railways need to ensure provision for corridor block in the Working Time Tables and to ensure its availability and proper utilisation.

As line capacity utilisation of these sections on an average of 2013-14 to 2015-16 was more than 100 per cent, less availability of block in heavy traffic section may lead to poor maintenance of track. Hence, these sections needs more block hours along with mechanised maintenance for proper maintenance of track. The assessment of requirement of blocks may be arrived at in consultation with all the concerned departments, so that a realistic assessment of requirement is done and blocks are provided and utilised optimally. Divisional Railway Managers who head the Divisions, could play an important role in coordinating efforts regarding block availability and utilisation.