EASTERN RAILWAY

WORKSTUDY REPORT
ON

REVIEW OF STAFF WORKING AS TRACK MAINTAINER
UNDER ENGINEERING DEPARTMENT
OVER ASANSOL DIVISION

(Study No.WSER-17/19-20)
(Submitted on 30.12.2019)

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ACKNOWLEDGEMENT

The study team hereby acknowledges its deep gratitude to Sr.DEN/Co-ordination./ASN for his valuable suggestions and guidelines to the study team for conducting the study. The study team will even be thankful to all SSE/SE working in different P-WAY units for their heartiest cooperation by supplying all necessary information and related data to complete this study in time.

METHODOLOGY ADOPTED

The following methodology has been adopted in carrying out the study:

i) Collection of data in regard to workload of Track Maintainer under P-Way units.
ii) Discussed with SSE/SE in different P-Way units.
iii) Studied the existing workload and deployment of staff.
iv) Analyzed the above and recommendation made.

AUTHORITY & TERMS OF REFERENCE

As approved by the competent authority, the subject work study has been undertaken by the GM's Efficiency Cell of Eastern Railway under the following terms of reference:-

To review the workload and assess the requirement of Track Maintainer under different P-Way units over ASN division based on the following Terms of Reference:

- Identification of workload (ETKM) of permanent way staff under Engineering department over Asansol Division.
- Rationalisation of deployment of staff against the existing workload.

SUMMARY OF RECOMMENDATION

Sl. No.	Recommendation	Para Ref.
1.	It is recommended that the revised sanction strength of Track maintainer of ASN division would be 4465 after surrendering of 154 posts.	3.5.2.1

EXECUTIVE SUMMARY

Study Name & No:	**WORK STUDY ON REVIEW OF STAFF WORKING AS TRACK MAINTAINER UNDER ENGINEERING DEPARTMENT OVER ASANSOL DIVISION.** **(STUDY NO.WSER-17/19-20)**
Year of conducting the study:	2019-20
Terms of reference:	As approved by the competent authority, the subject work study has been undertaken by the GM's Efficiency Cell of Eastern Railway under the following terms of reference:-
Methodology adopted:	i) Collection of data in regard to workload of Track Maintainer under P-Way units. i) Discussed with SSE/SE in different P-way units. ii) Studied the existing workload and deployment of staff. iii) Analyzed the above and recommendation made.
Existing Sanctioned Strength:	4619
On roll strength	3275
Vacant post:	1344
Proposed Surrender:	154
Justification	Assessment of Track Maintainer has been made based on the existing workload of ASN division.

CHAPTER-I

1.0 INTRODUCTION:

1.1 Civil Engineering department or commonly known as Engineering department of the Railways specifically performs or holds responsibility of three different kinds of works as under:

i) To upkeep the railway track under the supervision of PWI or Sr. Section Engineer(P.Way)
ii) To upkeep the building, sewage, water system etc under the supervision of IOW OR Sr. Section Engineer (Works).
iii) To upkeep the bridges under the supervision of BRI or Sr. Section Engineer (Bridge).

1.2 The mainly track maintenance works under Engineering department over Asansol division are being made in the following sections:

i) Khana - Sitarampur Section. ii) Sitarampur – Pradhankhunta Section.
iii) Sitarampur – Jhajha Section. iv) Jasidih – Dumka – Banka Section.
v) Jasidih – Baidyanath dham Section. vi) Madhupur – Giridih Section.
vii) Andal – Sainthia chord Sec.viii) Bhimgara-Palasthali Section.
ix) Andal-Sitarampur (via BBI loop). x) Tapasi-Barabani (via TB chord).
xi) Kulti-Salanpur (via PP link).

1.3 The organizational set up of Engineering department of Asansol like other any division is more or less the same, which is headed by Sr. DEN (Coordination)/ ASN. The respective DEN/DENs and AEN/AENs are under the control of Sr.DEN (Co-ord)/ASN. Similarly, PWIs, IOWs and BRIs are under the different AEN/AENS.

1.4 There may be one or more PWIs, IOWs and BRIs under one AEN. It depends upon the convenience of the administration. There are 17 units of P.Way in ASN division. Total workload in terms of ETKM catered by 17 P.Way units is 2568.81.

1.5 Presently 3275 nos of Track Maintainer against the sanctioned strength of 4619 are working under 17 P.Way units over ASN division and 1344 posts are lying vacant in the P.Way units.

CHAPTER-II

2.0 Existing Scenario & Review of Manpower:

2.1 All the P.Way units are under the overall control of Sr.DEN/Co-ord /ASN and under direct supervision of concerned DEN&AEN. Each P.Way unit is functioning directly under SSE/P.Way in regard to maintenance of Railway track after consideration of safety rules.

2.2 Track or Permanent Way is the single costliest asset on Indian Railways. It basically consists of rails, sleepers, fittings and fastening ballast and formation.

2.2.1 An annual program for regular track maintenance works to be done by the existing gangs is drawn out. This annual program is divided in three periods such as post monsoon attention for period of six months after the end of monsoon, Pre-monsoon attention for period of two months prior to break of monsoon and attention during monsoon for a period of four months.
The twelve months cycle of maintenance works are shown as under.

1. Through packing
2. Systematic overhauling
3. Picking up of slacks

A) Through packing consists of following works being done systematically in the order given below:

i) Opening of road
ii) Examination of rails, sleepers and fastenings.
iii) Squaring of sleepers
iv) Alignment of track
v) Gauging of track
vi) Packing of sleepers
vii) Repacking of joint sleepers
viii) Boxing ballast section and dressing etc.

B). Systematic overhauling of track should normally commence after completion of one cycle of through packing. It consists of the following operations in sequence:

i) Shallow screening and making up of ballast section
ii) Replacement of damaged or broken fittings
iii) All items including in through packing
iv) Adjustment of gap after joint gap survey and also adjustment of creep.

C). Picking up slacks.
Slacks are normally those particular points in the track where running is bad due to poor maintenance.

2.2.2 In addition to the above manual maintenance works, the gangs attend the emergency work as well as accidental cases as and when required.

2.3 The mechanized maintenance of track implies the deployment of track machines for day to day track maintenance works, normally being done by manual labour. The system has also enabled the P.Way men to maintain the modern track more economically and effectively to cater for higher speeds and heavier axle loads. There is no doubt that for modern track structure having LWR and concrete sleepers, the mechanical maintenance of track are considered a technical necessary. Now-a-days, the major track maintenance works are carried out by contractual agencies and track machines. At present the different types of track machines are working over Eastern Railway. The type of machine vis-à-vis output/effective hours is detailed as under:

Type of Machine	Output/Effective hour
CSM	1.2 KM
TXP	1.6 KM
DUOMATIC	0.78 KM
UNIMAT	1T/O per 1 Hr block
MPT	1T/O per 1 Hr block
BCM	0.2 km
FRM	0.4 km
PQRS	0.2 KM
T-28	1 T/O per 3 Hrs block
BRM	1.5-3 km as per site condition
DGS	0.45 KM

2.4 There are total 17 P.Way units over ASN division where 2 P.Way units i.e. SSE/PW/DMKA & SSE/PW/DGHR are newly created in the current financial year. The details workload in terms of ETKM of the following units is given hereunder:

i) SSE/PW/MNAE - 162.64
ii) SSE/PW/PAN - 193.72
iii) SSE/PW/East/UDL - 147.53 (Redesignated as SSE/PW/DGR)
iv) SSE/PW/West/UDL - 145.16 (Redesignated as SSE/PW/I/UDL)
v) SSE/PW/YD/UDL - 151.96 (Redesignated as SSE/PW/II/UDL)
vi) SSE/PW/TOP - 170.02
vii) SSE/PW/SURI - 227.80
viii) SSE/PW/KPK - 151.79
ix) SSE/PW/ASN - 138.68
x) SSE/PW/STN - 151.27
xi) SSE/PW/BRR - 100.47
xii) SSE/PW/KAO - 117.11
xiii) SSE/PW/VDS - 175.45
xiv) SSE/PW/MDP - 165.00
xv) SSE/PW/JSME - 175.45
xvi) SSE/PW/DGHR - 94.00 (Newly created section)
xvii) SSE/PW/DMKA - 100.76 (Newly created section))
TOTAL = 2568.81

2.5 The sanctioned strength and on roll position of Track maintainer comprising of six category under 17 P.Way units in Asansol division is given below. The staff position of Track Maintainer (P-way) as on 01.05.19 supplied by Sr.DEN/Co-ordination./ASN office is also attached in **Annexure-I.**

Staff position of Track maintainer				
Sl.No.	**Category of staff**	**Sanctioned Strength**	**On Roll**	**Vacancy**
1	Mate	142	127	15
2	Key man	123	191	32
3	Track man	3643	2418	1225
4	Trolley man	232	217	15
5	Gate Keeper	344	306	38
6	Chowkider	35	16	19
TOTAL		**4619**	**3275**	**1344**

2.6 Presently 78% major maintenance works under P.Way units have already been given to private agency. Now the contractual work has been processed through special work and yearly contract basis i.e. Zonal work. Besides of the above, some of the major maintenance works are executed by the help of track machines. Existing gang are deployed to cater the regular maintenance work such as lubrication of rails, greasing of ERC, patrolling works and slack packing etc as per routine program made by sectional PWI. The following item of works of about 22% is carried out by the department gang.

i) Through fittings renewal(TFR)
ii) Ballasting
iii) Formation treatment
iv) Through bridge treatment renewal(TBTR)
v) Strengthening of major bridge approach
vi) Painting of rail/painting of weld
vii) Toe load measurement
viii) Distressing
ix) Renewal of points and crossing
x) Renewal of diamond crossing
xi) Through weld renewal
xii) Deep screening
xiii) Through rail renewal(primary/secondary)
xiv) .through sleeper renewal(primary/secondary)

2.6.1 Average %age of contractual and departmental work of 17 P-Way units over Asansol division has been assessed on the basis of data given by Engineering department vide letter no W/PL/Misc/2019 dated 01.08.2019 as shown in **Annexure-II:**

SL no.	P-WAY units	Total average contractual work (A)	Total average departmental work (B)	Total contractual and departmental work i.e. (A+B)	Average % of contractual work	Average % of departmental work
1.	**SSE/PW/ASN**	850	150	1000	85%	15%
2.	**SSE/PW/BRR**	965	235	1200	80%	20%
3.	**SSE/PW/KAO**	855	245	1100	78%	22%
4.	**SSE/PW/STN**	950	150	1100	86%	14%
5.	**SSE/PW/VDS**	960	140	1100	87%	13%
6.	**SSE/PW/MNAE**	735	265	1000	74%	26%
7.	**SSE/PW/PAN**	735	265	1000	74%	26%
8.	**SSE/PW/DGR**	740	270	1010	73%	27%
9.	**SSE/PW/WEST/UDL**	835	265	1100	76%	24%
10	**SSE/PW/KPK**	865	255	1120	77%	23%
11	**SSE/PW/MDP**	960	140	1100	87%	13%
12.	**SSE/PW/SURI**	860	255	1115	77%	23%
13.	**SSE/PW/TOP**	865	235	1100	79%	21%
14.	**SSE/PW/YARD/UDL**	630	385	1015	62%	38%
15.	**SSE/PW/JSME**	960	140	1100	87%	13%
16.	**SSE/PW/DGHR**	Newly created section			-	-
17.	**SSE/PW/ DMKA**	Newly created section			-	-
	TOTAL				78%	22%

2.6.2 When a train moves over a set of parallel rails, it generates enormous forces. More the speed more is the pressure exerted on the tracks. The entire track consisting of rails, sleepers and ballast is a fairly elastic system that deforms and returns to its original position after the train has passed over it. But over time and repeated use, the track progressively moves, causing deviations from the desired vertical and horizontal alignment. For smooth and incident free running of trains, track maintenance has to be done at regular intervals – this includes leveling, lifting, lining and tamping, this ensures the ideal geometry of the track. Machine tamping is the process of squeezing and uniformly re-arranging the ballast (rock pebbles) under the sleeper to keep the track in position and provide it with a homogenous ballast bed. The machine is also equipped with the latest measuring and recording equipment. This means measurement of all necessary track parameters after tamping without an additional measuring run, which further reduces track possession time and costs.

2.6.2.1 The different types of track machines were used in ASN division in the year 2018-19 for smooth maintenance of track parameters such as leveling, lifting, lining and tamping etc. The details of track machines used and progress in terms of KM over Asansol division have been tabulated as under.

Machine Progress in Terms of KM 2018-19

SL. No.	M/c Name & No.	Progress in KM		Section	Purpose of Work	Divn.
		Track	Machine			
1	3x(3958)	515.5	523.3	KAN-STN	Maintenance	ASN
2	BCM(370)	48.78	48.78	KAN-UDL	Maintenance	ASN
3	BCM(401)	44.53	44.53	STN-JAJ	Maintenance	ASN
4	BCM(709)	14.21	14.21	KAN-UDL	Maintenance	ASN
5	BCM(728)	15.85	15.85	STN-JAJ	Maintenance	ASN
6	BRM(116)	368.8	405	KAN-UDL	Maintenance	ASN
7	CSM(956)	535.3	570.9	UDL-STN	Maintenance	ASN
8	DTS(421)	270.8	288.2	KAN-UDL	Maintenance	ASN
9	DTS(441)	316.9	364.4	STN-JAJ	Maintenance	ASN
10	MPT(2008)	42.36	43.99	KAN-UDL	Maintenance	ASN
11	PQRS(88233, 88234)	36.64	36.64	KAN-UDL	Maintenance	ASN
12	UNIMAT(8405)	87.8	90.47	UDL -STN	Maintenance	ASN
13	UNIMAT4S(8434)	32.48	33.2	KAN-STN	Maintenance	ASN
14	WST(8082)	317.8	414.6	STN-JAJ	Maintenance	ASN
15	WST(8098)	297.3	332.9	KAN-UDL	Maintenance	ASN
16	WST(8117)	319.1	415.1	STN-JAJ	Maintenance	ASN
	TOTAL	**3264.15**				

It is evident from the above table that the track maintenance progress by the help different machines is 3264.15 KM over ASN division during the financial year 2018 – 19.

CHAPTER-III

3.0 CRITICAL ANALYSIS:

3.1 On going through the different stages of operation and activities involved in different PWI units over Asansol division in connection with the Track maintenance work made by the departmental gang, contractual agency or modern Track machines has been observed by the study team. The proposed requirement of manpower under PWI units over Asansol Division have been critically analyzed herein under based on the existing workload catered by the sectional gang as envisaged in different para of Chapter-II.

3.2 Presently 15 PWI units and newly created 2 PWI units i.e. SSE/PW/DGHR & SSE/PW/DMKA totaling to 17 PWI units over Asansol division are working to make the track in safe running of traffic. The nature of maintenance work of PW units over ASN division is more or less same. However, the study team has undertaken PWI units under engineering department for assessment of manpower after considering the quantum of manual maintenance work catered by the department gang.

3.3 It has been observed by the study team during field study and it is evident from para 2.6.1 & 2.6.2.1 that on an average 78% major maintenance work is conducted by contractual agency as well as different types of Track machines and rest 22% of work being tackled by departmental existing Track maintainer. It is worth mentioning that Deep screening, packing and renewal of points and crossing/Diamond X-ing works are executed partly by Track Machine.

3.4 Manual maintenance of Track has already been discussed in the physical chapter. But this type of manual maintenance has been changed due to modernization of track. This consists of following four heads.

3.4.1 Heavier Track Structure:

(i) Use of wear resistant 90 UTS rails and heavier rail sections i.e. 50 KG/60 KG to increase the service of life.
(ii) Use of PSC sleepers, elastic fastenings and rubber pads and increased the ballast cushion and sleeper density resulting minimum maintenance.
(iii) Use of LWR/CWR and SEJs to provide smooth and fast rail travel.
(iv) Use of curved switches of 1 in 8½ & 1 in 12 on Fan shaped layout for higher speed potentials.

3.4.2 Modern track maintenance methods.

(i) Improved in convention maintenance.
(ii) Directed Track maintenance.
(iii) Measured shovel packing.
(iv) Mechanical maintenance.

3.4.3 Modern Methods of Track Renewal and Track Laying.

(i) Use of PQRS to get increased output of track renewals with better standards of Track parameters.

3.4.4 Modern Methods of Track Inspection and Track monitoring.

(i) Portable acceletro meter to record horizontal and vertical accelerations.
(ii) Amsler car for recording track parameters.
(iii) Track recorded –cum-research car including use of computers.
(iv) Ultrasonic testing of rails and use of SPURT car for detection of rail flaws.

The effect of modernization of track has increased volume of traffic, higher speeds and heavier axle loads demand heavy track structure which can provide better service and require less maintenance.

3.5 About 22% of major maintenance work has been conducted by existing Track maintainer as mentioned in Para-3.3 Limitation of manual method of maintenance to maintain heavy track structure and to achieve track parameters having close tolerances. In view of the above, others manual maintenance work catered annually by the sectional Track maintainer are stated herein under.

(i) Cleaning of longitudinal and cross drains.
(ii) Deseeding and cleaning of jungle in between or outside the Main/Loop line track.
(iii) Track maintainer engaged during hot and cold weather patrolling.
(iv) Lubrication of rail joints.
(v) Greasing of ERC.
(vi) Attention to bridge approach/Level Crossing/Pts. & Xing.
(vii) Packing of glued joints and switch expansion joints (SEJ).
(viii) Repairing of case after rainy season.
(ix) Scattered renewal of rails and sleepers as and when required.
(x) Painting of rails/weld collars.
(xi) Pre/Post tamping operation made by existing gang.
(xii) Gang also engaged for design mode operation.
(xiii) Measurement of rail temperature during maximum hot/cold period.

3.5.1 Existing gang also engaged in emergency work as well as store work in association with contractual agency are as under.

(i) Loading/Unloading of materials (in Rail/Sleepers etc.) in the main line.
(ii) Placement of Lay out such as 1 in 8½ or 1 in 12 in the M/Line, Loop line or Yard line.
(iii) Conversion of new rail i.e. 52 KG from old rails i.e. LWR from SWR.
(iv) To take action as well as repair the track and restore the traffic at the time of accidents or derailments.
(v) Mechanical maintenance of track by the help of different track machines under traffic block.
(vi) To attend the maintenance failure at night time (i.e. Rail fracture, SEJ fracture or Points & Crossings failure etc.)
(vii) Patrolling of line during heavy rains, storms.
(ix) Procurement of P-way materials from divisional store at ASN & PAN and other places.
(x) Unloading of P-way materials including small fittings at sectional store.
(xi) Stacking of P-way materials in the store.
(xii) Involvement of track maintainer at the time of disposal of scrap.

3.5.2 Apart from the existing work as mentioned in Para 2.2.1, the workload of Track maintainer has been enhanced due to emergency work & store work. The function of Track maintainer is inescapable in PW units over Asansol division. The study team is of the opinion that the existing deployment of Track maintainer is, therefore, recommended to continue. Moreover, 70 Track maintainer per PW unit over Asansol division i.e. (70 x 17) = 1190 nos. of Track maintainer) are also to be provided to cater the emergency work as well as store works as mentioned in Para-3.5.1. Total requirement of Track maintainer over Asansol division is calculated to 3275 + 1190 = 4465 posts as against the existing sanctioned strength of 4619. Therefore, 4619 – 4465 = 154 posts are lying vacant with P-way units of ASN division. Therefore, 154 posts are recommended for surrender immediately.

3.5.2.1 Recommendation:

It is recommended that the revised sanction strength of Track maintainer of ASN division would be 4465 after surrendering of 154 posts.

CHAPTER-IV

4.0 SUGGESTIVE MEASURES:

Keeping in safety point of view, the following action should be taken as suggestive measures in connection with better track maintenance work:

i) All loop lines and track of yard lines should be maintained with clean cushion of six inches so that the several failures and derailments due to old rails and sleepers can be avoided

ii) Introduction of multinational company or quality contractor with technical supervisors for contractual work in P-way field which will result in good quality of works completed within the targeted time

iii) To provide suitable technical supervisors at Asansol control so that the emergency work as well as unloading of materials such as rails, ballast, and sleepers can be executed under proper traffic block in day or night time.

iv) Sufficient supply of following items are to be arranged in PW units over Asansol division in connection with track maintenance work:

   a) Track maintenance tools and wagon measurement tools
   b) Small track machines and training for operating the track machines should be provided to handle the small tarck machines.
   c) As all the SSE/P-way are over burdened with track maintenance, store and establishment works ministerial/material clerk in PW units should be provided to handle the store transactions and verification work so that the concerned in charge of the PW units can concentrate only on better track maintenance work.
   d) Necessary small fittings of track should be provided as and when required for maintenance of track or at the time of emergency.

v) It is seen that deterioration of track quality due to existence of huge unauthorised encroachment. Action should be taken against the unauthorised encroachment in order to maintaining the safety of track and avoid the theft of track fittings.

CHAPTER-V

5.0 FINANCIAL APPRAISAL:

5.1 According to recommendation made in Para 3.5.2.1, the financial savings achieved on account of surrender of 154 vacant posts of Track Maintainer under different P-way units over ASN division is calculated based on lower scale as under:

Category	No. of posts	Scale of Pay	Mean pay	DA @ 17%	Monthly	Yearly
		Figures in Rs.				
Track Maintainer	154	18000-56900	37450	6367	6747818	80973816

Thus, consequent upon implementation of recommendations the annual savings would be Rs.8,09,73,816/-