SOUTH EASTERN RAILWAY

REVIEW OF STAFF STRENGTH OF TRACK MAINTAINER CATEGORY STAFF IN VIEW OF UTILISATION OF MODERN OF EQUIPMENT FOR TRACK MAINTENANCE

EFFICIENCY CELL,
(PLANNING & WORK STUDY),
GARDEN REACH, KOLKATA – 700 043.

STUDY NO. EFF/913

S Y N O P S I S

1.	Name of the work study		Review of Staff Strength of Track Maintainer Category staff in view of utilisation of Modern of Equipment for Track Maintenance in Adra Division.
2.	Terms of reference		The study has been taken up in the Annual Programme of workstudy in 2019-20
3.	Aim		To make an assessment of Track maintainer category in accordance with need base requirement considering utilisation of modern high capacity track maintaining machine.
4.	Projected manpower re-deployment/ surrender.		Surrender : 110 Vacant Posts.
5.	Anticipated/projected savings		**Rs. 549**.lakhs (approx)
6.	No of recommendations made		01 (One)
7.	Critical analysis & observations		Resizing of the category in accordance with need base requirement and update.
8.	Brief note on recommendations		In view of revised need of track maintainer due to modernization in the division it is recommended to resize the sanctioned strength of the category by reducing entry level of this category. Thus, it is recommended to surrender 110 vacant posts of TM category outright and reduced the sanction strength to 4155 from 4265.
9.	Department concerned		Engineering

C O N T E N T S

C H A P T E R - I

1. INTRODUCTION :

Indian Railway is rapidly proceeding towards modernization in all fields. The 11th Five Year Plan has reiterated that the pace of railway modernization needs to be vigorously accelerated and that a paradigm shift in provision and delivery of rail services is called for. The need of the day is to concentrate on the core activities of infrastructure and operation. The action plan for the future should be planned with a view to:-

- Achieve a quantum reduction in manpower requirement for sustaining financial viability of IR with rising manpower costs and impact of the 6th and now by 7th Pay Commission recommendations.
- Lateral thinking to identify unconventional areas for reduction of dependence on manpower.
- Switch over from the conventional labour-intensive working methods to technology-intensive methods to reduce human intervention to a bare minimum.
- Use of such systems that require much less maintenance, review, periodicity of maintenance schedules and improves reliability.
- Modernization in all fields primarily with a view to ensure safe running of the system and simultaneously increase the average speed.

Maintenance of track is the utmost criteria for Railway movement. It is essential for safe, economic and smooth running of a railway. Indian Railways is taking special care about track maintenance and also introducing new ideas for this. Due to vibration and impact of the high speed trains and constant movement of heavy loaded trains, the packing under the sleepers becomes loose and track geometry gets disturbed. The gauge, alignment and longitudinal as well as cross-levels of the track thus get affected adversely. The fittings of the track come undone and there is heavy wear and tear of the track and its components. The typical climatic condition is also did affect the track and its components adversely. As such periodical over hauling is required with the objective of restoring it to its best possible condition in which it can serve all the requirement of good track. A good maintenance of track produces long lasting, lesser consumption of fuel, safe and smooth running of trains without noise and to get high speed Track Maintenance is required.

The study on the Review of Staff Strength of Track Maintainer Category in view of utilisation of Modern machines and Equipments for Track Maintenance in Adra Division has been taken up as one of the workstudy for the year 2019-20.

M E T H O D O L O G Y

1. Collection of the details of workload particulars.

2. Interaction with concerning field officials.

3. Direct observation of the present pattern of working comparing the conventional pattern.

4. Reference of similar work done in different Rlys.

5. Critical examination of the existing system of working and the deployment of staff thereof.

C H A P T E R – II

2 STAFF STRENGTH

2.1 The present sanctioned and on-roll strength of the Track Maintainer category in ADRA Division::-

Sl. No	PWI Unit	Sanctioned Strength					Actual Strength					Vacancy				
		TM-I	TM-II	TM-III	TM-IV	Total	TM-I	TM-II	TM-III	TM-IV	Total	TM-I	TM-II	TM-III	TM-IV	Total
		2800	2400	1900	1800		2800	2400	1900	1800		2800	2400	1900	1800	
1	GBA	18	36	65	184	**303**	15	23	44	128	**210**	3	13	21	56	**93**
2	BQA	17	34	61	159	**271**	16	17	77	115	**225**	1	17	-16	44	**46**
3	SONA	17	33	64	242	**356**	16	25	66	155	**262**	1	8	-2	87	**94**
4	EAST/ ADA	17	34	62	186	**299**	16	10	85	176	**287**	1	24	-23	10	**12**
5	JOC/ ADA	17	33	60	182	**292**	16	4	90	173	**283**	1	29	-30	9	**9**
6	DMA	16	31	57	164	**268**	15	15	75	156	**261**	1	16	-18	8	**7**
7	PRR	19	39	71	189	**318**	15	35	60	192	**302**	4	4	11	-3	**16**
8	CNI	21	41	75	204	**341**	17	31	100	111	**259**	4	10	-25	93	**82**
9	BJE	15	30	55	150	**250**	10	1	51	149	**211**	5	29	4	1	**39**
10	WEST/ ADA	17	34	62	168	**281**	13	6	60	206	**285**	4	28	2	-38	**-4**
11	VAA	16	33	58	156	**263**	15	24	40	102	**181**	1	9	18	54	**82**
12	MHQ	19	40	71	202	**332**	18	43	78	121	**260**	1	-3	-7	81	**72**
13	KSX	16	31	57	164	**268**	12	25	40	123	**200**	4	6	17	41	**68**
14	BKSC	26	51	94	252	**423**	25	50	64	174	**313**	1	1	30	78	**110**
TOTAL		251	500	912	2602	**4265**	219	309	930	2081	**3539**	32	191	-18	521	**726**

C H A P T E R – III

3.0 EXISTING SYSTEM OF WORKING :

It is the primary job of track maintainer to keep a track in good condition that is the gauge should be correct and within the specified limits, no difference in cross levels except on curves, kink-free straight alignment, uniform longitudinal levels, adequate ballast and well packed sleepers, good drainage and proper fittings and fastened. Special attention is to give during pre-monsoon, post monsoon and in monsoon.
Track Maintenance done in two way (1) Conventional system of Track maintenance (2) 3-Tier System of track maintenance how ever in our Rly track maintenance is done according to conventional system using Powrah, Jim Crow, Sleeper Tongs, Shovel, Crow Bar, Track Lifter, Tampers etc. for manual daily based maintenance. Generally Man power is deployed for track maintenance for following activities:

(1) Monsoon patrolling
(2) Hot weather patrolling for LWR track.
(3) Cold weather patrolling for LWR track
(4) Watching of vulnerable locations.
(5) Gate keeping at Engineering level crossings.
(6) Rest giving for keymen.
(7) Waterman duty (to serve the gang).
(8) Store watchman duty (at isolated locations of P.Way material store)

As regards Activity's, the sub activities are as under:

(1) Tunnel maintenance.
(2) Bridge substructure maintenance.
(3) Long girder bridge maintenance.
(4) Extra workload due to very sharp curves, deep cuttings and steep gradients.
(5) Maintenance of track on extremely bad formation.
(6) Look-out man duty (for the safety of gang).
(7) Fog signal man duty (to assist Traffic Department).
(8) Filth removal from track (within city limits).
(9) Security patrolling.
(10) Watching of water level in suburban section during monsoon and stopping of trains as soon as found necessary.

Heavy machine like CSM, Duomatic, BRM, DTS/DGS, UNIMAT, DGS, PQRS are utilized for heavy, quick and errorless work as per zonal contract.

Adra division is a big division in terms of size and civil engineering establishment. Total ETKM under Sr. DEN(Co)/ADRA is 2500 and 10068.90 ITKM. The management of this vast portion under Sr.DEN(Co) is sub-divided by 3 DEN, viz DEN/EAST, DEN/Central & DEN/North , who are further assisted by 7 AEN viz, AEN/BQA, AEN/ Sett, AEN/East, AEN/PRR, AEN/BJE, AEN/MHQ, AEN/BKSC & AEN/Bridge. There are 14 PWI units & 13 IOW Units are established in the division.

During 2018-19, 15 e-tender for P-Way zonal were invited to carryout different works viz section Z of SOR'2001, all works under unified standard schedule of rates (works & materials) – 2010, all spl items of works of Annexure-IIIA , Supply of cement etc. in ADRA Division are:

(1) Misc. P.Way Zonal works for the period from 1.10.2018 to 30.9.2019 under the jurisdiction of PWI/Chandil with Tender value of Rs. 1,08,00,000/-
(2) Misc. P.Way Zonal works for the period from 1.10.2018 to 30.9.2019 under the jurisdiction of PWI/Damodar with Tender value of Rs. 1,08,00,000/-
(3) Misc. P.Way Zonal works for the period from 1.10.2018 to 30.9.2019 under the jurisdiction of PWI/East/Adra with Tender value of Rs. 81,00,000/-
(4) Misc. P.Way Zonal works for the period from 1.10.2018 to 30.9.2019 under the jurisdiction of PWI/JOC at ADRA with Tender value of Rs. 81,00,000/-
(5) Misc. P.Way Zonal works for the period from 1.10.2018 to 30.9.2019 under the jurisdiction of PWI/Purulia with Tender value of Rs. 1,08,00,000/-
(6) O.T. for Misc. P.Way Zonal works for the period from 1.10.2018 to 30.9.2019 under the jurisdiction of SSE (P.Way)/Bankura with Tender value of Rs. 96,00,000/-
(7) O.T. for Misc. P.Way Zonal works for the period from 1.10.2018 to 30.9.2019 under the jurisdiction of SSE (P.Way)/Garbeta with Tender value of Rs. 90,00,000/-
(8) O.T. for Misc. P.Way Zonal works for the period from 1.10.2018 to 30.9.2019 under the jurisdiction of SSE (P.Way)/Sonamukhi with Tender value of Rs. 60,00,000/-
(9) O.T. for Misc. P.Way Zonal works for the period from 1.10.2018 to 30.9.2019 under the jurisdiction of SSE (P.Way)/BKSC with Tender value of Rs. 95,00,000/-
(10) O.T. for Misc. P.Way Zonal works for the period from 1.10.2018 to 30.9.2019 under the jurisdiction of SSE (P.Way)/Kotshila with Tender value of Rs. 90,00,000/-
(11) O.T. for Misc. P.Way Zonal works for the period from 1.10.2018 to 30.9.2019 under the jurisdiction of SSE (P.Way)/Mohuda with Tender value of Rs. 90,00,000/-
(12) O.T. for Misc. P.Way Zonal works for the period from 1.10.2018 to 30.9.2019 under the jurisdiction of SSE (P.Way)/Bhaga with Tender value of Rs. 80,00,000/-
(13) O.T. for Misc. P.Way Zonal works for the period from 1.10.2018 to 30.9.2019 under the jurisdiction of SSE (P.Way)/Bhojudih with Tender value of Rs. 70,00,000/-
(14) O.T. for Misc. P.Way Zonal works for the period from 1.10.2018 to 30.9.2019 under the jurisdiction of SSE (P.Way)/West/Adra with Tender value of Rs. 70,00,000/-
(15) O.T. for Misc. Zonal works for maintenance of Level Crossings for the period from 1.07.2018 to 30.6.2019 under the jurisdiction ADEN/Mahuda with Tender value of Rs. 1,00,00,000/-

Tamping Chart of Track in Adra Division using Machine is as under:-

Section Adra-MDN Frequency : 18 Month												
Stn	ADA - IBL	IBL-JPH	JPH-CJN	CJN-BQA	BQA-ODM	ODM -VSU	VSU-PBA	PBA-GBA	GBA-CDGR	CDGR -SLB	SLB-GSL	GSL-MDN
UL Last Tamping	Feb'18	Feb'18	Sep'17	Mar'18	Apr'19	Apr'19	Nov'17	Sep'16	Oct'18	Jan'18	Jan'18	Jan'18
Next Due	July'19	July'19	Mar'19	Sep'19	Oct'20	Oct'20	May'19	Mar'18	Apr'20	July'19	July'19	July'19
DL-Last Tamping	May'19	May'19	Mar'18	Mar'18	May'19	June'19	Sep'18	Oct'18	Oct'18	Oct'18	Oct'18	Oct'18
Next Due	Nov'20	Nov'20	Sep'19	Sep'19	Nov'20	Dec'20	Mar'20	Apr'20	Apr'20	Apr'20	Apr'20	Apr'20

Section Adra-CNI Frequency : 12 Month												
Station	ADA-GRB	GRB-ANR	ANR-BGA	BGA-KSU	KSU-CHRRA	CHRRA -PRR	PRR-TAO	TAO-KTD	KTD-URA	URA-BBM	BBM-BRMD	BRMD -NIM
UL Last Tamping	June'18	June'18	June'18	June'18	June'18	July'18	July'18	July'18	July'18	Aug'18	Aug'18	Jan'19
Next Due	June'19	June'19	June'19	June'19	June'19	July'19	July'19	July'19	July'19	Aug'19	Aug'19	Jan'20
DL-Last Tamping	S/Line	June'18	June'18	June'18	June'18	July'18	July'18	July'18	July'18	July'18	Aug'18	Aug'18
Next Due		June'19	June'19	June'19	June'19	July'19	July'19	July'19	July'19	July'19	Aug'19	Aug'19

Section Adra-CNI Frequency : 12 Month		
Portion	NIM-CNI	CNI-MIK
UL Last Tamping	Aug'18	June'17
Next Due	Aug'19	June'18
DL-Last Tamping	Sept'17	Sept'17
Next Due	Sept'18	Sept'18

Section Adra-ASN Frequency : 12 Month						
Stn	ADA -JOC	JOC-RKI	RKI-MDKD	MDKD-DMA	DMA-BURN	BURN-ASN
UL Last Tamping	May'18	May'18	Apr'17	Apr'17	Apr'17	Apr'17
Next Due	May'19	May'19	Apr'18	Apr'18	Apr'18	Oct'18
DL-Last Tamping	May'18	May'18	May'18	Apr'17	Apr'17	
Next Due	May'19	May'19	May'19	Apr'18	Apr'18	

Section RDR-DMA-KPK Frequency : 24 Month			
Portion	RDR-DMA	DMA-MOH	MOH-KPK
UL Last Tamping	Apr'17	May'18	June'19
Next Due	Apr'19	May'20	June'21
DL-Last Tamping	Single Line		
Next Due			

Section: GRB-JOC Frequency : 12 Month	
Portion	GRB-JOC
UL Last Tamping	June'18
Next Due	June'19
DL-Last Tamping	June'18
Next Due	June'19

Section ADRA-BJE-VAA-JNN											
Frequency	18 Month		18 Month		24 Month						18 Month
Stn	ADA-SNKR	SNKR-RUI	RUI-SNTD	SNTD-BJE	BJE-SDMD	SDMD-BCB	BCB-VAA	VAA-LYD	LYD-MLQ	MLQ-MHQ	MHQ-JNN
UL Last Tamping	SEPT'17	SEPT'17	SEPT'17	SEPT'17	Mar'17	Mar'17	Mar'17	Mar'17	Mar'17	Mar'17	Mar'17
Next Due	MAR'19	MAR'19	MAR'19	MAR'19	Mar'19	Mar'19	Mar'19	Mar'19	Mar'19	Mar'19	Mar'19
DL-Last Tamping	S/Line		SEPT'17	SEPT'17	Mar'17	Mar'17	Single Line				
Next Due			MAR'19	MAR'19	Mar'19	Mar'19					

Section: BJE-TLE-GOMO Frequency : 18 Month					
Station	BJE-SBW	SBW-TLE	TLE-MHQ	MHQ-KNF	KNF-GOMO
SL Last Tamping	Sep'17	Dec'18	Feb'17	Feb'17	Mar'17
Next Due	Mar'19	June'20	Aug'19	Aug'19	Sept'18

Section: TT Line Frequency : 24 Month			
TLE-BDIH	BDIH-CHAS	CHAS-IPTN	IPTN-BKSC
DEC'18	JULY'17	AUG'17	AUG'17
JUNE'20	JULY'19	AUG'19	AUG'19

Section: TKX-BKSC - KSX-PRR								ARN-RUI	SNKR-JOC	BDA-DRGU
Frequency : 15 Month					18 Month			24 Month	24 Month	18 Month
Stn	TKX-BKSC	BKSC-RDF	RDF-PNW	PNW-KSX	KSX-BBDA	BBDA-GTD	GTD-PRR	ARN-RUI	SNKR-JOC	BDA-DRGU
UL Last Tamping	July'19	July'19	Aug'17	Aug'17	Aug'16	July'16	Sept'17	Feb'17	Feb'17	July'17
Next Due	Dec'20	Dec'20	Oct'18	Oct'18	Feb'18	Jan'18	Mar'19	Feb'19	Feb'19	Jan'19
DL-Last Tamping	July'19	July'19	Aug'17	July'17	Single Line					
Next Due	Dec'20	Dec'20	Oct'18	Oct'18						

Section: BQA-SONA-MSAE Frequency : 24 Month							
Station	BQA-BZC	BZC-SONA	SONA-BTPR	BTPR-SRBZ	SRBZ-RNGR	RNGR-MTIP	MTIP-MSAE
SL Last Tamping	Oct'18	Sep'18	Sep'18	Aug'18	Aug'18	Aug'18	Oct'18
Next Due	Oct'20	Sep'20	Sep'20	Aug'20	Aug'20	Aug'20	Oct'20

C H A P T E R – IV

4.0 CRITICAL ANALYSIS

Equated Track Kilometer is worked out from the running track KM by the formula E= L x U(1+A+B+C) where E= ETKM, L= Running Track Kilometer, U= Traffic density factor, A= Formation/soil factor, B= Alignment factor, C= Rainfall factor.

The 'Equated Track Kilometer' is used as the performance unit for matching the manpower or the expenditure, against the revenue activity of track maintenance. In the pre-modernization era, ETKM would have served this purpose with fair accuracy, since all the three factors; namely, manpower, maintenance cost and ETKM were defined to be proportional to each other. As track modernization was spreading over a part of the system in Indian Railway, the manpower/ETKM was reduced as per the correction factor K (in Special Committee Formula) for the modernized length of the track, whereas the corresponding ETKM remained unchanged. Thus the linearity between gross ETKM and gross manpower got vitiated. Total ETKM of ADRA Division is 2500 and total sanctioned strength of Track Maintainer is 4265 therefore Manpower per ETKM is 1.706 however present on-roll strength is 3539, therefore actual manpower per ETKM 1.437. It has been proved that 'Equated Track Kilometre (ETKM)' has become an unreliable Performance Unit, both for manpower and track maintenance cost. ETKM derives its relevance from Special Committee Formula. With the Rational Formulae replacing the Special Committee Formula, the Committee has proposed 'Equated Manpower Kilometre (EMKM)' as the Performance Unit. For defining EMKM, a comparator P.Way section has been assumed, which requires 12/3 men per km (as average) of mainline track in the section, to perform all the Activities T, R, M & S as per the Rational formulae.

Manpower requirement for Activities T and R

Main Line

Equivalent length of mainline = 70+(0.1x40) = 74km

Mandays for Activity T = (80+2.3x2.5)x74 = 6346

Mandays for Activity R = 159 x 74 = 11766

Yard Lines

Equivalent length of RYL = 13+(0.1x10) = 14km Equivalent length of RYL including NRYL= 14+(2/3x4.5) = 17km

Mandays for Activity R = 297 x 17 = 5049

Manpower requirement for Activities M

Monsoon patrolling

10 beat-lengths, 60 days in a year, 1 beat in each beat length, 2 shifts in each beat length

Mandays = 60x10x2x1 = 1200

Hot weather patrolling

LWR track of 28km length requiring 30 mandays/km

Mandays = 28 x 30= 840

Cold weather patrolling

LWR track of 28km length requiring 12 mandays/km

Mandays = 28 x 12 = 336

Rest giving for keymen

10 keyman-beats

Mandays = 10(365-290) = 750

Waterman duty

10 gangs

Mandays = 290 x 10 = 2900

Manpower requirement for Activities S

Bridge substructure maintenance

Total lineal waterway = 760m

Mandays = 1.1 x 0.29 x 760 = 242

Mandays requirement = 6346+(11766+5049)+1200+840+336+750+2900+242 = 29429

Mandays requirement including LR = 1.125 x 29429 = 33108

Mandays required for LR for 10 gangmates and 10 keymen = 0.125 x 20 x 290 = 725

Total mandays requirement = 33108 + 725 = 33833

No. of gangmen required per km = 33833/(290x70) = 1.6667 = 12/3

NUMBER OF GANGMEN REQUIRED IN PERMANENT GANGS

N = M K E

Where N = Number of gangmen, E = Equated Track Kilometre (ETKM) worked out as per para 2, M = Manpower Factor (1.47 for BG and 1.21 for MG & NG), K = Correction Factor, due to modernisation of track, methods of maintenance etc.

However, as per Railway Board' s letter No.E(NG)/II/77/CL/46/E.Rly dt.12.01.83, the gang strength as calculated by the above formula is to be reduced by 5%.

Therefore the formula under adoption by the Zonal Railways is,

N = 0.95 MKE

For ADRA Division where where ETKM is 2500 with only Broad gauge service is available (ignoring correction factor). The requirement of Gangmen would be like

N= 0.95 x 1.47 x1x2500

= 3,491.25 i.e., 3,491 however the present sanction is 4265 for the division.

C H A P T E R - V

5.0 RECOMMENDATIONS :

The strength of track maintainer in the division had been setup according to need based requirement as per old establishment of the track year by year. As such pin pointing of these staff are also made as per requirement in every particular PWI unit. With the adoption of modern high capacity machines for track maintenance the requirement of gang has decreased remarkably. E.g., during heavy machine work for track maintenance, a few staff are only required for protection of section where the work is under process as per safety rule. However, the requirement of track maintainer during regular manual maintenance and for various other jobs like night patrolling, hot weather patrolling, attending failure, attending accident site etc. cannot be ignored. In view of the circumstances, the strength of staff also revised time to time according to need.

Recommendation – I : In view of revised need of track maintainer due to modernization in the division it is recommended to resize the sanctioned strength of the category by reducing entry level of this category. Thus, it is recommended to surrender 110 vacant posts of TM category outright and reduced the sanction strength to 4155 from 4265.

C H A P T E R - VI

6.0 Financial Evaluation:

In reference to the recommendations made in the study report the financial evaluation on the basis of surrendering '110' Posts of Track Maintainer is as under:-

SURRENDER OF 110 Posts								
Srl No.	**Desgn**	**Scale of pay**	**No. of posts**	**GP**	**Mean Pay** (18000+56900/2) (Level-1)	**DA @ 11 %**	**Monthly cost per staff**	**Total Cost Per Month**
1	Track maintainer	5200-20200	110	1800	37,450	4,120	41,570	45,72,700
TOTAL			**110**					**45,72,700**

The annual savings on account of surrender of 110 posts = **4572700** x 12

= 548,72,400

Say = Rs. 549 lacs per annum approx