WORK STUDY REPORT

ON

REVIEW OF TRACKMAINTAINER STAFF

WORKING UNDER SSE-'P' WAY

CONTROLLED BY SR.DEN/C

OVER

AMBALA DIVISION

2021-22

WORK STUDY TEAM

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Central Planning Cell
Northern Railway,
Headquarters Office,
Baroda House, New Delhi

EXECUTIVE SUMMARY

This study was allotted to Central Planning Cell, HQ Office on the directives of SDGM/NR ON "Review of trackman staff under SSE 'P' way controlled by Sr. DEN-C/UMB over UMB Division" with a view to achieve economy and manpower productivity.

STAFF POSITION

The sanctioned and on roll strength of trackman staff under SSE'P' controlled by Sr.DEN/C/UMB over Ambala Division is as under:-

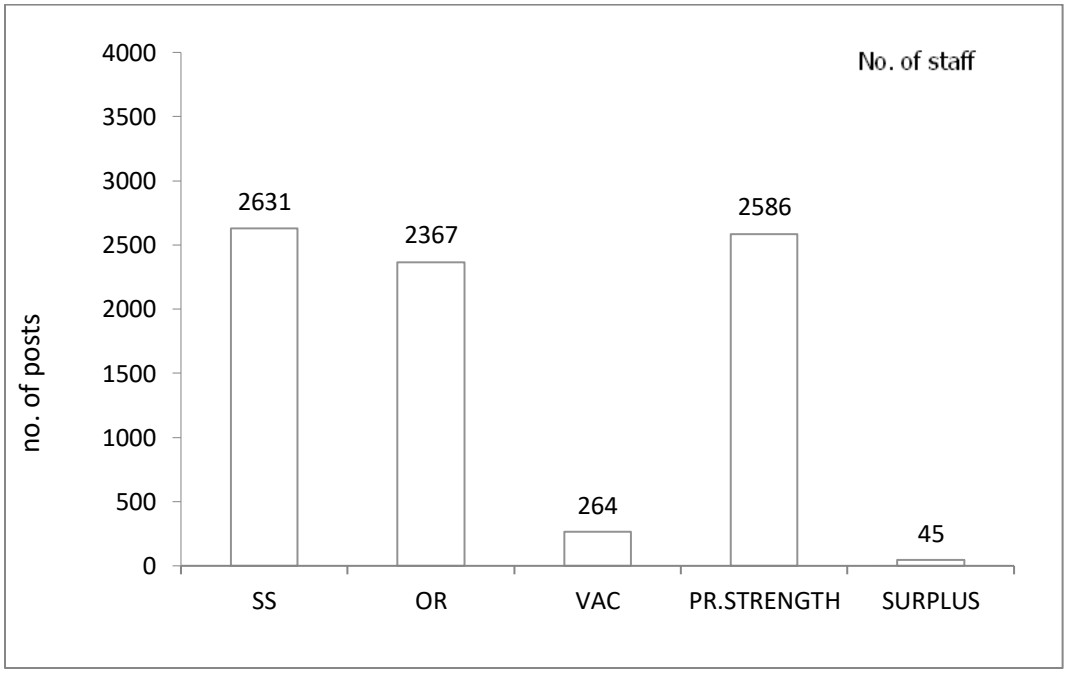
S.N.	Station	S/S	O/R	Var.
1	Trackman	2631	2367	264
	Total	2631	2367	264

No. of posts identified as surplus and recommended for surrender: -

Gr. 'C' = NIL
Gr. 'D' = 45 posts
Total = 45 posts

FINANCIAL IMPLICATIONS

Anticipated recurring savings = ₹ 131.10 lakh per annum.
Capital saving = Nil
Total = ₹ 131.10 lakh per annum



I N D E X

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SYNOPSIS

Permanent way plays a vital role in safe running trains on railway track. Indian Railway spread over the nation from North to South and East to West. A huge manpower is deployed to maintain the track within the prescribed tolerances so as to enable the trains to run at an optimum level of safety, security, reliability and punctuality.

It has become inevitable to run heavier trains at high speeds, which has necessitated to introduce modernized track structure and its improvised maintenance system. Even after the introduction of improvised track and track machines for maintenance, the trackmen are still being deployed on conventional pattern. Taking into consideration the activities based upon improvised track and mechanized maintenance as per manpower and cost norms for trackman (MCNTM) was assigned to be conducted by the Central Planning Cell, HQ Office, by SDGM/NR.

The team collected the SSE 'P' way wise trackman staff position and activity wise workload being maintained by the trackman staff. The team critically analyzed the data supplied by SSE P.Way and assessed the requirement of trackman staff accordingly.

The requirement of trackman staff comes to 2586 posts against the sanctioned strength of 2631 posts. Hence **45** posts of trackman are identified as surplus and recommended for surrender.

The zealous acceptance and implementation of the recommendations contained therein the work study report will result in recurring saving to the tune of worth ₹ 131.10 lakh per annum to the administration.

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SUMMARY OF RECOMMENDATIONS

S. N.	Recommendations	Refer para No.	Accepting/ implementing authority.
1	It is proposed that **45** posts of trackman Gr.Rs.5200-20200-1800 identified as surplus under the control of Sr. DEN-C/ UMB over UMB Division and recommended for surrender.	2.28.0	ADRM/Admin/UMB Sr.DEN/C/UMB Sr.DPO/UMB

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ACKNOWLEDGEMENT

The work study team is highly grateful to Shri Karan Singh, ADRM/Admin/UMB, Sh. Rakesh Sabharwal, Sr.DEN/C/UMB and Sh. Nikhil Dhongri, DPO/UMB for their valuable guidance and other functionaries for extending full cooperation in providing requite data/information during the conduct of study.

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1.0 INTRODUCTION

1.1.0 The Permanent way is the backbone of any railway system. The safety and comfort of rail users depend upon the proper maintenance of track. The permanent way is maintained by Civil Engineering Department by deploying huge manpower. Mechanized maintenance technology is being used to maintain heavy and modernized track structure to cope up increased of faster traffic needs. to cope with heavier and faster traffic needs. By virtue of heavy/modernized track structure and mechanized maintenance of track, the workload trackman category is supposed to be reduced significantly. However, the trackmen are still being deployed arbitrarily based upon conventional pattern. Thus with the introduction of track machine, still trackman category strength either remains some or increased.

1.2.0 In view of above, SDGM/NR desired to conduct "Review of trackman staff over UMB Division" with a view to effect optimum utilization of advance track maintenance technology thereby reducing wastage to improve productivity of organization.

1.3.0 TERMS OF REFERENCE:

The following terms of reference were adopted for conducting the study:-

1. Review of staff strength vis-à-vis existing workload.
2. Suggest ways and means to identify redundant/unproductive activities to eliminate wastages.
3. Suggest ways and means to improve the system economic in view of modernization and system development.

1.4.0 METHODOLOGY ADOPTED

The following method study and work measurement techniques of work study were applied for conducting the review:-

1. Data collection and its critical analysis to assess the factual position
2. Application of yardstick in vogue, if any
3. Held discussions at various levels.

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2.0.0 BRIEF DESCRIPTION, STAFF POSITION, WORKLOAD, CRITICAL ANALYSIS, PROPOSED STAFF AND RECOMMENDATIONS.

2.1.0 BRIEF DESCRIPTION

2.1.1 UMB Division is an important Division of Northern Railway. It is a strategic division with train operations point of view. It is spread over the states of Uttar Pradesh, Haryana, Punjab and Himachal Pradesh.

2.1.2 Permanent Way or track is the real head upon which the trains run. Track is the backbone of any railway system, which is maintained effectively by track engineers and trackman staff within the prescribed tolerances.

2.1.3 Modernization in railway system has become necessity of today so as to haul heavier and longer trains at faster speeds safely and conveniently to achieve better productivity and render better consumer service to rail users. Modernization of track involves use of heavier track structure, long welded rails, modern mechanized methods of track maintenance and quick renewals of track structure etc.

2.1.4 The Indian Railway track is mainly maintained by permanent way gangs of 10/20 men each having a beat of about 6 to 10 km. Depending upon various local/tropical/working conditions, the gangs normally carry out thorough packing of their beat every year and deep screening once in five years. Besides, trackman, mates, keymen, blacksmiths and welders are also utilized for track maintenance.

2.1.5. Activities carried out by departmental staff and norms.

The activities performed by departmental staff and norms as per MCNTM formula is tabulated as under:-

Activities		Norms
T	Activities 'T' affected by Traffic Density	
T.1	Slack attention to	
a.	Bad spots	12 sleepers/head, 1/4 length
b.	Low joints (F for welded) Glued joints	10 GJs attended 4 times/year
c.	SEJ (1 no. per km)	6 times/year, 8SL/SEJ, 12 SL/Head.
d.	Minor curve realignment	As required 10% of gang length.
T.2	For tie tamper work	
a.	Pretamping operations	(2 years cycle) 20 men/km
b.	Alongwith tamper	10 men for week/gang length of 10 km.
c.	Post tamping operations	28 men/km (includes boxing needed).
T.3	Casual renewal of	
a.	Rails	60 mandays/gang length of 10 km.
b.	Track sleepers	60 mandays/gang length of 10 km.
c.	Fasteners (alongwith re-gauging)	100 mandays/gang length of 10 km.
T-4	Repair Welding	12 men/failure/year
R	ACTIVITIES 'R' UNAFFECTED BY TRAFFIC DENSITY	
R.1	Lubrication of ERCs	Keyman duty (occasional)
R.2	Shallow screening (1/5 length)	6 SL/Head
R.3	Loading, leading, unloading	Inferred from field data anlaysis.

R.4	Overhauling of level crossing	1 LC per 1.5 km, 20 men/LC
R.5	Watching caution spots and misc.	Inferred from field data analysis.
R.6	Tree cutting for visibility	-do-
R.7	Lubrication of rails in curves	-do-
R.8	Accident relief & carcass removal in run over case.	-do-
R.9	Bridge sleeper attention and renewal.	-do-
R.1	Pre monsoon attention, such as cleaning of drains and water ways, cess repairs, deweeding of track and attention to cuttings and trolley refuges.	Referred from field data analysis.
R.1	Creep pulling (approaches of bridge turnout)	-do-
R.1	Rectifying damage to L/C posts and gates.	-do-
M	ACTIVITIES 'M'	
M.1	Monsoon patrolling	Total no. of patrol man in 24 hrs. No. of days for which patrolling is required.
M.2	Hot weather patrolling	30xlength of LWR in km
M.3	Cold weather patrolling	12 x length of LWR
M.4	Vulnerable locations	Total no. of stationery watchman no. of days for which locations is watched.
M.5	Waterman duty	No. of beatx1 man/ beatx294
M.6	Site store chowkidar	No. of site store x shifts x 365
M.7	Rest Givers to gate keepers (No. of manned level x-ing.	Xingx2x365- S/S of gate keeper x 294
'S'	ACTIVITIES SITE SPECIFIC	
S1	Tunnel maintenance = length of tunnel in km x no. of line in tunnel) x1.2 x 294	
S2	Bridge structure maintenance =(length of bridge in km. x no. of line on bridge) 1.1 x 294	
S3	Long girder bridge maintenance = 6x4x4/56=0.64xtotal lineal water way.	
S4	Extra for very sharp curve= (Length of track in km x 1 x 294)	
S5	Extra for very bad formation =(Length of bad formation meter x 10 x 4 x 3/200)	
S6	Look out man duty= length of poor visibility/length of gang length x 294	
S7	Fog signal man duty 1st year 2nd Year 3rd year Avg.	
S8	Filth removal= 1 man /beat	
S9	Security patrolling 1st year 2nd Year 3rd year Avg.	

2.1.6 Activities that can be outsourced

During the conduct of study, the activities which can be outsourced on contract basis was discussed at various levels. The work done on contractual basis is economical and better in quality when compared with departmental staff. Indian Railway has out sourced certain activities in some departments like cleaning of coaches, cleaning of drains, platform surface cleaning, washing line cleaning, picking up slag/rag/poly bag from railway lines, cleaning work in Medical Department, box porter work in mechanical/operational departments etc. Some activities in P.Way can be outsourced which will not only improve economy but also increase productivity and standard of work. The activities which can be outsourced are listed below:-

Lubrication of elastic rail clips (ERCs)

1. Shallow screening.
2. Loading, leading and unloading of material
3. Cleaning of drains and waterways.
4. Heavy cess repair and attention to cuttings and trolley refuges.
5. Rectifying damage of L/C posts and gates.
6. Painting of weld collars and rails.
7. Destressing LWR when planned with track renewed.
8. USFD testing.
9. Creep pulling and overhauling of turn outs.
10. Reconditioning of tongue rails and crossings.
11. Unloading ballast.
12. Muck removal from yard.

2.1.7 This study is limited to review the trackman staff working under SSE/SE (P. Way) controlled by Sr. DEN-C/UMB over UMB Division. The head quarters station of SSE (P. Way) under their respective ADENs are given below:-

SN	Sr.DEN	ADEN	SSE (P. Way)
1	Sr.DEN/II	BTI	BTI
			ABS
			BNN
		PTA	PTA
			DUI
			UKN
	SR.DEN-I	RPJ	RPJ
		CDG	CDG
	DEN/HQ	UMB	UMB
			USFD-UMB
			TD-UMB
2	DEN-IV	SIR	SIR
			RPAR
			DOA
			SAMRALA
3	Sr. DEN-III	SRE	SRE
			JUD
		JUDW	JUDW
		SML	KLK
			SML

2.2.0 STAFF POSITION

During the course of study, the team collected the staff position from Divisional Headquarters office as well as from SSE (P. Way) offices. The sanctioned strength supplied by Divisional Office and the on roll strength supplied by the respective SSE/SE P. Way offices have been taken into consideration. The detailed staff position is depicted as annexure No. II in the report and the summarized position of the trackman staff is tabulated below:-

SN	ADEN	SEE/P. Way	Trackman		
			S/S	O/R	Vac
1	BTI	BTI	171	134	37
		ABS	101	94	-7
		BNN	139	117	-22
		USED BTI	9	5	-4
2	PTA	PTA	122	96	-11
		DUI	192	154	-48
		UKN	113	105	-8
3	RPJ	RPJ	213	211	-2
4	CDG	CDG	114	113	-1
		SASN	62	49	-13
5	UMB	UMB	291	283	-8
		USFD-UMB	11	28	+17
		TD-UMB	16	16	-
6	SIR	SIR	131	127	-4
		RPAR	170	150	-20
		DOA	125	115	-10
		SAMRALA	86	62	-24
7	SRE	SRE	190	179	-11
		JUD	160	150	-10
8	JUDW	JUDW	40	35	-5
9	SML	KLK	84	70	-14
		SML	91	74	-17
Total			2631	2367	-264

The above table reveals that the sanctioned strength of trackman staff is 2631 posts, the on roll strength is 2367 posts and 264 posts are lying vacant under Sr.DEN/C/UMB over UMB Division.

2.3.0 WORKLOAD

During the course of study, the team collected the workload in terms of track kilometer being maintained by track maintenance staff and also the mandays per year for activity M & S as per MCNTM norms. The effective working days in one year are taken as 294 days.

The depot wise workload in terms of the kilometer is depicted as Annexure III in the report and the summarized position of the same is tabulated below:-

SN	ADEN	SSE (P.Way)	Track kilometer			Annual Average GMT
			On PRC sleeper in KM	On other lay outs in Km.	Total	
1	BTI	BTI	62.959	45.564+ 22.793	131.316	BTI=SGNR=4.95 DUI-BTI=7.51
		ABS	86.00	17.20	103.2	4.95
		BNN	92.40	9.55	101.95	7.51
		USFD-BTI	-	-	-	-
2	PTA	PTA	67.06	26.347	93.407	8.94
		DUI	133.760	20.35	154.11	DUI-LDH=9.67 JHL-DUI=3.07
		UKN	84.691	7.747	92.438	3.07
3	RPJ	RPJ	126.507	98.97	225.477	65.72
4	CDG	CDG	73.0	27.00	100.00	6.431
		SASN	47.00	1.80	48.8	2.22
5	UMB	UMB	82.7	139.58+ 13.34	235.62	JUD-SRE=32.25 UMB-RPS=65.72
		UMB-USFD	-	-	-	-
		TD/UMB	-	-	-	-
6	SIR	SIR	65.473	16.64+ 6.39	88.503	57.54
		RPAR	72.13	14.75+ 45.23	132.11	9.52
		DOA	86.48	22.76	109.24	42.70
		SMRL	55.95	4.63	60.58	2.22
7	SRE	SRE	54.909	57.59+19	131.499	32.25
		JUD	93.089	25.347	118.436	32.25
8	JUDW	JUDW	-	74.70	74.70	JUDW W/SHOP ONLY
9	SML	KLK	1.69	34.23+ 48.72 NG	84.64	BG=6.43 NG=0.52
		SML	NG 50.22	8.53	58.75	0.52

2.4.0 CRITICAL ANALYSIS

The modernization of track has resulted in introduction of modern infrastructure, equipments and devices etc. involving heavy costs in commissioning but on the other hand wastages of manpower specially manual labour viz utilization of trackman is still persisting. In this dynamic age, the track maintenance are being used exclusively and intensively not only to minimize the working expenses but also to improve safety standards.

To economize the track maintenance system due to effect of various modernizations of tracks assessing requirement of trackman has become imperative.

Consequently, SDGM/NR desired to conduct a study on "Review of trackman over UMB Division" with a view to improve economy and manpower productivity. The team collected relevant data/information from respective SSE (P. Way) offices and assessed the requirement of trackman as per MCNTM norms.

2.5.0 REQUIREMENT OF TRACKMAN STAFF & YARDSTICK

The team collected the workload in terms of track kilometers and mandays per year for various activities i.e. T, R, M & S etc. from respective SSE (P. Way) offices working under Sr. DEN-C/UMB over UMB Division. The work study team has considered the GMT, Track kilometers, other layout and MCNTM committee formula while calculating the requirement of staff.

The activities 'T' for machine maintenance track kilometers
'T' =80+ 2.3XGMT mandays/km/year
R =159 mandays/km/year

The activities T & R for manual track taken as
T = 223+8.24 GMT mandays/km/year
R =169 mandays/km/year
The activities R for running yard line and non running yard line
R for mechanized and running yard line=177 mandays/km/yr
R for non running yard line= 297 mandays/km/yr.
As per MCNTM formula.
For Narrow Gauge (NG)- R=153 mandays/km/year, Activity T+R=271 mandays/km/year for NG Yardstick(Manual packed)

2.6.0 SSE/P.Way BTI

Gang strength as per MCNTM formula

Annual Avg. GMT DUI-BTI Section= 7.51

BTI-SGNR section=4.95

Total track kilometer= 131.316 km

Track on PRC sleeper (Mech.) 62.959 km DUI-BTI Section=14 km

BTI –SGNR =48.959 sec.

Track on other layout

Including Running yard lines 45.564 km

Track on other layout

Conventional 22.793 km

Mandays/km/year for mechanized track

Activity T for DUI-BTI Section with Avg. GMT 7.51

T= 80+2.3xGMT=80+2.3xGMT

80+2.3x7.51= 97.273 mandays/km/yr

97.273x14 = 1361.822 mandays/yr

Activity 'T' for BTI-SGNR section with Avg.GMT = 4.95

T= 80+2.3xGMT=80+2.3xGMT

80+2.3x4.95= 91.385 mandays/km/yr

91.385x48.959=4474.12mandays/year

Total Activity T= 1361.822+4474.12= 5835.940 mandays/year.

Activity R= 159x62.959= 10010.48 mandays/year

Activity R for other lay outs=177x45.564= 8064.828 mandays/year

Activity R for manually maintenance=297x22.793=6769.521 -do-

Total mandays/years for Activity R=10010.481+8064.828+6769.521

= 24844.83 mandays/year

Activity miscellaneous 'M' length of LWR = 59 km

i)	Monsoon patrolling		= 1460
ii)	Hot weather patrolling	= 30x59	= 1770
iii)	Cold weather patrolling	= 12xLWR=12x59	= 708
iv)	Vulnerable locations	= 40x4	= 160
v)	Waterman duty		= NIL
vi)	Site store chowkidar	= 2x2x365	= 1460
	Total		= 5558

Activity site specific 'S':-

i)	Tunnel maintenance	= NIL
ii)	Bridge structure maintenance	= 24
iii)	Long Girder Bridge maintenance	= NIL
iv)	Extra for every sharp curve	= 120
v)	Extra for bad formation	= 1080
vi)	Look out man duty	= 160

vii) For signal men duty 1st year 2nd Year 3rd year

Avg. of three years 120 120 120 = 120

viii) Security patrolling 1st yr 2nd yr 3rd yr Avg. of three yr=NILL

Total =1504

T	R	M	S	Total T+R+ M+S	No of mates & Keyman	LR	Calculated gang strength	S/ S	Surplus + Short -	On roll staff
5835.940	24844.83	5558	1504	37742.77	29	16.04+3.62=19 .66	128.374+ 19.66=148.03 or say 148	171	+23	134

2.7.0 SSE/P.Way ABS:-

Gang Strength as per MCNTM formula
Avg. GMT-UP=5.92+DN=3.91 = 4.915
Total track km =103.20 km
Track on PRC sleeper (Mechanized)=86 km
Track on other layout =17.20 km
Mandays/km/year mechanized track:-
For activity 'T'=80+2.3 GMT
= 80+2.3x4.915 mandays/km/year
=91.30x86 = 7851.8 for 86 Km track
For activity 'R'=159x86 = 13674

Other layout and running yard lines 17.20x177 =3044.4 mandays/yr
Total activity 'T' for mechanized =7851.8 -do-
Total activity 'R' for mechanized =13674+3044.40
=16718.40 mandays/yr.

Activity miscellaneous 'M' length of LWR = 76 km

i)	Monsoon patrolling	= 5x4x10	= 200
ii)	Hot weather patrolling	= 30xLWR (76km)	= 2280
iii)	Cold weather patrolling	= 12x76	= 912
iv)	Vulnerable locations	= NIL	= NIL
v)	Waterman duty	= NIL	= NIL
vi)	Site store chowkidar	= 1x2x365	= 730
	Total		= 4122

Activity site specific 'S':-

vii) Tunnel maintenance = NIL
viii) Bridge structure maintenance = NIL
ix) Long Girder Bridge maintenance = NIL
x) Extra for every sharp curve = NIL
xi) Extra for bad formation = NIL
xii) Look out man duty = NIL
xiii) For signal men duty 1st year 2nd Year 3rd year Avg. of three years=NIL
xiv) Security patrolling 1st year 2nd Year 3rd year Avg.of three yr=NIL

T	R	M	S	Total T+R+M+S	No of mates & Keyman	LR	Calculated gang strength	S/S	Surplus + Short -	On roll staff
7851.80	16718.40	4122	NIL	28692.20	20	12.19+2.5= 14.69	97.59+14.69=112 12.28 or say	101	-11	94

2.8.0 SSE/P.WAY BNN

Gang strength as per MCNTM formula
Annual Avg. GMT-UP-10.56+DN-4.46= 07.51
Total track km =101.95 km
Track on PRC sleeper (Mechanized)=92.40 km
Track on other layout = 09.55
Mandays/km/year mechanized track:-
For activity 'T'=80+2.3 GMT
= 80+2.3x7.51 = 97.273 mandays/km/year
=97.273x92.40 = 8988.02 for 92.40 Km track
For activity 'R'=159x92.40=14691.60

Other layout and running yard lines 177x9.55 =1690.35 mandays/yr
Total activity 'T' for mechanized =8988.02 -do-
Total activity 'R' for mechanized =14691.60+1690.35
=16381.95 mandays/yr.

Activity miscellaneous 'M' length of LWR = 80 km

i)	Monsoon patrolling	= 5x4x10	= 200
ii)	Hot weather patrolling	= 30x80	= 2400
iii)	Cold weather patrolling	= 12x80	= 960
iv)	Vulnerable locations	= NIL	= NIL
v)	Waterman duty	= NIL	= NIL
vi)	Site store chowkidar	= 2x3x365	= 1460
	Total		= 4872

Activity site specific 'S':-

vii) Tunnel maintenance = NIL
viii) Bridge structure maintenance = NIL
ix) Long Girder Bridge maintenance = NIL
x) Extra for every sharp curve = NIL
xi) Extra for bad formation = NIL
xii) Look out man duty = NIL
xiii) For signal men duty 1st year 2nd Year 3rd year Avg. of three years=NIL
xiv) Security patrolling 1st year 2nd Year 3rd year Avg.of three yr=NIL

T	R	M	S	Total T+R+ M+S	No of mates & Keyman	LR	Calculated gang strength	S/ S	Surplus + Short -	On roll staff
8988.02	16381.95	5020	NIL	30389.97	22	12.92+2.75=15 .67	103.36+ 15.67= 119.03 or say 119	139	20	117

2.9.0 SSE/USFD BTI:

JE/BTI is functioning for detecting of flaw, crack in the track and joints build up by the Thermit Welding Plant. Their schedule and frequency of checking is fixed keeping in view the aspect. The checking detail as per USFD manual is as under:-

GMT	Frequency
Upto 5	24 months
>5 upto 8	12 months
>8 upto 12	9 months
>12 upto 16	6 months
>16 upto 24	4 months
>24 upto 24	3 month
>40 upto 60	2 months
>60 upto 80	1.5 months
>80	1 month

ALUMINUM THERMIT WELDING (ATW TESTING) SKV

Acceptance test	Immediately after test
First periodic test	01 year
Further tests	Based on GMT
>45	24 months
>30 upto 45	36 months
>15 upto 30	48 months
Upto 15	60 months

WORKLOAD

Following is the jurisdiction of MIC BTI

DLI-BTI	S/L	79.1 to 173.38 km		Total 964.642 km during 2014-15
BTI-SGNR	"	79.1 to 125	km	
LDH-DUI	"	4.0 to 61.990 km		
DUI-JHL	"	61.990 to 127.120	km	
JHL-HSR	"	1.160 to99.40 km		

PROPOSED REQUIREMENT OF STAFF

At present, 5 trackman are deputed to cope up the existing workload. But this matter was discussed at various level and the JE Incharge/USFD apprised the work study team that the existing on roll staff is in sufficient to cope up the existing workload and demanded 5 more trackman for handling the USFD machine. The work study also proposed 10 trackman including LR. Therefore the proposed requirement comes to =10.

2.10.0 SSE/P.WAY- PTA

Gang strength as per MCNTM formula
Annual Avg. GMT-UP-10.75+DN-7.13=08.94
Total track km =93.407 km
Track on PRC sleeper (Mechanized) =67.06 km
Track on other layout =26.347 km
Including running yard line etc.
Mandays/km/year mechanized track:-
For activity 'T'=80+2.3 GMT
= 80+2.3x8.94 = 100.502 mandays/km/year
= 100.562x67.06 = 6743.68 for 67.06 Km track
For activity 'R'=159x67.06=10662.570

Other layout and running yard lines 177x26.347=4663.42 mandays/yr
Total activity 'T' for mechanized =6743.68 mandays/yr
Total activity 'R' for mechanized =10662.57+4663.42
=15325.96 mandays/yr.

Activity miscellaneous 'M' length of LWR = 54.325 km

i)	Monsoon patrolling	= 1780	= 1780
ii)	Hot weather patrolling	= 30x54.325	=1629.75
iii)	Cold weather patrolling	= 12x54.325	= 651.90
iv)	Vulnerable locations		= NIL
v)	Waterman duty		= NIL
vi)	Site store chowkidar	= 2x2x365	= 1460
	Total		= 5522.45

Activity site specific 'S':-

vii)	Tunnel maintenance	= NIL
viii)	Bridge structure maintenance	= NIL
ix)	Long Girder Bridge maintenance 0.64x286.27x1	= 183.21
x)	Extra for every sharp curve 1x4711x294	= 432.47
xi)	Extra for bad formation	= NIL
xii)	Look out man duty	= NIL
xiii)	For signal men duty 1st year 2nd Year 3rd year Avg. of three years	=NIL
xiv)	Security patrolling 1st year 2nd Year 3rd year Avg. of three yr	=NIL
	Total	=615.68

T	R	M	S	Total T+R+M+S	No of mates & Keyman	LR	Calculated gang strength	S/S	Surplus + Short -	On roll staff
6743.68	15325.96	5522.45	615.68	28207.77	24	11.99+3=14.99	95.94+14.99=110.93 ors ay 111	122	+11	98

2.11.0 SSE/P.Way DUI

Gang strength as per MCNTM formula

Annual avg. GMT=LDH-DUI Sect. UP-10.75 DN-7.13 Avg. 9.67

DUI-JHL Sect. UP- 2.15 DN-4.00 Avg. 3.07

Total track kilometer = 154.11 km

Track on PRC sleeper= 119.760 km LDH-DUI Sect. 55.800 km

DUI-JHL Sect. 63.960 km

Track on other layouts including Running yard line= 34.350 km

Mandays/km/year mechanized track:-

Activity 'T' for LDH-DUI section with annual avg. GMT 9.67

For activity 'T'=80+2.3xGMT

= 80+2.3x9.67= 102.241 mandays/km/year

= 102.241x55.800=5705.048 mandays/year

Activity 'T' for DUI-JHL Section with annual Avg. GMT= 3.07

'T'= 80+2.3xGMT

= 80+2.3x3.07=87.06 mandays/km/yr

= 87.06x63.960= 5568.36

Activity R= 159x119.760 = 19041.84 mandays/year

Activity R for other layouts= 177x34.75= 6079.95

Total Activity T= 5705.048+5568.36= 11273.40 mandays/yr

Total Activity R= 19041.84+6079.95= 25121.79 mandays/yr

Activity miscellaneous 'M' length of LWR = 113.299 km

i)	Monsoon patrolling	= 3592.80	= 3592.80
ii)	Hot weather patrolling	= 30x113.299	= 3498.97
iii)	Cold weather patrolling	= 12x113.299	= 1359.59
iv)	Vulnerable locations	= NIL	= NIL
v)	Waterman duty	= NIL	= NIL
vi)	Site store chowkidar	= 2x2x365	= 1460
	Total		= 9681.36

Activity site specific 'S':-

vii) Tunnel maintenance = NIL

viii) Bridge structure maintenance = NIL

ix) Long Girder Bridge maintenance 0.64x365.28x1= 233.77

x) Extra for every sharp curve = NIL

xi) Extra for bad formation = NIL

xii) Look out man duty = NIL

xiii) For signal men duty 1st year 2nd Year 3rd year

1440 1522 1584

Avg. of three years =1515

xiv) Security patrolling 1st year 2nd Year 3rd year Avg. of three yr=NIL

total 1748.77

T	R	M	S	Total T+R+ M+S	No of mates & Keyman	LR	Calculated gang strength	S/ S	Surplus + Short -	On roll staff
11273.40	25121.79	9681.36	1748.77	48555.39	34	20.64+4.25=24.89	165.15+24.89= 190.04 or say 190	192	+2	154

2.12.0 SSE/P.WAY UKN

Gang strength as per MCNTM formula
Annual Avg. GMT = 3.07
Total track km =92.438 km
Track on PRC sleeper (Mechanized)=84.691 km
Track on other layout including =7.747 km
Running yard line etc.
Mandays/km/year mechanized track:-
For activity 'T'=80+2.3xGMT
= 80+2.3x3.07 = 87.06 mandays/km/year
= 87.06x84.691 =7373.19 for 84.691 Km
For activity 'R'=159x84.691 =13465.87 track

Other layout and running yard lines 177x7.747 =1371.22 mandays/yr
Total activity 'T' for mechanized =7975.18 mandays/yr
Total activity 'R' for mechanized =13465.87+1371.22
=14837.09 mandays/yr.

Activity miscellaneous 'M' length of LWR = 75.714 km

i)	Monsoon patrolling	= 450	= 450
ii)	Hot weather patrolling	= 30x75.714	= 2271.40
iii)	Cold weather patrolling	= 12x75.714	= 908.57
iv)	Vulnerable locations	=	= 156
v)	Waterman duty	= NIL	= NIL
vi)	Site store chowkidar	= 2x2x365	= 1460
	Total		= 5245.97

Activity site specific 'S':-

vii)	Tunnel maintenance	= NIL
viii)	Bridge structure maintenance	= NIL
ix)	Long Girder Bridge maintenance	= 122
x)	Extra for every sharp curve	= NIL
xi)	Extra for bad formation	= 180
xii)	Look out man duty	= NIL

xiii) For signal men duty 1st year 2nd Year 3rd year
40 46 42
Avg. of three years =43

xiv) Security patrolling 1st year 2nd Year 3rd year Avg. of three yr=NIL
Total 345

T	R	M	S	Total T+R+ M+S	No of mates & Keyman	LR	Calculated gang strength	S/ S	Surplus + Short -	On roll staff
7373.19	14837.09	5245.97	345	27801.25	21	1182+2.62=14.44	94.56+14.44=109	113	+4	105

2.13.0 SSE/P.WAY- RPJ

Gang strength as per MCNTM formula
Annual Avg. GMT =65.72 (Main line)Annual Avg. GMT S/L= 894
Total track km =225.477 km
Track on PRC sleeper (Mechanized)=126.507 km 103.507 main line
+ 23.00 S/L
Track on other layout including = 98.97 km
Running yard lines etc.
Mandays/km/year mechanized track:-
For activity 'T'=80+2.3 GMT
= 80+2.3x65.72 = 231.156 mandays/km/year
= 231.156x103.507= 23926.26 for 126.507 Km
For activity 'R'=159x126.507 = 20114.61 track

For S/L with GMT=8.94
'T'= 80+2.3 GMT
= 80+2.3x8.94 =100.562 mandays/km/yr
= 100.562x23km =2312.92
Other layout and running yard lines 177x98.97 =17517.69 mandays/yr
Total activity 'T' for mechanized =23926.26+2312.92 = 26239.18 -do-
Total activity 'R' for mechanized =20114.61+17517.69 =37632.30 -do-

Activity miscellaneous 'M' length of LWR =115.507 km

i) Monsoon patrolling = 200
ii) Hot weather patrolling = 30x115.507 =3465.21
iii) Cold weather patrolling = 12x115.507 =1386.02
iv) Vulnerable locations = 240
v) Waterman duty = NIL
vi) Site store chowkidar = 1x2x365 = 730
Total =6021. 23

Activity site specific 'S':-

vii) Tunnel maintenance = NIL
viii) Bridge structure maintenance = NIL
ix) Long Girder Bridge maintenance = 471
x) Extra for every sharp curve = 294
xi) Extra for bad formation = NIL
xii) Look out man duty = NIL
xiii) For signal men duty 1st year 2nd Year 3rd year
Avg. of three years = NIL
xiv) Security patrolling 1st year 2nd Year 3rd year Avg. of three yr=26
24 28 26
Total =791

T	R	M	S	Total T+R+ M+S	No of mates & Keyman	LR	Calculated gang strength	S/ S	Surplus + Short -	On roll staff
26239,18	37632.3	6021.23	791	70683.77	16	30.05+2= 32.05	240.42+32.05=2 72.47 or say 272	213	-59	211

2.14.0 SSE/P.WAY- CDG

Gang strength as per MCNTM formula
Annual Avg. GMT =643
Total track km =100 km
Track on PRC sleeper (Mechanized)=73.00
Track on other layout including = 27.00
Running yard lines etc.
Mandays/km/year mechanized track:-
For activity 'T'=80+2.3 GMT
= 80+2.3x6.43 = 94.789 mandays/km/year
= 94.789x73 = 6919.60 for 73 Km
For activity 'R'=159x73 = 11607 track

Other layout and running yard lines 177x27= 4779 mandays/yr
Total activity 'T' for mechanized = 6919.60 mandays/yr
Total activity 'R' for mechanized =11607+4779 16386 mandays/yr

Activity miscellaneous 'M' length of LWR=40 km

i) Monsoon patrolling = 1920 =1920
ii) Hot weather patrolling = 30x40 =1200
iii) Cold weather patrolling = 12x40 = 480
iv) Vulnerable locations = 4x2x30 = 240
v) Waterman duty = NIL = NIL
vi) Site store chowkidar = 2x2x365 = 1460
Total = 5300

Activity site specific 'S':-

vii) Tunnel maintenance = NIL
viii) Bridge structure maintenance = NIL
ix) Long Girder Bridge maintenance 0.64x1000 = 640
x) Extra for every sharp curve 1x294 = 294
xi) Extra for bad formation = NIL
xii) Look out man duty = NIL
xiii) For signal men duty 1st year 2nd Year 3rd year
Avg. of three years = NIL
xiv) Security patrolling 1st year 2nd Year 3rd year Avg. of three yr=200
200 200 200
Total= 1134

T	R	M	S	Total T+R+ M+S	No of mates & Keyman	LR	Calculated gang strength	S/ S	Surplus + Short -	On roll staff
6919.60	16386	5300	1134	29735.60	19	12.64+2.37=15 .01	101.14+15.01= 116.15or say 116	114	-2	113

2.15.0 SSE/P.WAY- SASN

Gang strength as per MCNTM formula
Annual Avg. GMT =2.22
Total track km =48.80 km
Track on PRC sleeper (Mechanized) =47.00 km
Track on other lout including = 1.8 km
Running yard line etc.
Mandays/km/year mechanized track:-
For activity 'T'=80+2.3 GMT
= 80+2.3x2.2 = 85.06 mandays/km/year
= 85.06x47 = 3997.826 for 47 Km
For activity 'R'=159x47 = 7473 track

Other layout and running yard lines 177x1.80 = 318.6 mandays/yr
Total activity 'T' for mechanized = =3997.82mandays/yr
Total activity 'R' for mechanized =7473+318.6=7791.6 mandays/yr

Activity miscellaneous 'M' length of LWR =27 km

i) Monsoon patrolling = 8kmx30daysx2x4 = 1920
ii) Hot weather patrolling = 30x27 = 810
iii) Cold weather patrolling = 12x27 = 324
iv) Vulnerable locations = 2x2x30 = 120
v) Waterman duty = NIL = NIL
vi) Site store chowkidar = 2x2x365 = 1460
Total = 4634

Activity site specific 'S':-
vii) Tunnel maintenance = NIL
viii) Bridge structure maintenance = NIL
ix) Long Girder Bridge maintenance 0.64x315x1 = 201
x) Extra for every sharp curve 2.953kmx294 = 868.18
xi) Extra for bad formation = NIL
xii) Look out man duty = NIL
xiii) For signal men duty 1st year 2nd Year 3rd year Avg. of three years=NIL
xiv) Security patrolling 1st year 2nd Year 3rd year Avg. of three yr=NIL
Total 1069.18

T	R	M	S	Total T+R+ M+S	No of mates & Keyman	LR	Calculated gang strength	S/ S	Surplus + Short -	On roll staff
3997.82	7791.6	4634	1069.18	17492.60	5	7.43+0.62=8.05	59.49+8.05=65.54 or say 66	62	-4	49

2.16.0 SSE/P.WAY UMB

Gang strength as per MCNTM formula

Annual Avg. GMT SRE-UMB = 32.35
UMB-RPJ = 62.72 } Main line
DUK = 32.25
UMB-KLK = 6.43 = S/L

Total track kilometers = 235.62 km
Track on PRC sleeper = 82.70 km
Track on other layout =139.58 km
Track on conventional maint. = 13.34 km
Section wise track kilometer
SRE-UMB= 236 km to 264.70 km= 28.7 km x2= 57.4 km
UMB-RPJ = 262 km to 264.70 km = 2.7 km x2= 05.4 km
DUK =189.2 km to 197.5 km = 8.3 km x2= 16.6 km
UMB-KLK =197.5 to 200.8(SL) = 3.3 = 3.3 km
=82.7 km

Mandays/km/yr for mechanized track
SRE-UMB Section= Activity T= 80+2.3xGMT mandays/km/yr
= 80+2.3x32.25= 154.175 mandays/km/yr
=154.175x57.4 km=8849.65 mandays/yr
UMB-RPJ Section Activity T= 80+2.3xGMT mandays/km/yr
= 80+2.3x62.72= 224.26 mandays/km/yr
=224.26x5.4 km=1211.00 mandays/yr
DUK- Section Activity T= 80+2.3xGMT mandays/km/yr
= 80+2.3x32.25= 154.175 mandays/km/yr
=154.175x16.6 km=2559.30 mandays/yr
UMB-KLK Section Activity T= 80+2.3x GMT mandays/km/yr
= 80+2.3x6.43 = 94.79 mandays/km/yr
=94.79+3.3 km =312.80 mandays/yr

Total Activity 'T' 8849.65+1211.00+2559.30+312.80= 12932.76 mandays/yr
Activity R=177x139.58 = 24705.66 mandays/yr
Activity R for conven. = 297 mandays/km/yr
-do- =297x13.34 =3961.98 mandays/yr
Total Activity R= 24705.66+3961.98= 28667.64 mandays/yr

Activity miscellaneous 'M' length of LWR =86.48 km

i) Monsoon patrolling = 2400
ii) Hot weather patrolling = 30x82.7 = 2481.00
iii) Cold weather patrolling = 12x82.7 = 992.40
iv) Vulnerable locations = 2x2x30 = 120
v) Waterman duty = NIL
vi) Site store chowkidar = 1x2x365 = 1460
Total = 7253.40

Activity site specific 'S':-
vii) Tunnel maintenance = NIL
viii) Bridge structure maintenance = NIL
ix) Long Girder Bridge maintenance
x) Extra for every sharp curve

$=3^0$ =1000 mtr
$=2^0$=875x4=3500 mtr =4.5km x365 =1642

xi) Extra for bad formation = NIL

xii) Look out man duty 4x60 = 240

xiii) For signal men duty 1st yr 900, 2nd yr 900, 3rd yr 900 Avg. =900

xiv) Security patrolling 1st year 20 2nd Year 18 3rd year 20 Avg. of three yr=19

Total 2801

T	R	M	S	Total T+R+ M+S	No of mates & Keyman	LR	Calculated00 gang strength	S/ S	Surplus + Short -	On roll staff
12932.76	28667.64	7253.40	2801	51654.80	26	21.96+3.25=25.21	175.69+ 25.21=200.90 or say 201	291	+90	283

2.17.0 USFD-UMB

For the ease of work UMB division is divided into USFD-I, II, III & IV and supervised by the SSE/SE, USFD in their respective jurisdiction. The frequency of testing depends upon the GMT of the section

Staff position

S.Nio.	SSE/USFD	S/S	O/R	Var.
1	USFD/SSE-UMB-I	-	05	-
2	USFD/SSE-UMB-II	-	07	-
3	USFD/SSE-UMB-III	-	08	-
4	USFD/SSE-UMB-IV		08	
Total		11	28	+17

2.17.1 WORKLOAD

S.N	SSE/USFD/ UMB	Section	KM		GMT			Frequency of testing in months			Total testing
			From	To	UP	DN	SL	UP	DN	SL	
1	SSE/USFD-UMB-I	UMB-RPJ	279	290	72.96	58.47	-	1.5	2	-	-945 km – 865 km
2		RPJ-SIR	290	315	62.89	52.19	-	1.5	2	-	
		SIR-LDH	315	333	44.37	41.03	-	2	2	-	
		UMB-RPJ	Loop lines		72.96	58.47	-	1.5	2	-	
		RPJ-SIR	Loops RPJ, SBJ SOY		62.89	52.19	-	1.5	2	-	
		SIR-LDH	Loops (SIR, GVG)		44.37	41.03	-	2	2	-	
	S/L	RPJ-DUI	O	0.8	-	-	17.85	-	-	4	
		NMDA	44	95	-	-	-	-	-	-	
2	SSE/USFD-UMB-II	KLK-SML	%	96/0	0.52	0.52	-	-	-	-	9945 km
		SRE-UMB	180/790	261/961	33.52	30.98	-	-	-	-	
		MB-SRE	1584/660	1590/651	36.55	24.96	-	-	-	-	
		DLI-SRE	176/300	180/790	11.40	10.09	-	-	-	-	
3	SSE/USFD/ UMB-III	SIR-LDH	333	359	44.37	41.03	-	2	2	-	996 km
		SIR-LDH	Loop BNN, CHA, DOA Yd.	44.37	41.03	-	2	2	-		
		RPJ-DUI	50	79	-	-	17.85	-	-	4	
		SIR-NLDM	0	20	-	-	19.40	-	-	4	-
		SIR-NLDM	20	67	-	-	19.40	-	-	4	
		SIR-NLDM	67	104	-	-	19.40	-	-	4	
		NLDM-AADR	104	1048	-	-	44	-	-	27	
		API-DUI	Loops line		-	1	17.19	-	-	4	
		SIR-NLDM	-do-		-	-	19.4	-	-	4	
4	SSE/USFD-UMB-IV										

2.17.2 PROPOSED REQUIREMENT OF STAFF

At present 5,7,8,8 trackmen are working under USFD/SSE-UMB-I, II, III & IV respectively. A total of 28 track men against the sanction strength of 11 and 17 trackmen are short. The work study team proposed 22 trackmen after discuss at various level. The proposed requirement comes to 22 trackmen including LR .

2.18.0 UMB TD

Track Depot/UMB is functioning as a store for various SSE/P.Way over UMB Division and procure material as per requirement of the entire division related to P.Way. The material list is hereby attached as Annexure No.V in the work study report. At present 16 trackmen are working to cope up the existing workload. The requirement of trackman discussed at various level and it was found sufficient and may continue.

2.19.0 SSE/P.WAY- SIR

Gang strength as per MCNTM formula

Annual Avg. GMT Main line =57.54,

Annual Avg.GMT branch line SIR-NLDM=9.52

Total track km =88.503 km

Track on PRC sleeper (Mechanized) =26.473 km (Main line)
=39.00 km (Branch line) = } 65.473 km

Track on other layout = 16.64 km

Conventional charges = 6.39 km

Mandays/km/year mechanized track(Main line)

For maintaining activity 'T'=80+2.3 GMT

= 80+2.3x57.54 = 212.342 mandays/km/year

= 212.342x26.473= 5621.33 for 26.473 Km

For branch line SIR-NLDM

Activity T = 80+2.3 GMT

= 80+2.3x9.52 = 101.16 mandays/km/yr for 39 km

= 101.16x39 = 3945.24 mandays/km/yr track

For activity 'R'=159x65.473 =10410.21 mandays/km/yr

For conventional layouts

'R' =297x6.39 =1897.83 for 6.39 track km

Other layout and running yard lines 177x16.64 =2945 mandays/yr

Total activity 'T' for mechanized =5621.33+3945.24=9560.57 mandays/yr

Total activity 'R' for mechanized =10410.21+1897.83=15253.32 mandays/yr

Activity miscellaneous 'M' length of LWR =48.756 km

i) Monsoon patrolling = 2x22x30 = 1320

ii) Hot weather patrolling = 30x48.756 = 1462.68

iii) Cold weather patrolling = 12x48.756 = 585.07

iv) Vulnerable locations = NIL = NIL

v) Waterman duty = NIL = NIL

vi) Site store chowkidar = 2x3x365 = 1460

Total = 4827.75

Activity site specific 'S':-

i) Tunnel maintenance = NIL

ii) Bridge structure maintenance = NIL

iii) Long Girder Bridge maintenance = 140.80

iv) Extra for every sharp curve 294x.33km = 97.02

v) Extra for bad formation = NIL

vi) Look out man duty 6x30 = 180

vii) For signal men duty 1st year 2nd Year 3rd year Avg.
Avg. of three years =NIL

viii) Security patrolling 1st year 2nd Year 3rd year Avg. of three yr=12
12 10 12 Total 429.82

T	R	M	S	Total T+R+ M+S	No of mates & Keyman	LR	Calculated gang strength	S/ S	Surplus + Short -	On roll staff
9566.57	15253.32	4827.75	429.82	30077.46	18	12.78+2.25=15.03	102.30+15.03=117 17.33 or say	131	+14	125

2.20.0 SSE/P.WAY- RPAR

Gang strength as per MCNTM formula
Annual Avg. GMT =9.52
Total track km =132.11 km
Track on PRC sleeper (Mechanized)=72.13 km
Track on other layout = 14.75 km
Track on conventional = 45.23 km

Mandays/km/year mechanized track:-

For activity 'T'=80+2.3xGMT
= 80+2.3x9.52 = 101.90 mandays/km/year
= 101.90x72.13 =7350.05 for 72.13 Km track
For activity 'R'=159x72.13 =11468.67

Other layout and running yard lines 177x14.75 =2610.75 mandays/yr
For conventional R 297x45.23 =13433.31mandays/yr
Total activity 'T' for mechanized = 7350.07mandays/yr
Total activity 'R' for mechanized =11468.67+2610.75+13433.31
= 27512.73 mandays/yr

Activity miscellaneous 'M' length of LWR =58.97 km

i) Monsoon patrolling = 16x90 =1440
ii) Hot weather patrolling = 30x58.97 =1769.1
iii) Cold weather patrolling = 12x58.97 = 707.64
iv) Vulnerable locations = 6x90 = 540
v) Waterman duty = NIL
vi) Site store chowkidar = 2x2x365 = 1460
Total = 5916.74

Activity site specific 'S':-

vii) Tunnel maintenance = NIL
viii) Bridge structure maintenance = 1152
ix) Long Girder Bridge maintenance = 2520
x) Extra for every sharp curve 10x2x12 = 240
xi) Extra for bad formation = NIL
xii) Look out man duty 4x294 =1176
xiii) For signal men duty 1st year 2nd Year 3rd year
Avg. of three years=NIL
xiv) Security patrolling 1st year 2nd Year 3rd year Avg. of three yr=
300 300 300 =300
Total =5388

T	R	M	S	Total T+R+ M+S	No of mates & Keyman	LR	Calculated gang strength	S/ S	Surplus + Short -	On roll staff
7350.05	27512.73	6096.74	5388	46347.52	27	19.62+3.37=22.99	157.03+22.99=180.02 sa7 180	170	-10	150

2.21.0 SSE/P.WAY DOA

Gang strength as per MCNTM formula
Annual Avg. GMT =42.7
Total track km =109.24 km
Track on PRC sleeper (Mechanized)=86.48 km
Track on other layout including
Running yard line etc. =22.76 km
Mandays/km/year mechanized track:-

For activity 'T'=80+2.3xGMT
= 80+2.3x42.7 =178.21 mandays/km/yr
= 178.21x86.48 =15411.60 mandyas/km/yr for 86.48
For activity 'R'=159x86.48 =13750.32 mandays/km/yr km track
Other layout and running yard lines 177x22.76=4028.52 mandays/yr
Total activity 'T' for mechanized =15411.60 mandays.yr
Total activity 'R' for mechanized =13750.32+4028.52=17778.84 -do-

Activity miscellaneous 'M' length of LWR =75.36 km

i) Monsoon patrolling =90.
ii) Hot weather patrolling = 30x75.36 =2260.80
iii) Cold weather patrolling = 12x75.36 = 904.32
iv) Vulnerable locations = NIL = NIL
v) Waterman duty = NIL = NIL
vi) Site store chowkidar = 1x2x365 = 730
Total = 3985.12

Activity site specific 'S':-

vii) Tunnel maintenance = NIL
viii) Bridge structure maintenance = 210
ix) Long Girder Bridge maintenance = 140
x) Extra for every sharp curve = NIL
xi) Extra for bad formation = NIL
xii) Look out man duty = 1070
xiii) For signal men duty 1st year 2nd Year 3rd year
Avg. of three years = NIL
xiv) Security patrolling 1st year 2nd Year 3rd year Avg.of three yr=NIL
Total = 1420

T	R	M	S	Total T+R+ M+S	No of mates & Keyman	LR	Calculated gang strength	S/ S	Surplus + Short -	On roll staff
15411.60	17778.84	3985.12	1420	38595.56	15	16.40+1.87=18 .27	131.27+ 18.27= 149.54 or say 150	125	-25	115

2.22.0 SSE/P.WAY- SMRL

Gang strength as per MCNTM formula
Annual Avg. GMT =2.22
Total track km =60.58 km
Track on PRC sleeper (Mechanized)=55.95
Track on other layout including
Running yard line etc. = 4.63 km
Mandays/km/year mechanized track:-
For activity 'T'=80+2.3 GMT
= 80+2.3x2.22 = 85.106 mandays/km/year
= 85.106x55.95 =4761.68 mandays/yr for 55.95km track
For activity 'R'=159x55.95 =8896.05 mandays/yr
Other layout and running yard lines 177x4.63=819.51 mandays/yr
Total activity 'T' for mechanized = 4761.68 mandays/yr
Total activity 'R' for mechanized =8896.05+819.51=9751.56 mandays/yr

Activity miscellaneous 'M' length of LWR =48.75 km

i)	Monsoon patrolling	= 4x5x45	= 900
ii)	Hot weather patrolling	= 30x48.75	=1462.5
iii)	Cold weather patrolling	= 12x48.75	= 585
iv)	Vulnerable locations	=	= 540
v)	Waterman duty	= NIL	= NIL
vi)	Site store chowkidar	= 1x2x365	= 730
	Total		=4217.5

Activity site specific 'S':-

vii)	Tunnel maintenance	= NIL
viii)	Bridge structure maintenance	= NIL
ix)	Long Girder Bridge maintenance 347x4	=1388
x)	Extra for every sharp curve 14x365	= 5110
xi)	Extra for bad formation	= 50
xii)	Look out man duty	= NIL

xiii) For signal men duty 1st year 2nd Year 3rd year
Avg. of three years =NIL

xiv) Security patrolling 1st year 2nd Year 3rd year Avg. of three yr=140
140 140 140

Total =6688

T	R	M	S	Total T+R+M+S	No of mates & Keyman	LR	Calculated gang strength	S/S	Surplus + Short -	On roll staff
4761.68	9715.56	4217.50	6688	25382.74	7	10.79+0.87=11.66	86.33+11.66 =97.88 or say 98	86	-12	62

2.23.0 SSE/P.WAY- SRE

Gang strength as per MCNTM formula
Annual Avg. GMT =32.25
Total track km =131.499 km
Track on PRC sleeper (Mechanized)=54.909 km
Track on other layout including
Running yard line etc. = 57.59 km
On conventional = 19 km
Mandays/km/year mechanized track:-
For activity 'T'=80+2.3xGMT
= 80+2.3x32.25 =154.175 mandays/km/year
= 154.175x54.909 =8465.60 for 54.909 Km track
For activity 'R'=159x54.909 =8730.53

Other layout and running yard lines 177x57.49=10175.73 mandays/yr
R for conventional track 297x19 =5643 mandays/yr
Total activity 'T' for mechanized = 8465.60 mandays/yr
Total activity 'R' for mechanized=8730.53+10175.73+5643=24549.26-do-

Activity miscellaneous 'M' length of LWR =29.419 km

i)	Monsoon patrolling	=	=720
ii)	Hot weather patrolling	= 30x29.419	=882.57
iii)	Cold weather patrolling	= 12x29.419	=353.03
iv)	Vulnerable locations		= 365
v)	Waterman duty		= NIL
vi)	Site store chowkidar	= 1x2x365	= 730
	Total		= 3050.6

Activity site specific 'S':-

vii)	Tunnel maintenance	= NIL
viii)	Bridge structure maintenance	= 288
ix)	Long Girder Bridge maintenance	= NIL
x)	Extra for every sharp curve	= 192
xi)	Extra for bad formation	= 80
xii)	Look out man duty 2x365	= 730

xiii) For signal men duty 1st year 2nd Year 3rd year Avg.
120 120 120
Avg. of three years =120

xiv) Security patrolling 1st year 2nd Year 3rd year Avg. of three yr=NIL
Total 1410

T	R	M	S	Total T+R+ M+S	No of mates & Keyman	LR	Calculated gang strength	S/ S	Surplus + Short -	On roll staff
8465.60	24549.26	3050.6	1410	37475.43	17	15.93+2.12 =18.05	127.46+18.05= 145.51 or say 146	190	+44	179

2.24.0 SSE/P.WAY- JUD

Gang strength as per MCNTM formula
Annual Avg. GMT =32.25
Total track km =118.436 km
Track on PRC sleeper (Mechanized)=93.089km
Track on other layout including =25.347 km
Running yard line etc
Mandays/km/year mechanized track:-
For activity 'T'=80+2.3xGMT
= 80+2.3x32.25 = 154.175 mandays/km/year
= 154.175x93.089 = 14351.99 for 93.089 Km track
For activity 'R'=159x93.089 = 14801.15

Other layout and running yard lines 177x25.347=4486.42 mandays/yr
Total activity 'T' for mechanized =14351.99mandays.yr
Total activity 'R' for mechanized =14801.15+4486.42=19287.57 –do-

Activity miscellaneous 'M' length of LWR =82.967 km

i) Monsoon patrolling = =1080
ii) Hot weather patrolling = 30x82.967 =2489.01
iii) Cold weather patrolling = 12x82.967 = 995.60
iv) Vulnerable locations
Br.No.242 & 245 = 2x60+2x365 = 850.00
v) Waterman duty = NIL = NIL
vi) Site store chowkidar = 1x2x365 = 730
Total = 6164.61

Activity site specific 'S':-

vii) Tunnel maintenance = NIL
viii) Bridge structure maintenance = NIL
ix) Long Girder Bridge maintenance = NIL
x) Extra for every sharp curve = NIL
xi) Extra for bad formation km 223/6 to 224/6 1000x06=600
xii) Look out man duty = NIL
xiii) For signal men duty 1st year 2nd Year 3rd year Avg.
6x4x90=2160,6x4x70=1680, 6x4x80=1920

Avg. of three years =1920
xiv) Security patrolling 1st year 2nd Year 3rd year Avg. of three yr=26.60
24 30 26
Total = 2546.66

T	R	M	S	Total T+R+ M+S	No of mates & Keyman	LR	Calculated gang strength	S/ S	Surplus + Short -	On roll staff
14351.99	19287.57	6144.61	2546.66	42330.83	18	17.99+2.25=20 .24	143.98+ 20.24 =164.20 or say 164	160	-4	150

2.24.0 SSE/P.WAY- JUDW

Gang strength as per MCNTM formula
Annual Avg. GMT = NIL
Total track km = 74.70 km
Track on PRC sleeper (Mechanized)=NIL
Track on other layout including =74.70 km
Running yard line etc
Mandays/km/year mechanized track:-
For activity 'T' = NIL

Other layout and running yard lines 177x74.70=13221.9 mandays/yr
Total activity 'T' for mechanized NIL-
Total activity 'R' for mechanized = =13221.9 mandays/yr

Activity miscellaneous 'M' length of LWR =NIL

i) Monsoon patrolling =NIL
ii) Hot weather patrolling =NIL
iii) Cold weather patrolling =NIL
iv) Vulnerable locations =936
v) Waterman duty = NIL
vi) Site store chowkidar = NIL
Total = 936

Activity site specific 'S':-

vii) Tunnel maintenance = NIL
viii) Bridge structure maintenance = NIL
ix) Long Girder Bridge maintenance = NIL
x) Extra for every sharp curve = NIL
xi) Extra for bad formation = NIL
xii) Look out man duty = 588
xiii) For signal men duty 1st year 2nd Year 3rd year Avg.
Avg. of three years =NIL
xiv) Security patrolling 1st year 2nd Year 3rd year Avg. of three yr=NIL
Total 588

T	R	M	S	Total T+R+ M+S	No of mates & Keyman	LR	Calculated gang strength	S/ S	Surplus + Short -	On roll staff
NIL	13221.9	936	588	14745.9	NIL	6.26	50.15+6.26=56 .42 or say 56	40	-16	35

2.26.0 SSE/P.WAY- KLK

Gang strength as per MCNTM formula
Annual Avg. GMT =6.43 for B/G& 0.52 for NG
Total track km =84.88(BG1.69, NH=48.72
Other layout= 34.23)
Track on PRC sleeper (Mechanized) BG= 1.69 km
Track on other layout including BG =34.23 km
Running yard line etc

Mandays/km/year mechanized track for **Broad Gauge**:-
For activity 'T'=80+2.3xGMT
= 80+2.3x6.43 = 94.789 mandays/km/yr
= 94.789x1.69 = 160.19 mandays/km/yr
For activity 'R'=159x1.69 = 268.71 mandays/km/yr

Other layout and running yard lines 177x34.23=6058.71 mandays/yr
Total activity 'T' for mechanized =160.19 mandays/yr
Total activity 'R' for mechanized =268.71+6058.71=6327.42 mandays/yr
For **Narrow Gauge**
Track km = 4872 km
Manually maintenance for 1 km track of NG R required=271 mandays/yr
Total manday = 48.92x271 13203.12 mandays/yr for **NG**

Activity miscellaneous 'M' length of LWR =NIL

i) Monsoon patrolling = 15x120 =1800
ii) Hot weather patrolling =NIL
iii) Cold weather patrolling =NIL
iv) Vulnerable locations = 200
v) Waterman duty = NIL
vi) Site store chowkidar = 140
Total =2140

Activity site specific 'S':-

vii) Tunnel maintenance = 1220
viii) Bridge structure maintenance = 120
ix) Long Girder Bridge maintenance = NIL
x) Extra for every sharp curve = 2205
xi) Extra for bad formation = 100
xii) Look out man duty = 100
xiii) For signal men duty 1st year 2nd Year 3rd year Avg.
28 30 34
Avg. of three years = 31
xiv) Security patrolling 1st year 2nd Year 3rd year Avg. of three yr=NIL
Total= 3736

T	R	M	S	Total T+R+ M+S	No of mates & Keyman	LR	Calculated gang strength	S/ S	Surplus + Short -	On roll staff
160.19	6327.42 BG+ 13203.12 NG Total 19530.54 NG	2140	3736	25566.73	12	10.87+1.50= 12.37	86.96+12.37=99.33 or say 99	84	-15	70

2.27.0 SSE/P.WAY- SML/NG

Gang strength as per MCNTM formula

Annual Avg. GMT = 0.52

Total track km = 58.75 km

Track on steel sleeper = 50.22 km

Track on other layout including

Running yard line etc = 8.53 km

Mandays/km/year manually maintenance of NG:-

For activity R= 271 manday s/km for 50.22 track

= 271x50.22= 13609.62 mandays/km km NG

Other layout and running yard lines 153x8.53=1305.09 mandays/yr

Total activity 'T' for mechanized NIL-

Total activity 'R' for manual =13609.62+1305.09=14914.71 mandays/yr

Activity miscellaneous 'M' length of LWR =NIL

i) Monsoon patrolling =2x30x16 =960

ii) Hot weather patrolling =NIL

iii) Cold weather patrolling =NIL

iv) Vulnerable locations =640

v) Waterman duty =NIL

vi) Site store chowkidar = 2x1x365 =730

Total =2330

Activity site specific 'S':-

vii) Tunnel maintenance =522

viii) Bridge structure maintenance =100

ix) Long Girder Bridge maintenance = NIL

x) Extra for every sharp curve =3455

xi) Extra for bad formation = 90

xii) Look out man duty = 100

xiii) For signal men duty 1st year 2nd Year 3rd year

Avg. of three years = NIL

xiv) Security patrolling 1st year 2nd Year 3rd year Avg. of three yr =30

25 30 32

Total= 4297

T	R	M	S	Total T+R+ M+S	No of mates & Keyman	LR	Calculated gang strength	S/ S	Surplus + Short -	On roll staff
	14914.71	2330	4297	21541,71	12	9.75+1.5= 10.55	73.27+10.55 =83.92 or say 84	91	+7	74

2.28.0 ADEN WISE AND SSE/P.Way wise, the summarized position of existing S/S proposed staff and surplus/required position of trackman over UMB Division is given below:-

S.No.	ADEN	SSE/P.Way	S/S	Proposed staff	Surplus /+ Required
1	BTI	BTI	171	148	+23
		ABS	101	112	-11
		BNN	139	119	+20
		USFD/BTI	09	10	-1
2	PTA	PTA	122	111	+11
		DUI	192	190	+2
		UKN	113	109	+4
3	RPJ	RPJ	213	272	-59
4	CDG	CDG	114	116	-2
		SASN	62	66	-4
5	UMB	UMB	291	201	+90
		USFD/UMB	11	22	-11
		T.D/UMB	16	16	-
6	SIR	SIR	131	117	+14
		RPAR	170	180	-10
		DOA	125	150	-25
		SMRL	86	98	-12
7	SRE	SRE	190	146	+44
		JUD	160	164	-4
8	JUDW	JUDW	40	56	-16
9	SML	KLK	84	99	-15
		SML	91	-84	+7
Total			2631	2586	+45

I) The above table reveals that the proposed requirement of trackman comes to 2586 against the sanctioned strength of 2631 posts thus 45 posts of trackman are identified as surplus and recommended for surrender.

II) In the existing set up the sanctioned strength and on roll position are 2631 & 2367 respectively and 264 posts are lying vacant. After analyzing the data and taking working condition into consideration, the team proposes 2586 posts of trackman where as the on roll staff is only 2367.

RECOMMENDATION NO.1

It is proposed that **45** posts of trackman Gr. ₹ 5200-20200-1800 identified as surplus under the control of Sr.DEN/C/UMB over Ambala Division be surrendered.

3.0.0 FINANCIAL IMPLICATIONS

After the implementation of the work study recommendations following are the financial implications.

SN	Category	Grade Rs.	Refer Recom. No.	No. of surplus posts	Monthly value per posts Rs.	Anticipated annual recurring saving Rs.
1	Trackman	5200-20200+ 1800	1	45	24278	1,31,10,120/-
		Total		45	24278	1,31,10,120/-

No. of posts identified as surplus: -

Group 'C'= NIL posts
Group 'D'= 45 posts
Total = 45 posts

Anticipated recurring saving = ₹ 131.10 lakh per annum
Capital saving = Nil
Total saving = ₹ 131.10 lakh per annum

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4.0.0 PRODUCTIVITY

4.1.0 The total annual expenditure on the sanctioned strength of P.Way staff working under SSE/P.Way controlled by Sr.DEN/C/UMB over UMB Division is tabulated as under:-

SN	Category	Pay Scale + Grade Pay	Monthly value per posts	Sanctioned strength	Total annual expenditure
1	Trackman	5200-20200+1800	24278	2631	766505016/-
	Total			2631	766505016/-

The above table reveals that Ambala division is expending ₹766505016/- on the sanctioned posts of 2631 trackman every year.

4.1.2. The annual expenditure on the proposed staff working under SSE/P. Way controlled by Sr.DEN/C/UMB.

SN	Category	Pay Scale + Grade Pay	Monthly value per posts	Proposed staff	Total annual expenditure
1	Trackman	5200-20200+1800	24278	2586	753394896/-
	Total			2586	753394896/-

The above table reveals that after the implementation of the work study report, the expenditure on the proposed staff will come to ₹753394896/-Therefore the expenditure will be reduced from ₹766505016/- to ₹753394896/-

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WORK STUDY REPORT DETAILED CHART

Department : - Engineering

Name of study: - Review of P. Way staff working under SSE/P. Way controlled by Sr.DEN/C/UMB over Ambala Division.

Activity Centre : - BTI,ABS, BNN, PTA, DUI, UKN, RPJ, CDG, UMB, SIR, SRE, KLK, SML

SN	Sub activity	Brief description of workload	Actual staff deployed	Work Study recommendation	Representative workload
1	BTI, ABS, BNN, BNN, PTA, DUI, UKN, RPJ, CDG, UMB, USFD, TD UMB, SIR, RPAR, DOA, SAMRL, SRE, JUD, JUDW, KLK, SML etc.	Maintenance of track through various maintenance practices, security hot/cold patrolling, bad spots, welding, black smithy, watching and vulnerable locations etc.	S/S= 2631 O/R=2367 Vac =264	S/S =2631 posts Proposed staff= 2586 Surplus posts = +45	To maintain the track by adopting various activities of maintenance as per MCNTM formula.

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LIST OF ANNEXURES

S.N.	Description	Annex. No.
1	Letter of authority No. 16-CP/06/2021-22 dt. 09.04.2021.	I
2	Statement showing category wise, the sanctioned strength of P. Way staff working under SSE/P. Way controlled by Sr.DEN/C/UMB over Ambala Division	II
3	Statement showing workload of track kilometer being maintained by the track maintenance staff working under SSE/P. Way controlled by Sr.DEN/C/UMB over Ambala Division	III

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Annexure- No. I

Annexure- No. II

CATEGORY WISE AND GRADEWISE SANCTIONED AND ON ROLL POSITION OF TRACKMAN STAFF WORKING UNDER SSE/P.WAY OVER AMBALA DIVISION

S.No.	ADEN	SSE/P. Way	Grade in Rs. 5200-20200-1800		
			S/S	OR	Vac
1	BTI	BTI	171	134	37
		ABS	101	94	7
		BNN	139	117	22
		USFD/BTI	9	5	4
2	PTA	PTA	122	96	26
		DUI	192	154	38
		UKN	113	105	8
3	RPJ	RPJ	213	211	2
4	CDG	CDG	114	113	1
		SASN	62	49	13
5	UMB	UMB	291	283	8
		USFD/UMB	11	28	-17
		TD/UMB	16	16	0
6	SIR	SIR	131	127	4
		RPAR	170	150	20
		DOA	125	115	10
		SAMRL	86	62	24
7	SRE	SRE	190	179	11
		JUD	160	150	10
8	JUDW	JUDW	40	35	5
9	SML	KLK	84	70	14
		SML	91	74	17
TOTAL			2631	2367	264

Annexure- No. III

SN	ADEN	SSE (P.Way)	Track kilometer			Annual Average GMT
			On PRC sleeper in KM	On other lay outs in Km.	Total	
1	BTI	BTI	62.959	45.564+ 22.793	131.316	BTI=SGNR=4.95 DUI-BTI=7.51
		ABS	86.00	17.20	103.2	4.95
		BNN	92.40	9.55	101.95	7.51
		USFD-BTI	-	-	-	-
2	PTA	PTA	67.06	26.347	93.407	8.94
		DUI	133.760	20.35	154.11	DUI-LDH=9.67 JHL-DUI=3.07
		UKN	84.691	7.747	92.438	3.07
3	RPJ	RPJ	126.507	98.97	225.477	65.72
4	CDG	CDG	73.0	27.00	100.00	6.431
		SASN	47.00	1.80	48.8	2.22
5	UMB	UMB	82.7	139.58+ 13.34	235.62	JUD-SRE=32.25 UMB-RPS=65.72
		UMB-USFD	-	-	-	-
		TD/UMB	-	-	-	-
6	SIR	SIR	65.473	16.64+ 6.39	88.503	57.54
		RPAR	72.13	14.75+ 45.23	132.11	9.52
		DOA	86.48	22.76	109.24	42.70
		SMRL	55.95	4.63	60.58	2.22
7	SRE	SRE	54.909	57.59+19	131.499	32.25
		JUD	93.089	25.347	118.436	32.25
8	JUDW	JUDW	-	74.70	74.70	JUDW W/SHOP ONLY
9	SML	KLK	1.69	34.23+ 48.72 NG	84.64	BG=6.43 NG=0.52
		SML	NG 50.22	8.53	58.75	0.52

Salient features of work study report No. 16-CP-06/WS/2021-22

Sub: "Review of track maintainer staff working under SSE 'P' way controlled by Sr. DEN-C over Ambala Division"

1. Staff Position:

i)	Sanctioned strength	= 2631
ii)	On roll strength	= 2367
iii)	Vacancy	= 264
iv)	Proposed staff	= 2586
v)	Identified as surplus for surrender	= 45

The work study team has considered the GMT, Track kilometers, other layout and MCNTM committee formula while calculating the manpower.

2. Some of the track maintenance activities like thorough packing, deep screening, screening of ballast, tempting and lining work of track, spot tempting of concrete sleeper, tempting of newly laid turn outs, special SEJ, Glued joints, level crossing and curves etc; being maintained by track machines which was previously being done by trackmaintainer staff. Use of track machines has reduced the workload of track maintainer staff to great extent.

Financial implication:

Anticipated recurring saving	= ₹ 131.10 lakh per annum
Capital saving	= Nil
Total saving	= ₹ 131.10 lakh per annum