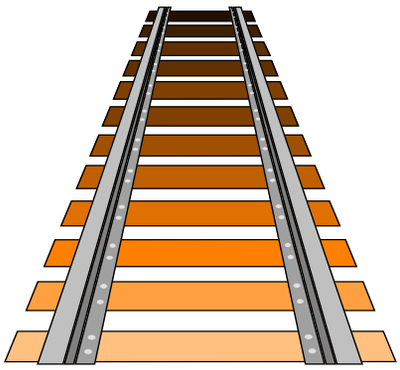

G.275/WSSR- 581718/2017-18

WORK STUDY TO REVIEW THE STAFF STRENGTH AT SSE/P.WAY/ERS TIRUVANANDAPURAM / DIVISION

SOUTHERN RAILWAY

PLANNING BRANCH

G.275/WSSR- 581718/2017-18

WORK STUDY TO REVIEW THE

STAFF STRENGTH AT SSE/P.WAY/ERS TIRUVANANDAPURAM DIVISION

STUDIED BY

WORK STUDY TEAM
OF
PLANNING BRANCH

MAY 2018

I N D E X

(i)
ACKNOWLEDGEMENT

The work study team sincerely acknowledges the valuable guidance and co-operation extended by ADEN/ERS & SSE/P.WAY/ERS in completing the study in time.

(ii)
TERMS OF REFERENCE

Work study to review the staff strength at SSE/P.Way/ERS Section of TVC Division.

(iii)
METHODOLOGY

The work study team has applied the following techniques in conducting the work study.

(1) Collection and compilation of Data.
(2) Observation of present system of working.
(3) Interaction with ADEN/ERS & SSE/P.Way/ERS
(4) Analyzed the data collected and assessed the manpower requirement based on the TRMS formula of MCNTM and ground realities.

(iv)

SUMMARY OF RECOMMENDATIONS

Revised Recommendation 1 :

AS per CTE/MAS standing instruction 9 maintenance activities are to be outsourced in which already 2 being in progress (Casual Renewal of PSC & Cleaning debris). The total outsourcing of 9 maintenance activities will result in saving of 23 posts of track maintainer. Hence, Division is recommended to surrender 23 surplus posts and credit to vacancy bank on implementation of outsourcing all the 9 Maintenance activities.

No of Posts : 23

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CHAPTER - I

1.0 INTRODUCTION

1.1 ERNAKULAM JUNCTION

1.2 Ernakulam Junction Railway Station also known as Ernakulam South, is the biggest railway station in the city of Kochi in Kerala. Controlling 376 train routes at a time, it is the biggest and the busiest railway junction station in South India. With earning of Rs.158 crore, it is the second largest in terms of passenger revenues in Kerala and the fifth largest in Southern Railway. It is an A1 classified station operated by the Southern Railway and comes under the TVC Division.

1.3 Permanent Way is the major activity of the Engineering branch which is entrusted with the periodical maintenance of tracks, bridges, LC gates and other assets. A well maintained track is very essential for speedy, safety and efficient operation of trains. Continuous monitoring and Inspection is warranted daily in ensuring a reliable permanent way.

1.4 The modern technologies led the track maintenance techniques from the era of pick axe & shovel to the era of modern mechanized Track maintenance. The interconnection with S&T and TRD branches is a new development in the team work. The equipments for testing the track have become sophisticated not only in detecting the failures but also in preventive checks. It will be worth mentioning the use of Ultrasonic Flaw Detector (USFD) equipment which detects even the minute air crack and blowholes in the rail which might develop into a rail crack leading to derailments.

1.5 The magnitude of out source in maintenance activities paved way for a meticulous calculation to arrive at the manpower requirement in commensurate with the major developments taken place in the field of track maintenance.

1.6 The manpower requirements of SSE/PWI/ERS is arrived based on the TRMS formula of CMCNTM, approved by Railway Board vide letter No. 95/CE-1/CWS/2/Vol.II/Pt.II dt.06.03.2006, which recommends to incorporate the effects of modernization once in 5 years such as introduction of more number of shoulder ballast cleaners, improving rail-weld technology, better design of SEJs, maintenance free level crossing track structure.

1.7 Substantial investments on Track machines over the years to improve the quality of Track structure and curtailment in the need of its annual maintenance led to the reduction in the number of staff deployed on the track maintenance activities.

CHAPTER – II

2.0 PRESENT SCENARIO

2.1 Organization:

The Engineering department of TVC division is under the control of Sr.DEN/Co-ord/TVC. The Permanent Way section of ERS which is managed by SSE/PWI/ERS is under the direct & general control of ADEN/ERS.

SSE/P.Way/ERS has seven section having the jurisdiction in the IPL-ERS section from km 102/050 to 106/00, ERS-CHTS section from Km 106/000-114/750, ERS-KUMM section 0/000-114/750 (S/L), ERS- KFE section from 0/000-2/000 (S/L), ERN- CRL Section , TRTR-IPN section from 0/000-2/880, ERM-ERG section 0/000-1/950. It covers a total track length (ETKM) of 178 km. The **ETKM** of 178 **kms** is maintained by 12 gang sections.

2.2 The brief outline of regular activities at P.Way /ERS is as under

- Picking of slacks
- Through packing
- Lubrication of Rail joints
- Clearing of water drains, side drains
- Waterways of bridges
- Casual renewal of Rails
- Casual renewal of Sleepers
- Opening & examining and overhauling of LC gates
- Attention to Points & Crossings

Activities other than regular duties

- Loading and unloading of materials
- Monsoon patrol
- Repair of bridges
- Stock verification
- Repair of ash pits, water columns, CC aprons etc
- Resurfacing of Points & crossings

- Complete realignment of curves
- Deep screening
- Painting of bridges
- Watching of materials
- Complete renewal of Points & crossing.

2.2 The actual staff strength of SSE/P.Way/ERS is 181 as against the sanctioned strength of 312 (including Supervisors and ministerial staff).

2.3 The sanction and actual strength of the SSE/P.Way/ERS Section is placed in **Annexure-I.**

2.4 The jurisdiction covered by SSE/P.Way/ERS is divided into 12 Gang Sections as detailed below:

Jurisdiction And Kilometre Of SSE/P.WAY/ERS Section :

Section	KM		Route KM	Total Route KM	ETKM
	From	To			
IPL-ERS	102/050	106/00	7.95	64.39	178
ERS-CHTS	106/000	114/750	8.75		
ERS-KUMM	0/000	8/170	8.17		
ERS-KFE	0/000	2/000	25.04		
ERN-CRL			9.65		
TRTR-IPN	0/000	2/880	2.88		
ERM-ERG	0/000	1/950	1.95		
Total ETKM as per last No: 178 Statement					
No. of gangs and units					
No: of gangs in ERS section : 12					
	Total No of Units : 12				

2.5 **Jurisdiction & beat length in Kms.**

Gang No	**Jurisdiction**		**Beat Length in KM**
1	102/0	103/350	2.70
2	103/350	106/50	5.4
3	106/50	109/500	6.55
4	102/0	103/350	
5	109/500	113/600	4.10
6	0/700 0/0	2/0 1/500	2.80
7	2/400	8/150	5.750
8	4/200 0/0	7/400 2/350	6.80
9	2/0 – 4/0	1/500 – 4/200	6.70
10	8/400	13/520	10.24
11	4/200	8/400	8.40
TOTAL			

Senior Section Engineer/P.Way/ERS is the in charge for maintaining the track with the help of his assistants. This section is divided into Gang Section (or) Gang beats of about 6 - 6.5 km per Gang Section/Beats and kept under the in-charge of SSE/JE P.Way for day-to-day maintenance. P.Way Supervisors are assisted by skilled labour i.e., Mate, Key man for identifying and correcting the track defects with the help of unskilled labour i.e., Trackman.

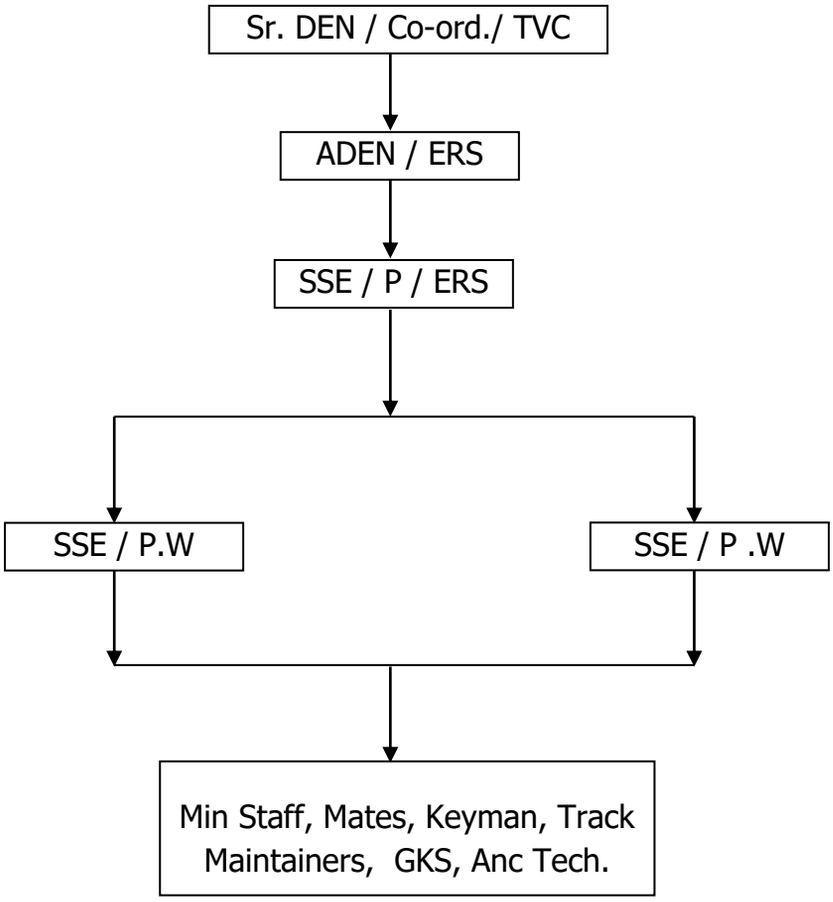
SSE/P.Way/ERS is having 1 push trolleys & 1 motor trolley manned with 8 trolley man. 8 interlocked & 4 Non interlocked LC gates in ERS section are manned with the actual strength of 33 Gate Keepers in various grades.

Special class & A - 3 men/day

B & C - 2 men /day

2.6 **Organization**:

Engineering Branch of TVC Division is working under the control of Sr. DEN /Co-ordination/TVC in the Division level. This P.way section is managed by SSE/P.WAY/ERS with the general in charge of ADEN/ERS



2.7 SSE/P.Way/ERS is the incharge for maintaining Track of 178 ETKM in 3 lines

SRR-ERS Line

ERS-ACCP Line

ERS-QLN Line

2.8 The entire length is an absolute block system, single line operating section. The track structure is 52/60 kg, PSC, M + 7 & M + 8 sleepers with long welded rails. The ruling gradient of the track is 1 in 150 for Down line and 1 in 90 for Up line. The maximum permitted Speed in Up line and Down line for this section is 105 kmph for passenger Trains and 75 kmph for Goods.

2.9 The following stations are coming under SSE/P.Way/ERS:

Sl. No.	Stations	Station Code
1	ERNAKULAM GOODS YARD	ERMG
2	ERNAKULAM TOWN	ERN
3	ERNAKULAM JN.	ERS
4	MATTANCHERI	MTNC
5	COCHI HARBOUR TERMINUS	CHTS
6	ERNAKULAM MARSHALLING YARD	ERM
7	KUMBAKAM	KUMM
8	ERNAKULAM QUILON LINE	EQ
9	COCHIN REFINERY LINE	KRL
10	IRUMBANAM	IPN
11	TRIPUNITTURA	TRTR

2.10 The Total Track Km is 64.39 kms.

The Total ETKM is 178 kms.

The Total stretch is being maintained by 12 gangs.

The working hours of gangs are = 07.00 to 12.00 / 14.30 to 17.50 hrs.

2.11 **Track Structure**:

The whole track is 52 & 60kg. PSC, structure with sleeper density of m+7 and m+8 which is formed by long welded (LWR) on mainline. The stabling, station lines are laid with 90R, m+4, PSC, SWP. This Rail structure is properly maintained by Track machines and some of maintenance activities are being carried out by manual also. Deep screening of Ballast for the whole section was carried out by Track machines is under progress.

2.12 **Curve Details of section**:

There are Zero nos. of curves are available in the Up line and 19 curves are in Dn. Line on the both LH & RH arrangements the degree of curve are varies from 0.25^0 to $4.0^{0.}$

2.13 **Average Rain fall details of the section area in mm:**

	Rainfall mm
2014	251.87
2015	215.5
2016	200.17

The Average Rainfall on the past 3 years is 222.51 mm.

2.14 **Temperature recorded in the section area :**

	Max Temp ^{0} C	Min. Temp^0 C	Average ^{0} C
2013	45.77	21.03	33.42
2014	42.32	23.40	32.86
2015	47.61	22.45	35.03

From the above, it could be seen that the Avg. temperature of this area could be 34^0 C. The actual de-stressed executed temperature of Track is about 36^0 C to 43^0 C. (For Zone III is suggested at 40^0 C).

2.15 **The duties of Supervisors and Technical staff in P. Way section are:**

i. Duties of SSE/P.way [prescribed in para118 -135 of Part-B of IRPWM]

- Responsible for maintenance and inspection of track and safe condition for traffic.
- Execution of all works incidental to track maintenance including track relaying works.

- Accountal and periodical verification of stores and tools.
- Maintenance of land boundary between stations and at unimportant stations.
- Co-ordination with the works, Bridge, Signalling and Electrical staff.
- Accompanying on Inspection with higher officials.
- Testing of Running qualities of track.
- Inspection of Gangs, Level Crossings, points and X-ings, curve inspection
- Foot plate inspection, Rear vehicle inspection, Foot inspection.
- Accompanying OMS/TRC (RDSO) Inspection.
- Check on patrolling
- Maintenance of station yards.
- Witnessing payment to staff
- Maintenance of Records
- Custodian of stores etc.
- Apart from above P.Way maintenance activities Staff Welfare viz. promotion, claiming of salary, supply of equipment and uniform, procurement of materials, issuing of materials scrap delivery (DS8)

ii. Duties of JE/P.way: [prescribed in para136 -145 of Part-B of IRPWM]

- Inspection and maintenance of track in a safe and satisfactory condition for traffic, including execution of all works, incidental to track maintenance.
- Execution of special works, such as a) Renewal, Directed Track maintenance curve re-alignment, deep screening etc.
- To assist the SSE/P.way.
- Co-ordination with Works, Bridge and staff of other departments.
- Inspection of Gangs, Level crossings, Points and crossings, Curves, foot plate inspection, rear vehicle inspection and foot inspection.

iii. P.Way Mistry /Track mate: [prescribed in para136-166 of Part-B of IRPWM]

- ❖ Knowledge of Rules and Signal
- ❖ Safety of the Track
- ❖ Equipments at site of work
- ❖ Muster and Gang Charts/Diary Books
- ❖ Observance of sleepers packing during passage of train.
- ❖ Precaution when view is obstructed
- ❖ Tidiness of section and Safe custody of tools
- ❖ Action when line is unsafe or in the event of accident
- ❖ Patrolling during abnormal Rainfall
- ❖ Commencing work affecting safety of train
- ❖ Weekly inspection of Gang length by mate.
- ❖ Preventing Tress pass and theft of P.way fittings
- ❖ Relief arrangements in emergencies
- ❖ Assistance to P&T staff
- ❖ Assistance in protection of train and Assistance in placing fog signals
- ❖ Responsibilities of the mate in LWR track

iv. **Duties of Key-man:** [prescribed in para167 -170 of Part-B of IRPWM]

- ▪ Key-man's daily inspection
- ▪ Equipment of key-man
- ▪ Rectifying the defects whichever possible by him.
- ▪ Reporting to Mate and PWI about the defects which require assistance for attending.
- ▪ In case of serious defects protection of Track & informing as per rules.
- ▪ Work at unmanned level crossings.
- ▪ Assisting mate after completing his routine inspection.
- ▪ Any materials found fallen safe custody and disposal.
- ▪ Apart from daily inspection, he should ensure tightness of fittings in systematic manner.

2.16 **The present staff deployment of SSE/P.WAY/ERS unit :**

The book of sanction of the Unit is 312 and the actual is 181 as on Scale Check Statement of May 2017 and the net vacant is 131. The Scale check Statement is placed as **Annexure -I.**

The actual staff distribution is ;

Sl. No	Category	Actual
1	SSE/P.Way	3
2	Ministerial staff	3
3	Welder	1
4	Black smith	2
5	Motor Trolley driver	1
5	Black smith helper	1
6	Track Maintainer	162
7	Track Maintainer (Trainee)	2
8	Store Watch Man	1
9	Lascar	1
9	SNP Staff	4
	Total	**181**

2.17 **Track Maintenance Methods :**

The para 228 of IRPWM prescribes the system of maintenance for concrete sleeper track as given below. The following 3-tier system of track maintenance shall be adopted on sections nominated for mechanized maintenance.

They are -

1. On track machines (OMU)
2. Mobile Maintenance unit(MMU)
3. Sectional gangs

2.18 **The mobile maintenance units shall comprise of two groups**:-

MMU-1:- One for each PWI section

MMU-2:- One for each Sub-division

MMU-1 shall be a Rail cum road vehicle with a PWI in-charge with a jurisdiction of 40-50Km. double line and 90-100Km for single line for various works including need based spot tamping and in situ rail welding.

MMU-2 shall be a road vehicle based unit with each sub-division for reconditioning of turnout and minor repairs to the equipments of MMU.

2.19 **Existing Maintenance Practices on IR**

As on date, the practice of maintenance can be briefly summarized as follows;

(a) In sections where relaying with PSC sleepers has been done,
   i. Tamping with machines as and when machines are available, plus
   ii. Conventional system of maintenance

(b) In sections where relaying has not been done,
   i. Only conventional system of maintenance is being used.

2.20 **Annual programmed regular track maintenance is as follow:**

Sl. No.	**Period**	**Work**
1.	Post monsoon attention for about six months	Attention to run down stretches, one round of through packing
2.	Pre-monsoon attention for about two months	Clearing of drains
3.	Attention during monsoon for about four months.	Attention to track as required.

2.21 The role of open line organization of Engineering Department in IR mainly meant for maintenance/ strengthening/ modification of existing infrastructure i.e. track for permitting higher speeds and heavier Loads.

2.22 The manual maintenance of the track has given way to highly mechanized maintenance practices that has become inevitable for the following reasons.

a) The high safety standards that can be achieved
b) The capability for higher axle load, speed etc.,
c) The overall economy in cost of maintenance
d) The accuracy in testing, checking and inspections that can be achieved through mechanization.
e) The necessity to avoid harsh physical work under inclement weather and isolated locations.
f) The speed of maintenance
g) The need to carry out the maintenance works within the constraints of time for line block etc.,

2.23 **The provisions of "Small Track Machines Manual":-**

The para1.3.2 says that the "Requirement of Manpower doesn't include Leave reserve". Further, the para1.3.3 stipulates that the Creation of posts for operation and maintenance of small track machines should be done by surrender of equivalent money value of live revenue charged posts of Gangman /other category involved in the track maintenance. The component of unskilled staff being created should be barest minimum. The proportion of skilled personnel should form at least 75% of the total posts to be created.

2.24 **Various track machines and their periodicity of working are Detailed below:-**

Sl. No.	Name of the Machine	Work done	Frequency
1.	BCM-Ballast Cleaning Machine	Deep screening of track	Once in10 years
2.	DUOMAT/CSM – Continuous Action Tamper	Tie Tamping LWR work	Once in 2 years
3.	DGS - Dynamic Track stabilizer	For consolidating track after works affects core stability	Once in 10 years along with BCM
4.	UNIMAT/MPT	1.Tamping Points & crossing	Once in 2 years
5.	BRM - Ballast Regulating Machine	Boxing of track	
6.	UTV - Utility Track Vehicle	Leading and stacking materials	As per need
7.	T-28 - T28 cranes – One job crane (PRC laying Machine)	For re-laying of Points & crossing	As per requirement
8.	PQRS	For re-laying track	-do-
9.	TRT	For CTR of track	-do-

2.25 **Actual Gang Performance** :

The various gang daily performance diaries were observed and noticed the following works are repeatedly allotted by the Supervisor and carried out by the Gangs are;

1. De-weeding
2. Weld collar painting
3. Cleaning
4. Boxing ballast working
5. ERC renewal / greasing.
6. Changing Rubber pad
7. Changing liners
8. Assisting various track machine activities.
9. Packing – manual at points, SEJ and other required areas.
10. Collecting store items.
11. Steel sleepers, chair plates changing.

2.26 **Man power calculation for Track maintenance a brief History:**

Permanent way gang strength was calculated by various methods right from 1931 through maflin formula. Over the years there has been lot of changes in Track maintenance practice, according to the timely changes the man power requirements also varied.

IR adopted various efforts to standardize in the past.

1.	Maflin formula	-	1931
2.	Lobo committee or modified Miff lin formula	-	1959
3.	Modified Maflin formula freezed in	-	1965
4.	Committee Report I in	-	1971
5.	Committee Report II in	-	1972
	No action taken on (4) & (5)		
6.	Appointment of special committee	-	1976
7.	Submission of Report by Spl. Committee Though Rly. Board did not give any direct clearance for this formula of 1979, it was implemented with 5% reduction in many Zones.	-	1979
8.	Committee for machine and manpower Deployment for Track Maintenance appointed in	-	1989 (Not accepted by Rly.Board)
9.	(CMMDTM) Report submitted in	-	1995
10.	Kapoor committee appointed on	-	05.01.1996
11.	Reconstituted committee on	-	12.11.1997
12.	Renamed as CMCNTM – Committee for Man power and Cost Norms for Track Maintenance	-	13.08.1998
13.	Finalization of the Report	-	May 2000
14.	Acceptance of the Report by Rly. Board	-	March 2006

The committee of "Man power and cost norms for Track maintenance "(MCNTM) is the latest which covers all the Track parameters and arrives the required Gang strength.

2.27 **Evaluation of Man power through MCNTM formulae:**

The man power requirements of Gangs (Trackman, Gatekeeper, Store watchman) are regularly calculated by division level through TRMS activities. IRICEN will be the custodian of the software for calculating man power.

The whole activities connected to Track Maintenance are clubbed under four main categories under MCNTM studies.

They are:

a) Activity 'T' - Affected by Traffic Density } Primary activities
b) Activity 'R' - Not affected by Traffic Density }
c) Activity 'M' - Miscellaneous } Auxiliary activities
d) Activity 'S' - Site specific }

Activity 'T' - Affected by Traffic Density

T_1 - Slack attention to
- a) Bad spots
- b) Low joints (FP, welded,Glued joints)
- c) SEJ (1 No. / km)
- d) Minor curve alignment

T_2 -- For Tie Tamper work
- a) Pre tamping operations
- b) Along with tamper
- c) Post tamping operations

T_3 - Casual Renewal of
- a) Rails
- b) Sleepers
- c) Fasteners along with regauging

T_4 - Repair Welding

Activity ' R ' – Not affected by Traffic Density

R_1 - Lubrication of ERCs

R_2 - Shallow screening

R_3 - Loading, Leading, Unloading

R_4 - Overhauling of LC gates

R_5 - Watching of caution spots & misc.

R_6 - Tree cutting for visibility

R_7 - Lubrication of Rails in Curves

R_8 - Accident Relief and carcass renewal in runover cases

R_9 - Bridge, Sleeper attention & Renewal

R_{10} - Pre-monsoon attention such as clearing of drains and Water ways, cess repair, de-weeding of track and Attention to cuttings & Trolley refuges.

R_{11} - Creep pulling approaches to bridges, turnout

R_{12} - Rectifying damage to LC posts and gates.

Activity 'M' – Miscellaneous

M_1 - Monsoon patrolling

M_2 - Hot weather patrolling

M_3 - Cold weather patrolling

M_4 - Watching vulnerable locations

M_5 - Gate keeping of LC gates

M_6 - Rest Giving for key man

M_7 - Water man duty

M_8 - Store watch man duty

Activity 'S' – Miscellaneous

S_1 - Tunnel Maintenance

S_2 - Bridge substructure maintenance

S_3 - Long girder maintenance

S_4 - Extra maintenance due to very steep curves, deep cutting, steep gradient

S_5 - Maintenance of track on extremely bad formation

S_6 - Look out man duty

S_7 - Fog signal man duty

S_8 - Filth removal from track

S_9 - Security patrolling

S_{10} - Watching of water level in suburban section

2.28 Based on Rational Formula the Track Maintainers [Gang strength] requirement of SSE/P.Way/ERS section is arrived as follows: Number of working Days in a year for P.Way Gang is 294 days (vide above Rly. Bd. Order No.95/CE1/GNS/2.Vol.II/Pt.11 dt.6.3.2006–Item No.4). **Annexure-III.**

One year	=	365 days.
Sundays	=	52 days.
National Holidays	=	9 days.
Casual leave	=	10 days.
Total No. of Holidays	=	71 days.
Available man days per year	=	365 – 71 = 294 days.

$$\text{No. of Gang men} = \frac{\text{T+R+M+S Activities (in man days)}}{\text{Available man days per year (294)}}$$

Also the MCNTM Committee recommended that Railway Board may order to review the Rational Formulae once in 5 years to incorporate the effects of Modernization to assess the Right Man Power which is on the anvil.

2.29 **Activities Recommended for Outsourcing by Rational Formula.**

1. Formation of treatment Works:
2. Collection of ballast, training out ballast by material train leading ballast from stack to track, insertion of ballast in track
3. Deep screening of the ballast in track, carried out manually oh by deploying BCM in which case man power is provided by the contractor
4. Introduction of sub ballast and ballast layers
5. Heavy repairs to track, including lifting
6. Complete realignment of curved track
7. Through renewal of rails, Sleepers and fosterers
8. Complete renewal of points and crossings, SEJs, traps etc
9. Resurfacing of crossings and switch rails
10. Loading and unloading of P.Way materials is bulk
11. Loading out of P.Way materials for other than casual renewal
12. Security of materials kin a depot which is closed and locked
13. Painting of Rails and weld collars
14. Painting of bridge girders
15. Heavy repairs(Measurable) to formation cutting bides drains and catch water
16. Heavy repairs (measurable)to bridges, bridge protection works, river training works and tunnels
17. Providing (Repairing road surface at level crossings including speed, breakers
18. Removal of major sand breaches
19. Works arising due to restoration following breach or accident
20. Clearing of rank vegetation in platforms and in the insanity of tracks in coaching and goods yards, repair depots and workshops or Engineering/Mechanical/Electrical and S & T depts.

CHAPTER – III

3.0 CRITICAL ANALYSIS

3.1 The Running Track Km of southern Railway on the year 2016 -17 is 7194 and the number of Staff of the Zone is 93381 as on 31.03.2017. The Operational Ratio of Southern Railway for the year 2016-17 is 147.82, where as it was 134.89 in the previous year. As the Railways are not being seen as Profit earning Industry, it is not so possible to increase the fares to achieve the required efficiency. Instead, Indian Railways takes all necessary steps to control expenditure by all possible ways. Since the Staff cost is alone took 33.3% in total expenditure, it is insisting by the Railway Board to conduct Work Studies in all the Units to Right size the Man power by which reduce Unit cost in an effective way to increase efficiency.

3.2 In respect of Track maintenance, Railway Board stipulated the yardstick and guideline for man power assessment in the form of MCNTM formula through software. This formula will ensure Zero base review as per the actual traffic, and other related conditions to arrive the optimum staff requirement. The committee has also recommended outsourcing certain activities.

3.3 The work study team after scrutinizing the activities has made suitable changes in certain data provided by the division to arrive the manpower requirement through MCNTM formulae. The data taken for calculation along with remarks is tabulated blow.

Sl. No.	Detail	Data	Remarks
1	Total Track KMs	64.39	-
2	ETKM	178	-
3	Rain fall (mm)	200.17mm	2016
4	T&P	245	

5	No. of Gang	12	-
6	No. of Curve	68	
7	LC Gates and shifts	12	-
8	Bridge data	136	-
9	Tunnel data	Nil	-
10	Extremely bad formation	2	-
11	Monsoon patrolling	Nil	-
12	Vulnerable locations	Nil	-
13	Gateman sanction	Nil	Clubbed with Track Maintainer.
14	No. of site stores	1	-
15	Fog signal man	Nil	-
16	Security patrolling	33 Man days	3 Shift x 11 Gangs for December 6^{th,} 15Th Aug. & Jan 26Th only
17	Gang Strength	169	Excluded Mate, Key men and Trolley Men in Total
18	No of Keyman	12	-
19	No of Mates	12	-

3.4 **The following output obtained through MCNTM formulae:**

Activity ' T ' – Affected by the Traffic Density:

T = (80 + 2.3 GMT) (1 + A + B + C) L

Segment	GMT	Track km.	Composite Factor	Mandays
1	21.4	7.02	1.1990	1087.05
2	21.0	4.00	1.1874	609.69
3	21.0	8.30	1.1200	3683.89
4	12.2	1.60	1.2106	209.22

5	12.2	6.64	1.2040	863.50
6	22.6	3.90	1.1841	1890.94
7	1.0	1.30	1.2950	389.29
8	10.5	12.80	1.2179	1621.75
9	1.0	2.2	1.1836	602.15
10	1.0	3.70	1.2065	1032.26
11	21.0	13.40	1.1911	6325.24
12	1.0	7.70	1.1200	1994.21
13	4.0	4.90	1.1200	1404.71
14	12.2	12.80	1.1767	1626.88
Total				23340.77
Shallow Screening Correction				2345.84

T = Excluding correction – Recommended for shallow screening

= **23,340.77 man days per year**.

3.5 **Activity ' R ' – Unaffected by the Traffic Density:**

The Total Manpower required to carry out 12 types are "R" activities.

Total Man days requirement for "R" activities

= 32,099.34 man days per year.

3.6 **Activity ' M ' – Miscellaneous:**

Total man days required for "M" activities

= 19,630 man days per year.

3.7 **Activity ' S ' – (Site – specific) :**

Total man days required for "S" activities = 4729.76 M.days per year.

3.8 **The Total Man Days Calculated / Year:**

1.	Activity	T	-	23,340.77
2.	Activity	R	-	32,099.34
3.	Activity	M	-	19,630.00
4.	Activity	S	-	4,729.76
				79,799.87

Total man days required - 79,799.87 per year
(Exclusive of Shallow Screening Correction)

= 79,799.87 / 294 = 271.42 men

" The total evaluated TRMS of 79,799.87 is equal to 271 Track Men".

All T,R,M,S activities listed are included in MCNTM formula and arrived the total maydays requirement as ***79,799.87***. Based on the field inspection and study, it is understood that some of the activities are not being done regularly by the Gang staff and some of the works are dealt through contracts. Hence, such activities are considered to the extent of actual staff deployment while evaluating the man power.

3.9 **The following activities are altered to suit the present level of requirement.**

As per rational formula the total manpower required to maintain for all the "R" activities is derives as 159 manpower per KM per annum.

R 2 – Shallow Screening:

After the utilization of Heavy Track Maintenance machines, the need of gang maintenance in Shallow Screening is not required; only to the length of 30 Sleepers on the both Road side approaches is being Shallow Screening by the Railway Staff, at some of the areas of our Zone.

Hence, Man power required for the Shallow Screening is disallowed. The Man power requirement is 55 MP (the Total MP requirement for R activity is 159), which is equal to 35% in Total of R activities. Hence, on need basis, four staff is allowed for attending road side and gate area activities.

Activity M = M7 water man duty:

There are 12 Gangs available for which the requirement is projected as 3728 man days per year for exclusively bringing drinking water for the Gang staff while on duty. It was noticed that never such water man duties were allotted ever in the 12 gangs for more than a decade. Since, this jurisdiction is not isolated open area also the whole section stations all have water facility. Also, to carry required water individual water bottles (Milton made – 2 liters.) was supplied to every Track man by the department. Hence, work study team considered the requirement for water man post is not necessary and it **Reduced 3728 man days.**

Scoring through the Reduced Man Days :

Activity	Man Days Proportion	Reduced Man Days
R 2 – Shallow Screening	35% in Total R (32099.34)	11103.57
M7 Water Man Duty	-	3728.00
Total :-		**14831.57 ***

Gang Strength Requirement :

Total T+R+M+S	=	79799.11
Reduced M.hrs	=	14831.57 *
Actual TRMS(79799.11 - 14831.57)	=	64967.54
Gang Strength (64967.54 / 294)	=	220.97 **Say 221**

Gang Strength (Track Maintainer + Gate Keeper + Store Watchman)	=	**221 Men**
Shallow screening at gate area & road side activities	**=**	4 Staff
Total	**=**	**225 Men**

3.10 Railway Board has authorized General Managers to make available man power through department as well as outsourcing also according to the needs in all assets maintenance vide Railway Board letter No.2011/CEDO/Southern Railway/15/O/Vol.I, dated 16.12.2013.

On this view, GM/S.Rly. has approved the following track maintenance activities for outsourcing (CTE's letter No.W.315/94/G.Men Rational Formula/Vol.III (pt) dated 17.01.2014). Copy of the letter is enclosed as **Annexure – II.**

Activities :

T_2 - For Tie Tamper
a) Pre tamping operations
b) Along with tamper
c) Post tamping operations

T_3 - Casual Renewal of
a) Rails
b) Sleepers
c) Fasteners along with regauging

T_4 - Repair Welding

R_4 - Overhauling of LC gates

R_{10} - Pre-monsoon attention such as clearing of drains and waterways, cess repair, de-weeding of track and attention to cuttings & Trolley refuges.

The above activities, if outsourced, will result in saving of **32** men. (Calculation sheet enclosed as **Annexure – III**).

After deducting the outsourcing equivalent man power from total TRMS calculation is

T + R + M + S	=	225 men (Refer Para No. 3.9)
Outsourcing Identified	=	32 men
Total trackmen requirement	=	225 – 32 = **193 men**

Total Trackmen requirement

(Track Maintainer + Gate Keeper + Store Watchmen) = 193 Men

3.11 Evaluation of Trolley man:

There are Three push type Trolleys are available in SSE/P.Way/ERS for the scheduled and other inspections.

The total running kilometer of this section is 90.26 which is manned by 4 supervisors. The average monthly inspection conducted by each supervisor is 90.26 kms by the push trolleys.

Trolley Inspection Schedule:

SSE/P.Way (in charge) – once in a month (CS No.132 Para 124(a), Dt.: 08.04.2013)

SSE/JE (section in charge) – once in a fortnight (CS No.132 Para 139, Dt.: 08.04.2012)

The section supervisor normally took two days to inspect the section in trollies in the fortnight period. For the movements of a push trolley three person are required in which, two will physically push the trolley and the other man is sitting and watching back side of the movement on safety view.

As per the movement record at a day maximum of two trollies will be engaged, also the maximum no. of movement in a month is 5. On need basis two batches are permitted for this section.

Total no. of trolley men required	= 8 men.
No of Mates & Key man required	= 24
LR for (193 Track man + 24 mates & Key man + 8 trolleyman)	= 225 * 12.5%
	= 28.12 **Say 28 men**
Total No of Track men (Track maintainer+G.Man+S.Watchman (193) + key men + Mate men (24)+ trolley men (8	*= 225 men*
LR for 225 men	*= 28*
Grand Total	*= **253 Men***

3.12 **Requirement of Supervisors:**

On need base, the supervisor requirement is as follows:

1. Over all in charge	=	1
2. Section supervisors	=	2
3. Special works (Track machines and others)	=	1
Total requirement	***=***	***4 supervisors***

3.13 **Requirement of ministerial staff:**

At present, there is three Ministerial staff (Clerks -2 WB & 1 PB) looks after the Staff personal matters and other allied works. Hence, on need basis, 3 ministerial staff are allowed.

On need base, the ministerial staff requirement = 3

3.14 **Requirement of other Technicians (artisan) :**

Sl. No.	Category	Requirement	Remarks
1	Blacksmith	2	To do the blacksmith work and to repair the gate lodges, 2 blacksmiths are allowed on need base.
2	Blacksmith Helper	1	To assist the artisans, one blacksmith Helper is allowed.
3	Tech.-I - Welder	1	To do the welding works, one welder is allowed on need base.
4	Lascar	1	To assist the SSE/P.Way and to do the office peon work, one lascar is allowed on need base.
5	Motor Trolley Driver	1	To operate the motor trolley, one M.T. Driver is allowed on need base.
Total		**6**	

On need base, the Artizan requirement = 6

3.15 **The total Sanction Vs Requirement of SSE/P.Way/ERS**

Sl. No	**Category**	**Sanc. (a)**	**Actual (b)**	**Req. (c)**	**Surplus (a-c)**
1	Supervisor / SSE / JE	4	3	4	0
2	OS Works	2	2	2	0
3	OS/Personnel	1	1	1	0
4	Blacksmith – Gr.I & II	2	2	2	0
5	Welder – Gr.I	1	1	1	0
6	Helper – II - Blacksmith	1	1	1	0
7	Motor Trolley Driver – Gr.III	1	1	1	0

8	Track Maintainer – Gr.I, II, III & IV	298	162	253	45
9	Lascar	1	1	1	0
10	Sr.Store watchman	1	1	0*	1
Total		**312**	**175 + 4 SNP + 2 T.Man Trainees**	**266**	**46**

NOTE :- 4 posts of trackmen are actually working and the posts have been created as SNP.

- **Store watchman with RG is already given in the track maintainer (253 post)**

Sanction Vs Requirement:

Sanction	Actual	Requirement	Surplus
312	**175 + 4 SNP + 2 T.Man Trainees**	**266**	**46**

Recommendation 1 :

Based on the Rational formula it is found that 14 post (13 post of Track maintainer & one post of Store watchman) is surplus to the requirement , which may be surrendered and credited to Vacancy bank .

No of Posts : 14

Recommendation 2 :

AS per CTE/MAS standing instruction 9 maintenance activities are to be outsourced in which already 2 being in progress (Casual Renewal of PSC & Cleaning debris). The total outsourced implementation will result in saving of 32 post of track maintainer. Division be surrender and credited to vacancy bank after implementing outsourcing.

No of Posts : 32

Summary of Recommendation :

The following 46 posts are found excess to the requirement and same may be surrendered and credited to the Vacancy Bank.

Sl. NO	Category	Grade Pay (Rs)	No of Posts
1	Track Maintainer-IV	1800	45
2	Senior Store Watch Man	2000	1
Total			**46**

****

CHAPTER – IV

4.0 PLANNING BRANCH'S REMARKS ON CO-ORDINATING OFFICER'S VIEWS :

4.1 Views of the ADEN/ERS, were received vide "Remarks Offered on Draft Report of work study", Dated 15.03.2018 on this Study Report and the same is placed as Annexure ….. The Remarks of the Planning Branch is detailed below parawise and necessary corrections incorporated to finalize the recommendations.

4.2 CO-ORDINATING OFFICER'S VIEWS ON PARA 3.3

Sl No	Details	Division Views	Remarks
1	Total Track kilometer	72.9	
2	ETKM	186.9	
3	Rainfall	200.17	
4	T&P	245	
5	No of Gang	12	
6	No of curves	68	
7	LC gates	12	3x2 shifts 12 hr Roster=6 9x 3 shifts 8 hr Roster = 27 ie.33 man/day
8	Bridge data	168 and required additionally 1344 mandays /year	Cleaning 4 men x168 Bridges x 2 times = 1344 staff /year
9	Tunnel data	Nil	
10	Extremely bad formation	2	
11	Monsoon Patrolling	8 beats is equal to 1800 man days /year	(2+1) per beat = 24 Men for 1/6-15/8(75 days) = 24x75 = 1800 staff /year
12	Vulnerable location	Nil	
13	Gateman	33 men/day	
14	No of sites stores	1	

15	Fog signal man	Nil	
16	Security Patrolling	Required for 12 gangs	3 shift x 12 gangs for Dec-6, Aug-15, Jan-26th ie 36 man days
17	Gang strength	93	Excluding mates (12), Keymen (12), Trolley men (12) & GK(33)
18	No of key man	12	
19	No of mates	12	

PLANNING BRANCH REMARKS :

Sl No	Details	Division Views	Planning branch remarks	Corrected data
1	Total Track kilometer 64.39	72.9	Agreed	72.9 KM
2	ETKM 178	186.9	Agreed	186.9
3	Rainfall	200.17	No correction	--
4	T&P	245	No correction	--
5	No of Gang	12	No correction	--
6	No of curves	68	No correction	--
7	LC gates	12	No correction	--
8	Bridge data	168 and required additionally 1344 mandays /year	Cleaning activities is also a part in Bridge maintenance. No additional staff allowed exclusively agreed for no of bridges to 168.	No of bridges is corrected from 136 to 168, which results the enhancement of 208 mandays (886/136*168-886)
9	Tunnel data	Nil	No correction	-----
10	Extremely bad formation	2	No correction	-----

Sl No	Details	Division Views	Planning branch remarks	Corrected data
11	Monsoon Patrolling	8 beats is equal to 1800 man days /year	Corrected to 1800 mandays /year	1800 mandays
12	Vulnerable location	Nil	No correction	-----
13	Gateman	33 men/day	agreed as per TRMS formula for the 12 gates allowed	
14	No of sites stores	1	No correction	----
15	Fog signal man	Nil	No correction	----
16	Security Patrolling	Required for 12 gangs	Agreed	Corrected for 12 gangs in the formula
17	Gang strength	93	No correction	169 already applied was explained in the para 3.3 of the report
18	No of key man	12	No correction	---
19	No of mates	12	No correction	----

4.2 CO-ORDINATING OFFICERS (PARA 3.4)

TRMS activities Error factor + 00.06 to tally the lesser ETKM considered in the formula

T: 23,340.72*1.06=24741

Para 3.5) R: 32099.34*1.06=34025

Para 3.6) M: 19630*1.06=20807

Para 3.7) S: 4729.76*1.06 = 5013

Para 3.8) Total man days per year = 84587

Agreeing for reduced man days of 14831.57 from 84587 balance = 69755 on account of outsourcing.

PLANNING BRANCH REMARKS:

The corrected datas are incorporated in the rational formula and the output is detailed further in Para 4.7.

4.3 COORDINATING OFFICER'S VIEWS ON (PARA 4)

Sl.No .8 (Bridge maintenance)	- 1344 staff/year
Sl.No.11 (Monsoon patrolling)	- 1800 staff/year
Total	- 69755+1344+1800=72899
Total staff required /day 72899/294	- 248 staff
Gang strength TM +GK+SW	- 248 staff per day
Shallow screening at gate area	- 4 staff
Additional Man power requirement for maintenance (due to not doing deep screening even after 10 years)	- 8 staff
Protecting identified USFD defect locations	- 1 staff
Trolley Men required for 2 batch of trolley	- 12 staff
Add keyman for extra EQ km	- 2 staff
Mates & keyman standard requirement	- 24 staff
Total	- 299 staff
Deducting 32 men on outsourcing account	- 32 staff
Balance	- 267 staff
LR for 367 man at 12.5%	- 33
Total	- 300 staff per day

PLANNING BRANCH REMARKS :

The following additional staff are only allowed and remaining are not agreed since the MCNTM formula itself calculating the required staff for the mentioned activities.

Protecting identified USFD defect locations = 1 staff
Trolley men (enhanced 4 above 8 staff) = 4 staff

4.4 CO-ORDINATING OFFICERS VIEWS :

Category	Sanctioned	Actual	Required	Excess/Shortage
Blacksmith I	1	1	2	(1)
Blacksmith II	1	1	2	(1)
Helper	1	1	3	(2)
Track maintainer I	18	14	24	(10)
Other Track Maintainers	280	148	276	(128)

Additional Black smith required for maintenance of Points & Xings

Extra care required for all points & Xings once in a month

2 blacksmiths + 2 helpers

PLANNING BRANCH REMARKS :

Ancillary category staff are allowed to total of 6 (para 3.14 of the report) including 1 Lascar post is sufficient & and hence no further enhancement needed.

4.6 CO-ORDINATING OFFICER'S VIEWS ON PARA NO 6

1. Total Track Km: 72.9 km(and not 64.39)
2. ETKM : 186.9km (and not 178)
3. Actual Bridges in section are 168 nos (not 136)
4. Monsoon patrolling in 8 beats with 24 Man (and not Nil)

PLANNING BRANCH REMARKS

Agreed to and applied in TRMS formula.

4.7 CO-ORDINATING OFFICER'S VIEWS ON PARA NO 7

The following posts are found short and needs immediate enhancement and postings:

Sl. No	Category	Grade Pay	No of posts in short
1	Blacksmith I	2800	1
2	Blacksmith II	2400	1
3	Helper	1800	2
4	Track Maintainer I	2800	10
5	Track Maintainer II, III & IV	2400 and below	128

These recommendations are based on the principles followed by the Work Study team to arrive at the requirements. The results put forth here is different from that of the work study team because the work study team has wrongly assumed certain datas, and certain basic datas they relied upon were totally wrong. A recalculation by the team with actual datas will yield this same result as tabulated above.

PLANNING BRANCH REMARKS

Ancillary category staff are allowed to total of 6 (para 3.14 of the report) is sufficient and hence no further enhancement needed.

The corrected Rational Formulae output in TRMS activities are as (Calculation sheet is enclosed **as Annexure** …) :

T : 23670.14 Mandays

R : 34020.06 Mandays

M : 24375.00 Mandays

S : 4453.76 Mandays

Total man days per year = 86518.96

Gang Strength (Track Maintainer + Gate keeper + Store Watchman) = 294 Men

Shallow Screening at gate area & Road

Side activities = 4 Men

Total = **298 Men**

- As per the Para No. 3.9, the R2 – Shallow screening and M7 Water Man duty are scoring is equal to 15635.021 Man days = 53 Men
- **The total man power requirement (298-53) = 245**
- As per the Para No. 3.10, the total Man power equivalent to outsourcing recommendation is **36 Men** (Calculation sheet is enclosed as Annexure ….)
- **After deducting the outsourcing equivalent Man power from the total TRMS calculation(245-36) = 209 Men**
- **The composite requirement :-**

1. Track Maintainers : 209
2. Trolley Man : 12
3. Mates & Key man : 24
4. Lascar : 1
5. Protecting identified USFD defect locations : 1
6. LR @ 12.5% (209+12+24+1) : 30
7. Supervisors : 4
8. Ministerial Staff : 3
9. Ancillary Category : 5

Total : **289 Men**

Sl. No	Category	Sanc. (a)	Actual (b)	Req. (c)	Surplus (a-c)
1	Supervisor / SSE / JE	4	3	4	0
2	OS Works	2	2	2	0
3	OS/Personnel	1	1	1	0
4	Blacksmith – Gr.I & II	2	2	2	0
5	Welder – Gr.I	1	1	1	0
6	Helper – II - Blacksmith	1	1	1	0
7	Motor Trolley Driver – Gr.III	1	1	1	0
8	Track Maintainer – Gr.I, II, III & IV	298	162	276*	22
9	Lascar	1	1	1	0
10	Sr.Store watchman	1	1	0*	1
Total		**312**	**175 + 4 SNP + 2 T.Man Trainees**	**289**	**23**

* For protecting identified USFD defect locations, one post is allowed in TM Category.

- **Store watchman with RG is already given in the track maintainer (276 post)**

Sanction Vs Requirement:

Sanction	Actual	Requirement	Surplus
312	**175 + 4 SNP + 2 T.Man Trainees**	**289**	**23**

Revised Recommendation 1 :

AS per CTE/MAS standing instruction 9 maintenance activities are to be outsourced in which already 2 being in progress (Casual Renewal of PSC & Cleaning debris). The total outsourcing of 9 maintenance activities will result in saving of 23 posts of track maintainer. Hence, Division is recommended to surrender 23 surplus posts and credit to vacancy bank on implementation of outsourcing all the 9 Maintenance activities.

No of Posts : 23

CHAPTER – V

5.0 FINANCIAL SAVINGS:

5.1 If the recommendations of the report are implemented the annual recurring financial savings will be as follows:

Sl. No.	Category	G.P	No. of Posts	Money Value (Rs.)	Annual Financial Savings (Rs.)
1	Track Maintainer-IV	1800	23	39323	10853148
	TOTAL		**23**		**1,08,53,148**

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1.6

SOUTHERN RAILWAY

Headquarters Office,
Works Branch,
Chennai – 600 003.

No.W.315/94/G.Men Rational Formula/Vol.III (pt) **Dt: 17 /01/2014.**

Sr.DEN/Co-ordn./MAS SA PGT TVC TPJ & MDU

Sub: Organising the resources for Track Maintenance Activities on Indian Railways – "Standing Instructions"- reg.

Ref: Railway Board's letter No.2011/CEDO/SR/15/O/Vol.I dt.16.12.2013. F.65

***

Railway Board has authorized General Managers to make available required manpower through departmental staff as well as through outsourcing as per needs, for the maintenance of all assets including track – vide – Board's letter above.

Copy of Railway Board's letter under reference regarding Organising the resources for Track Maintenance Activities on Indian Railways is enclosed. (in 3 sheets)

Railway Board desires that regular exercise for working out the required strength of Trackmen as per MCNTM formula, for maintenance of all running sections on the Railway, should be carried out by Zonal Railways.

Divisions are hereby advised to calculate the SE/P.Way section-wise requirement of Trackmen needed for Safety Related Track Works as per Railway Board format and submit the same to this office jointly signed by Sr.DEN/Co-ord, SR.DPO and Sr.DFM.

The following activities are approved by General Manager for outsourcing:

Activity - T2: For tie tamper working

a. ~~Pretamping operations~~
b. Along with tamper
c. Post tamping operations

Activity - T3: Casual Renewal of

a. Rails
b. Sleepers Fasteners (along with regauging) Activity - T4: Repair Welding

Acitivity - R4: Overhauling of level crossings

Activity - R10. Pre monsoon attention, such as clearing of drains and waterways, cess repairs, deweeding of track and attention to cutting and trolley refuges. (From Table-P of MCNTM Report Vo.II page 76) F-6

....2.

9/c F.78

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2-6

- 2 -

A sample calculation for the above works under the column "d" of Board's format (Total requirement of identified for Outsourcing) is also enclosed. The calculations are based on the worksheet "Manpower TR"- from Manpower xl work book of MCNTM Formula.

SE/P.way section-wise requirement as per Board's format jointly signed as mentioned above may be submitted to this office at the earliest so as to process further.

Note for MDU division: MDU division is yet to submit the SE/P.WaySection-wise requirement of Trackmen as per MCNTM Formula for the year ending 31/3/2013 copied on a CD. This may be sent by return.

Encl:1. Rly Bd. Letter in 3 sheets.
2. Sample calculation for outsourcing activities.

17/01/2014

(K.K.SHARMA)
Chief Track Engineer

O/C

प्रेषण अनुमोदित
दिनांक.....
लिपिक का हस्ताक्षर.....
प्रधान कार्यालय (संकर्म शाखा)
दक्षिण रेलवे, चेन्नै-3.

DESPATCHED
Date 20/1/14
Signature of the Clerk
Head Quarters Office (Works Branch)
Southern Railway, Chennai-3.

6
17.1.14

Vide F.78 Ante

MANDAYS T,R

DIV : TVC

AS ON: 20-Dec-17

Senior Section Engineer Unit : ERS

Segment No.	Gauge	Segment Name	GMT	Maintenance Type	Track km of Segment	Length of LWR in the Segment	Composite Factor 1+A+B+C	Mandays Required for T Activities	Mandays Required for R Activities	Mandays for T+R	Restricting value of 112 +200*GMT to 192 for NG
A	B	C	D	E	F	G	H	I	J	K	M
1	BG	UP	21.4	MECHANISED	7.02	1.30	1.1990	1087.05	1116.18	2203.23	1616.04
2	BG	DN	21.0	MECHANISED	4.00	1.30	1.1874	609.69	636.00	1245.69	911.90
3	BG	SL-YARD	21.0	MANUAL	8.30	0.00	1.1200	3683.89	1394.40	5078.29	1784.83
4	BG	SL-EAK	12.2	MECHANISED	1.60	1.60	1.2106	209.22	254.40	463.62	371.90
5	BG	SL-EAK	12.2	MECHANISED	6.64	5.00	1.2040	863.50	1055.76	1919.26	1534.91
6	BG	SL-EQ	22.6	MANUAL	3.90	0.00	1.1841	1890.94	655.20	2546.14	886.66
7	BG	SL-CRL	1.0	MANUAL	1.30	0.00	1.2950	389.29	218.40	607.69	323.23
8	BG	DN-EQ	10.5	MECHANISED	12.80	10.50	1.2179	1621.75	2035.20	3656.95	2992.99
9	BG	SL-CHORD	1.0	MANUAL	2.20	0.00	1.1836	602.15	369.60	971.75	499.97
10	BG	SL-CRL	1.0	MANUAL	3.70	0.00	1.2065	1032.26	621.60	1653.86	857.09
11	BG	SL	21.0	MANUAL	13.40	0.00	1.1911	6325.24	2251.20	8576.44	3064.56
12	BG	SL-CRL	1.0	MANUAL	7.70	0.00	1.1200	1994.21	1293.60	3287.81	1655.81
13	BG	SL-IPN	4.0	MANUAL	4.90	0.00	1.1200	1404.71	823.20	2227.91	1053.70
14	BG	UP-EQ	12.2	MECHANISED	12.80	10.50	1.1767	1626.88	2035.20	3662.08	2891.86
15	0	0	0.0	0	0.00	0.00	1.0000	0.00	0.00	0.00	0.00
16		0	0.0	0	0.00		1.0000	0.00	0.00	0.00	0.00
17		0	0.0	0	0.00		1.0000	0.00	0.00	0.00	0.00
18		0	0.0	0	0.00		1.0000	0.00	0.00	0.00	0.00
19		0	0.0	0	0.00		1.0000	0.00	0.00	0.00	0.00
20		0	0.0	0	0.00		1.0000	0.00	0.00	0.00	0.00
Total					90.26	30.20		23340.77	32099.34	55440.11	

Summary Mandays T,R	Activity T	Activity R	Total Mandays
BG	25686.61 Mandays*	32099.34 Mandays	57785.95
MG	0.00 Mandays	0.00 Mandays	0.00
NG	0.00 Mandays	0.00 Mandays	0.00
Total	25686.61 Mandays	32099.34 Mandays	57785.95

* Shallow Screeny is not taken

MANPOWER

MANDAYS M

DIV : TVC

AS ON 20-Dec-17

Senior Section Engineer Unit Name : ERS

Gauge	Monsoon Patrolling		Hot/Cold Weather Patrolling of LWR					Vulnerable Locations		Gate Keeping			Rest Giver for Keymen		Waterman		Store Watchman		Total
	No. of Beats	Mandays Required	Total Length of LWR	ength of LW Requiring Ho Weather Patrolling	ength of LW Requiring Cold Weathe Patrolling	Mandays Required fo Hot Weathe Patrolling	Mandays Required fo Cold Weather Patrolling	No of Locations	Mandays	No of Engg Manned Gate	Sanctioned Cadre of Gatemen	Mandays Required	No of Keymen	Mandays Required	No of Gangs	Mandays Required	No of Site Stores	Mandays Required	Mandays Required For M Activities
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
BG	8	5760.00	30.20	0.00	0.00	0.00	0.00	1	1095.00	9	0	7300.00	12	852.00	12	3528.00	1	1095.00	19630.00
MG	0	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0		0.00	0	0.00	0	0.00		0.00	0.00
NG	0	0.00	0.00	0.00	0.00	0.00	0.00	0	0.00	0		0.00	0	0.00	0	0.00		0.00	0.00
TOTAL	8	5760.00	30.20	0.00	0.00	0.00	0.00	1	1095.00	9	0	7300.00	12	852.00	12	3528.00	1	1095.00	19630.00

v2006.jun

MANPOWER

MANDAYS S

DIV: TVC

Senior Section Engineer Unit Name: ERS

AS ON: 20-Dec-17

Sr. No.	Gauge	Tunnel Maintenance		Bridge Substructure Maintenance			Long Girder Bridge Maintenance			Extra for very Sharp Curv		Extremely Bad Format		Lookout Man Mandays Required	Fog Signal Man				Filth Removal		Security Patrolling				Mandays Required For 'S' Activities
		Total Length in km	Mandays Required	No. of Bridges	Lineal Water Way in meters	Mandays Required	No. of Long Girder Bridges	Lineal Water Way of Long Girder Bridges	Mandays Required	Track Km of > 3deg(BG) >6deg(MG)	Mandays Required	Length of Bad Formation	Mandays Required		No of Mandays Required Yr(-3)	No of Mandays Required Yr(-2)	No of Mandays Required Yr(-1)	Mandays Required	No of Gangs working in Affected Area	Mandays Required	No of Mandays Required Yr(-3)	No of Mandays Required Yr(-2)	No of Mandays Required Yr(-1)	Mandays Required	
A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
1	BG	0.00	0.00	135	2063.96	106.96	2	1217.66	779.30	8.08	2376.70	800.00	480.00	602.80	0	0	0	0.00	0	0.00	384	384	384	384.00	4729.76
2	MG	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00				0.00	0	0.00				0.00	0.00
3	NG	0.00	0.00	0	0.00	0.00	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00				0.00	0	0.00				0.00	0.00
Total		0.00	0.00	135	2063.96	106.96	2	1217.66	779.30	8.08	2376.70	800.00	480.00	602.80	0	0	0	0.00	0	0.00	384	384	384	384.00	4729.76