No. G.275 / WSSR – 091920 / 2019-20

WORK STUDY TO REVIEW THE STAFF STRENGTH AT SSE/TRD/TPJ, ALU & VRI - TPJ DIVISION

SOUTHERN RAILWAY

PLANNING BRANCH

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STUDIED BY

WORK STUDY TEAM
OF
PLANNING BRANCH

JAN - 2020

INDEX

(i)

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(ii)

AUTHORITY

Annual Programme of work studies for the year 2019-20

(iii)

TERMS OF REFERENCE

Work study to Review the staff strength at SSE/TRD/TPJ, ALU & VRI in TPJ Division.

(iv)

METHODOLOGY

i) Collection of data.

ii) Field Observation.

iii) Interaction with Divisional Officers, Supervisors and staff of TRD/TPJ, ALU & VRI.

iv) Assessment of manpower requirement as per the bench marking and need base wherever needed.

(v)

SUMMARY OF RECOMMENDATIONS

RECOMMENDATION:

- **N I L -**

CHAPTER – I

1.0 INTRODUCTION

1.1 The Indian Railways is among the world's largest rail networks. The Indian Railways network is spread over 1,15,000 Km with 12,617 passenger trains and 7421 freight trains each day from 7172 stations plying 23 million travelers and 3 million tons of freight daily. Indian Railways is recognized as one of the largest railway system in the world under single management. The railway net work is also ideal for long distance travel and movement of bulk commodities apart from being an energy efficient and economic mode of conveyance and transport.

1.2 In the primitive days, the goods were carried by head loads and gradually changed by animals, tramways etc. Efforts were simultaneously made to replace that after perfecting the design of steam engine which was invented by George Stephenson in 1814. The railway system of operation for transportation was spread over the world by steam locomotives. As the civilization grew, diesel locomotive was also participated along with steam locos.

1.3 Railways emulate from Steam Locomotive to Diesel and further improved to Electric Loco Traction. This modification has given not only enormous advantages in Railway Transportation but also giving pollution free environment to the public. In India, railway electrification was started in Mumbai in 1920, when 388 route Kms were electrified as 1500 V D.C. Thereafter in the year 1957, the standard electric supply in India has been 25 KV, 50 Hz and single phase A.C. the phase wire in over head and negative potential with respect to the rail, and provides the return path for the current.

Application of electricity on Railways are Lighting, heating, driving motors, power supply to signaling system, electric traction, refrigeration and air conditioning, storage batteries.

1.4 Traction is the most vital application of electricity of Indian Railways, modern system of railway traction may be divided into two main groups. The first group, locomotives or motor coaches receives electric power either from an overhead line via a pantograph or from third rail through a collecting brush generally used in underground railway. The second group, locomotives or motor coaches generate their own power, the generators being driven by diesel engines. Locomotives of the first group are called straight electric or simply electric locomotives, while diesel electric and battery locomotives belong to the second group. Driving motors in either case are normally D.C. series.

1.5 **Traction Power Supply:**

There are four types of traction power supply used in Indian Railways:

- 25 KV A.C single phase
- 2 x 25 KV A.C single phase
- 1500 Volts D.C
- 750 Volts D.C with third rail provided as the conductor supplying power to the motor coach. Mostly, 25 KV A.C single phase is used.

1.6 **Over Head Equipment**:

The main items are (i) support structure (ii) insulator (iii) bracket assembly (iv) Catenary wire (v) droppers (vi) contact wire. The structure is generally a simple steel mast. In yards, portals with two legs and a boom are also used. Two insulators connect the bracket assembly to the structure. A clamp on the top of the bracket tube holds the catenary wire from which the contact wire is

suspended by means of droppers. The catenary wire is made of cadmium copper alloy and consists of 19 strands. Its cross – sectional area is 65 Sq mm. The contact wire is made of hard drawn copper with two grooves where it is held by dropper clips to maintain it horizontal. Its cross sectional area is 107.6 Sq.mm with 12.24 mm diameter. The contact wire is normally kept at a constant height or 4.80 m. above the rail level.

1.7 **High Speed OHE**: With the above described single catenary system, the increased uplift of contact wire at high speeds causes interruptions of flow of power supply. A compound catenary system is therefore provided on high speed tracks. It facilitates uninterrupted current collection.

1.8 **Third Rail System**: To keep the cost of tunnel for an underground railway low, the over head line is replaced by a rail which is laid on the ground supported by insulators by the side of one of the two running rails. A collector brush is fitted on the motor coach, which slides on the third rail to collect current during the run. Since the headway between trains is very small, being 1 1/2 to 3 minutes, the power demand is very high during peak traffic hours. This calls for a very small spacing of 2 to 3 km, between consecutive sub-stations.

1.9 **Earthling of Electrical Equipments & Apparatus:**

As per Indian Electricity Rules, the body of every electrical equipment and apparatus is required to be earthed; so is the enclosure or fencing provided around the equipment / apparatus. The earthling has to conform to Indian Standard : 3043.

In the case of high voltage, the neutral point is earthed by two separate connections with earth through two distinct electrodes. Normally G.I. pipe or G.I plate is used as the electrode. Strip

electrode is used in hard and rocky soil. Normally, the earth electrode resistance should be within 5 ohms, while in rocky soil it can be upto 8 ohms.

In the case of sub-stations, two additional earths are to be provided for each transformer body. For the house – wiring, and earth wire connected to an earthing electrode is run along with conductor wires through the building. This facilitates earthing of various appliances and devices.

1.10 **Safety Precautions in Electrified Areas:**

To save persons working near 25 KV OHE from getting electric shock, following precautions should be taken them.

(i) Loading on or unloading from a wagon or a locomotive is prohibited while it is standing under the O.H.E., unless a 'permit – to work' has been obtained from an electrical supervisor who would earlier switch off power and earth the line.

(ii) Working on any structure within 2m of the O.H.E is prohibited, unless a 'permit-to-work' is obtained as above.

(iii) No aerial wire for low – voltage current or signaling circuit or telecommunication purpose will be strung in the vicinity of, and parallel to, 25 KV, O.H.E as such wire may have dangerously high induced voltage.

(iv) Lever frames and other signaling equipment should be connected to a suitable earthling system.

(v) When unloading rails along electrified tracks, care should be taken that these rails do not form a continuous metallic mass longer than 300 m.

(vi) Since running rails provide the return path for the traction current, any breakage or gap should be carefully bridged with a temporary connection, using gloves and insulated – handle tools.

(vii) Bonds provided on structures and rails should not be opened without due precautions.

1.11 In conducting work study of SSE/TRD/TPJ, ALU & VRI, but the sanctioned and actual statement of all TRD/depots in the division is given by Sr.DPO/TPJ.

1.12 An attempt has been made to study the present system of working and the requirement of man power. In the process, Railway board norms, with reference to the maintenance of manuals for OHE, benchmarking, yardstick and need base norms were considered to arrive at the manpower requirement.

CHAPTER – II

2.0 PRESENT SCENARIO

2.1 The work study has been initiated for Depots viz. TPJ, ALU and VRI. The list of all TRD Units in TPJ division and their workload in terms of Kms to be maintained are listed below:-

Sl. No.	TRD Units	Track Km.	RE works in Future
1	TPJ	139	-
2	ALU	150	-
3	VRI	130	-
4	VM	149	-
5	TNM	78.60	-
6	ARV	85.00	-
7	TJ	44.00	TJ-TVR-KIK
8	CUPJ	60.00	CUPJ-MV-KIK

2.2 The actual staff strength (Both Group "C" & "D") of the TRD/TPJ, ALU & VRI, other TRD depots and staff working at division office is given by SSE/TRD/TPJ and tabulated below.

Depot	SSE	JE	TWD	MVD	LD	Sr.Tech	Tech-I	Tech-II	Tech-III	Helper	Total
TPJ	1	2	1	1	0	5	3	5	7	9	34
ALU	1	1	1	0	0	3	2	3	4	10	25
VRI	1	1	1	0	0	1	6	2	3	12	27
VM	2	1	1	0	0	5	2	2	6	13	32
TNM	1	1	1	0	0	4	1	0	2	11	21
ARV	2	0	1	0	1	1	0	1	5	11	22
TJ	0	0	0	0	0	0	2	3	1	9	15
CUPJ	0	0	0	0	0	1	1	0	3	2	7
Sub-Total	**8**	**6**	**6**	**1**	**1**	**20**	**17**	**16**	**31**	**77**	**183**
TPC	2	4	0	0	0	0	1	0	0	4	11
Sr.DEE/o	1	2	0	1	0	0	0	0	1	1	6

Trip shed	0	0	0	0	0	0	0	0	0	4	4
RE	0	3	0	0	0	2	0	0	0	0	5
CN/MS	0	0	0	0	0	1	0	0	0	0	1
Sr.DSO	1	0	0	0	0	0	0	0	0	0	1
Total	**12**	**15**	**6**	**2**	**1**	**23**	**18**	**16**	**32**	**86**	**211**

2.3 The sanction and actual staff strength (Both Group "C" & "D") of whole division of TRD sanctioned and actual is given by DPO/TPJ and tabulated as below.

Staff strength at TRD depots of DPO/TPJ as on 31.10.2019:

Sl. No	**Category**	**GP (Rs.)**	**Sanction**			**Actual**	**Vacancy**	**Excess**
			Per	Temp	Total			
1	SSE	4600	0	21	21	9	12	0
2	JE	4200	0	12	12	13	0	1
3	SSE Drawing	4600	0	0	0	1	0	1
4	JE Drawing	4200	0	2	2	1	1	0
5	Sr.Tech	4200	0	25	25	20	5	0
6	Tech. - I	2800	0	49	49	18	31	0
7	Tech – II	2400	0	21	21	16	5	0
8	Tech – III	1900	0	29	29	31	0	2
9	Trip Shed	4600	0	0	0	1	0	1
10	Lorry Driver	2800	0	0	0	1	0	1
11	Lorry Driver	1900	0	2	2	1	1	0
12	TWD	2800	0	9	9	6	3	0
13	MVD – I	2800	0	1	1	0	1	0
14	MVD – III	1900	0	0	0	1	0	1
15	Asst. TRD	1800	4	76	80	78	2	0
Total			**4**	**247**	**251**	**197**	**61**	**7**
16	Trainee		0	0	0	2		
1 CGA Post appointed as Asst.TRD in PL;1 O.O.ELE/TRD/10/2019 dt.21.08.2019 / NPS form yet to be submited by employee								
1 CGA Post appointed as Asst.TRD in PL;1 O.O.ELE/TRD/10/2019 dt.03.09.2019 / PRAN form yet to be Received								
33 RRC candidates appointed as Asst.TRD in various. O.O. till 31.10.2019								

The above table is shown that the sanction of 251 posts and actual is 197, the net vacant posts is 54.

Hence the study team has considered the sanctioned strength taken from DPO/TPJ and actual staff position has taken from the

various TRD/depots, divisional office etc, for conducting work study of both Group C & D staff. This is reproduced and tabulated as below.

Category	Sanction	Actual	Vacancy	Excess
Group C & D	251	211	40	0

2.4 **PSI Equipments and Schedule of maintenance at TPJ division:**

Sl.No	Equipment	Schedule	Target
1	Power Transformer	M/M	110
		H/M	11
		A/M	11
2	145 KV CB	Q/M	22
		H/M	11
		A/M	11
3	25 KV CB	Q/M	74
		H/M	37
		A/M	37
4	25 KV BM	Q/M	158
		H/M	79
		A/M	79
5	96 KV LA	A/M	46
6	42 KV LA	A/M	109
7	110 KV CT	A/M	22
8	110 KV Isolator	A/M	29
9	25 KV Isolator	A/M	134
10	25 KV CT	A/M	57
11	25 KV PT	A/M	61
12	Capacitor Bank	A/M	11
13	Series Reactor	A/M	11
14	AT	Q/M	258
		H/M	129

		A/M	129
15	40 AH Battery	M/M	201
		A/M	18
16	200 AH Battery	F/N	139
17		A/M	6

2.5 **PSI Equipments and Schedule of maintenance at Various Depots:**

PSI Equipments		**TPJ**	**ALU**	**VRI**	**VM**	**TNM**	**ARV**
Equipment	**Schedule**	**Target**	**Target**	**Target**	**Target**	**Target**	**Target**
Power Transformer	M/M	20	20	20	20	20	10
	H/M	2	2	2	2	2	1
	A/M	2	2	2	2	2	1
145 KV CB	Q/M	4	4	4	4	4	2
	H/M	2	2	2	2	2	1
	A/M	2	2	2	2	2	1
25 KV CB	Q/M	12	12	12	18	12	8
	H/M	6	6	6	9	6	4
	A/M	6	6	6	9	6	4
25 KV BM	Q/M	34	32	30	38	12	12
	H/M	17	16	15	19	6	6
	A/M	17	16	15	19	6	6
96 KV LA	A/M	8	8	8	8	8	6
42 KV LA	A/M	23	21	20	23	12	10
110 KV CT	A/M	4	4	4	4	4	2
110 KV Isolator	A/M	5	5	5	5	5	4
25 KV Isolator	A/M	25	25	24	34	16	10
25 KV CT	A/M	10	10	10	11	10	6
25 KV PT	A/M	13	13	12	9	8	6
Capacitor Bank	A/M	2	2	2	2	2	1
Series Reactor	A/M	2	2	2	2	2	1
AT	Q/M	54	42	34	74	22	32
	H/M	27	21	17	37	11	16

	A/M	27	21	17	37	11	16
40 AH Battery	M/M	33	33	33	33	33	36
	A/M	3	3	3	3	3	3
200 AH Battery	F/N	23	23	23	23	23	24
	A/M	1	1	1	1	1	1

2.6 **TPJ Division OHE Target:**

Sl.No	Items	Target
1	AOH	95.96
2	C/A	3480
3	IOH	262.038
4	C/A	5017
5	POH	96.925
6	C/A	1753
7	IC	33887
8	ATD AOH	1224
9	ATD POH	166
10	C	1433
11	F	225
12	G	944
13	IOL	104
14	UIOL	522
15	T/O	471
16	ACC	555
17	CTF & BPF	83
18	ISOL	232
19	SI	283
20	RRTC	1519

2.7 **OHE - Schedule maintenance at various depots:**

Item	TPJ	ALU	VRI	VM	TNM	ARV

	Target	Target	Target	Target	Target	Target
AOH	16.5	23.81	14.4	21.75	11	8.5
C/A	628	935	666	521	245	485
IOH	64.1	50	36.5	49.93	28	33.5
C/A	1340	926	564	1010	641	536
POH	14.15	27.65	18.75	17.37	10	9
C/A	269	445	260	351	223	205
IC	68.13	6850	6282	6540	3552	3850
ATD AOH	295	260	244	225	106	94
ATD POH	40	40	8	32	36	10
C	236	296	235	295	170	201
F	50	50	48	55	8	14
G	211	200	188	187	83	75
IOL	25	25	24	19	4	7
UIOL	111	95	89	106	56	65
T/O	142	110	94	78	21	26
ACC	94	120	95	118	58	70
CTF & BPF	21	13	20	11	8	10
ISOL	86	45	43	42	6	10
SI	83	65	57	52	12	14
RRTC	288	300	305	316	160	150

2.8 **Jurisdiction of SSE/TRD-Depots:**

2.8.1 **<u>Over Head Equipments at VRI:</u>**

Total Track KM – 130

Sidings at ICL 1 – 132 and MCL 1 – 101

Break down particulars – Nil for the year 2018 & 2019.

Outsourcing activity – Break down vehicle.

2.8.3 **Foot Patrolling Particulars:**

Sl.No	Section	KM	Schedule

1	From 195 - ULU	195 – 198	Fortnightly
2	ULU - MPLY	199 – 204	
3	MPLY - PVN	205 – 209	
4	PVN – VRI	217 – 225	
5	TLNR - PNDM	226 – 235	
6	PNDM - ICGH	236 – 240	
7	ICGH - MTUR	241 – 245	

2.9 **Over Head Equipments at ALU:**

Sl.No	Description of Item	Particulars
1	section	Mathur (Excl) – Pullambadi (Incl)
2	Kilometres	Km 246(Incl) to Km 300(Incl)
3	Route Km (RKM)	69 Km
4	Track Km (TKM)	150 TKM
5	Stations	SNDI, OTK, ALU, SLTH, KLGM, KKPM & PMB
6	Sidings	➢ Madras cement Ltd at ALU
		➢ Tamil Nadu cements Ltd at ALU
		➢ Chettinad cements Ltd at SLTH
		➢ Dalmiya cements Ltd at KKPM

2.9.1 **Power Supply Installations (PSI):**

Sl.No	Description of Item	Particulars
1	Traction Substation (TSS	Ariyalur (ALU)
2	Sectioning & Paralleling Post (SP)	Sendurai & Kallagam
3	Sub-Sectioning & Paralleling Post (SP)	Ichchangadu (ICG)

2.9.2 **Foot Patrolling Particulars:**

Sl.No	Section	KM	Schedule
1	MTUR - SNDI	246 - 253	Fortnightly
2	SNDI - OTK	253 - 262	
3	OTK - ALU	262 - 270	
4	ALU - SLTH	270 – 277	
5	SLTH - KLGM	277 – 286	
6	KLGM - KKPM	286 – 295	
7	KKPM - PMB	295 – 302	
8	TN Cement siding	TNC/1- TNC/146	
9	Madras cement siding	MCL/1-MCL/147	
10	Chettinad cements siding	0/1 – CC/114	

2.9.3 **Break down particulars for past two years:**

Sl.No	Date	Failure details	Action taken
1	18.07.19	42 KV LA at ICG/SP failed due to rain and lighting	Failed LA disconnected from service on 18.07.19 and replaced on 19.07.19

7 staff is residing in railway quarters at ALU.

2.10 **<u>Over Head Equipments at TRD/TPJ:</u>**

2.10.1 **Foot Patrolling Particulars:**

Sl.No	Section	KM	Schedule
1	PMB - KTTR	301 – 308	Fortnightly
2	KTTR - LLI	308 – 313	
3	LLI - VLDE	313 – 319	
4	VLDE – UKV	319 -326	
5	UKV - TPTN	326 – 332	
6	TPTN - GOC	332 – 337	
7	GOC – TPJ & TJ line upto Manjattidal	337 – 342	
8	TPJ 340 - MDU 342 – KKDI line – BG complex		
9	ED line Point No 100 - TP		
10	GOC – MRV siding – New MDU line – TPJ Rd No 1, 2 & 3		

11	TPGY – ED line Point No. 100 – VIP siding ETR line – TPJ PF 1A	
12	BHEL siding 1 to 100	
13	BHEL siding 101 to 193	
14	Manjattidal to TRB	

2.11 **Some of the general TRD/OHE activities:**

AOH of OHE feeder wire, cantilever assembly, catenary and contact wires, droppers, PTFE neutral section, insulators, crossover and turnouts, un-insulated and insulated overlaps, jumpers, auto tensioning device, insulator cleaning, current collection test, hotline checking of OHE, reliability improvement, replacement of flashed and failure prone insulators, removal of foreign material on OHE kite strings, crow nest and scare provision, clearance to trees – tree trimming, tree cutting etc.

2.12 **Bond connections:**

Replacement of damaged bonds, periodic checking of bonds, bond painting of entire section, Working along with engineering dept for track renewal, Machine works-Power block with bond disconnection required for BCM, SQRS machines, Permit to work to other departments after availing power block as and when required. Foot patrolling of entire section and find out reason for tripping and rectifying of defects. Testing of loading appliances every 3 months

2.13 **Maintenance of Tower car:**

Monthly joint inspection with C&W, Battery maintenance,
B checks –once in 3 months, C check per year,
Daily checks- Checking of engine, brakes, applying lubricants
ULTRASONIC testing once in a year

2.14 **Earth connections:**

Each and every metallic structure near to OHE is connected to rail through bonds, which is eventually connected to earth at Traction

substation. Earth electrodes are provided at girder bridges, FOB, ATs, SSP, SP, TSS, PTFE, water column, ROB etc.

2.15 **Plants and Equipments:**

The common plants and equipments are available in TRD depots such as Wood cutting machine, Welding generator, Rail hole drilling machine and portable drilling machine etc.

2.16 **Schedule of inspection:**

- Supervisory foot inspection-once in 3 months entire section
- Loco footplate by supervisor-fortnightly
- Hotline inspection using tower car
- Current collection test-once in 6 months
- Bond joint inspection with S&T-once in 6 months
- Joint inspection of implantation and rail level with P.way-once a year
- Foot patrolling of each section is done once in every 15 days.

2.17 **Maintenance of the OHE;**

- AOH/POH of Cantilever Assembly
- AOH / POH of ATD
- Insulator Cleaning
- Replacement of flashed or defective insulators
- Maintenance of PTFE Neutral section
- Maintenance of Section insulators
- Maintenance of Isolator switches
- Maintenance of Turnouts and cross-overs
- Maintenance of Feeders (Cross-Track and Along Track)
- Maintenance of overlaps (IOL 7 UIOL)
- Maintenance of all types of Bonds
- Maintenance of Anchors (ACA, FTA etc)
- Regular inspection of OHE at LC gates and under OLS
- Trimming / Cutting vulnerable trees near OHE.

2.18 **Maintenance of Depot / Office / Stores :**

- ✓ Maintenance of all the items and spares in Stores
- ✓ Maintenance of T&P items and its regular inspection.
- ✓ Looking after staff matters including issuing Pass / PTO etc.
- ✓ Maintaining registers regarding staff matters.
- ✓ Maintaining technical registers and records
- ✓ Technical Correspondence
- ✓ Co-ordination with other departments like P.way, Sig etc.
- ✓ Co-ordination of manpower and materials
- ✓ Planning of the daily works and special works
- ✓ Indenting, procurement and inspection of materials, maintaining T&P in good fettle.
- ✓ Scrap disposal DS8 of materials
- ✓ Materials verification in stores every 6 months, which require at least 3 days.
- ✓ Maintenance of sufficient materials in Breakdown Train / ART at MAQ.
- ✓ Carrying out all the clerical works in the depot.
- ✓ Checking and forwarding of staffs TA journals, NHA & NDA, OT and mileage of TWD.

2.19 **Details of SSE/TRD/TPJ, ALU & VRI:**

The work study conducting at depots TRD/TPJ, ALU & VRI and the available staff position of the above depots is tabulated below.

Sl. No	Category	Station		
		TPJ	**ALU**	**VRI**
1	SSE	1	1	1
2	JE	2	1	1
3	Sr.Tech	5	3	1
4	TWD	1	1	1
5	Tech - I	3	2	6
6	Tech - II	5	3	2
7	Tech - III	7	4	3
8	Helper	9	10	12
9	MVD	1	0	0
	Total	**34**	**25**	**27**

2.20 **Staff distribution:**

One supervisor is always required for batch working for routine maintenance, considering safety of equipment and personnel. Staff distributed in all kinds of works according to their skills and ability. Power block and non power block works are distributed evenly among staff. Staffs deputed for Engineering works and permit to work for other departments.

2.21 **Special inspection:**

Winter drive and Pre-monsoon drive inspection

2.22 **POH/Rehabilitation:**

OHE – once in 8 years

2.23 **Protective equipments for staff:**

Protective equipments are commonly used for staff working at TRD depots as Safety shoe, safety helmet, safety belt and raincoat.

2.24 **Stores:**

Indenting, procurement and inspection of materials, maintaining T&P in good fettle, scrap disposal and DS – 8 of materials. Material collection is required from DMS/TPJ once in quarterly and GSD/PER once in yearly. Store items are verified in every 6 months. Generally, the location of store items is available at Depot, breakdown vehicle and tower car.

2.25 **Special works:**

Slewing/profiling of OHE is required with the introduction of new bridges.

2.26 **Clerical works:**

- Issue of pass/PTO/EDP
- Checking and forwarding of TA sheet, NDA, OT and mileage of TWD.
- Maintaining leave particulars, CR, OT particulars, preparing absentee statement in every month.
- Staff matters, grievance redressal, quarters, daily movement.

2.27. **Technical:**

- ✓ Planning of work
- ✓ Requesting power block/line block
- ✓ Co-ordination with Engineering and operating departments.
- ✓ Co-ordination of manpower and materials
- ✓ Technical correspondence.

2.28 **DUTIES OF OHE STAFF**

To maintain the failure free OHE, the following activities are carried out.

- Annual overhauling of all Cantilever Assembly, Insulators, Section Insulators, Turn-outs, Cross-over, Jumpers, Insulator over laps and un-insulated over laps.
- Periodical overhauling of OHE.
- Periodical overhauling of regulatory equipment.
- Foot plate inspection once in a week in sub-urban sections and fortnightly in non-sub-urban sections.
- Attending remarks of foot patrolling.
- Maintenance of contact wire height in entire track length.
- Painting of Cantilever Assembly.
- Periodical checking of contact wire and Catenary's wire.
- Inspection of new track lines before commencing along with P.Way and S&T staff.
- Tree branch cutting, cleaning of danger boards and warning boards.
- Attending emergency derailments and accidents.
- Small repairs & daily maintenance in Tower Vans.
- Cleaning of Insulators fitted in OHE.

2.29 **Duties of PSI (Power Supply Installations)**

- Maintenance of transformers and circuit breakers under various schedules viz., quarterly, half yearly and annually.
- Maintenance of batteries placed in various way side stations
- Manning of PSI in round the clock shifts.

2.30 **Traction Power Control**

The duties of CTPC are -

- Maintaining continuous contact with Power supply from TNEB to ensure the power supply for train operations.
- Co-ordination with the division control for weekly power block programme.
- Imposition of power block as required by the OHE Unit
- Doing power block through remote control in case of an emergency.

CHAPTER – III

3.0 CRITICAL ANALYSIS

The prime task of the work study is to right size the man power in the general interest of productivity of the Indian Railways. Right sizing of Man power is a continuous and comprehensive measure referring with the current work load and the present processes methods. Also RITES recommended the concept of zero based budgeting in man power planning on regular basis as in such to justify the presence of every employee.

3.1 There are lot of tools available to measure the Man power requirement, normally the activities are split up into small groups and analyzed into micro level to arrive the required Man power. In Indian Railways, the work study conducted to the unit basis level, hence Macro level study is only possible and it is being carried out with the help of

i. Bench Mark
ii. Need basis

3.2 **Benchmarking** is a tool in the hands of Administration to compare the performance/productivity between similar activity centers of the same organization. The resources which are fed as input are compared with the other, so that the optimum utilization of the same can be arrived at. Benchmarking is not a one time affair but it is a continuous process of comparing similar activity centers, organizations, resources, products and their output.

3.3 Right sizing the Manpower in Railways is being achieved through conventional studies by Efficiency Cells in Zonal Railways. But, of late, Railways have started adopting benchmark concept for right sizing the staff strength.

3.4 In general, the functions of TRD section in two parts, such as PSI and OHE. The total track kilometre maintained and staff deployed in these units is compared and staff requirement is assessed based on bench marking/yardstick technique. The staff strength of TRD depots given by DPO/TPJ as on 31.10.2019 is tabulated below.

3.5 **Staff strength at TRD depots of DPO/TPJ as on 31.10.2019:**

Sl. No	**Category**	**GP (Rs.)**	**Sanction**			**Actual**	**Vacancy**	**Excess**
			Per	Temp	Total			
1	SSE	4600	0	21	21	9	12	0
2	JE	4200	0	12	12	13	0	1
3	SSE Drawing	4600	0	0	0	1	0	1
4	JE Drawing	4200	0	2	2	1	1	0
5	Sr.Tech	4200	0	25	25	20	5	0
6	Tech. - I	2800	0	49	49	18	31	0
7	Tech – II	2400	0	21	21	16	5	0
8	Tech – III	1900	0	29	29	31	0	2
9	Trip Shed	4600	0	0	0	1	0	1
10	Lorry Driver	2800	0	0	0	1	0	1
11	Lorry Driver	1900	0	2	2	1	1	0
12	TWD	2800	0	9	9	6	3	0
13	MVD – I	2800	0	1	1	0	1	0
14	MVD – III	1900	0	0	0	1	0	1
15	Asst. TRD	1800	4	76	80	78	2	0
		Total	4	247	251	197	61	7
16	Trainee		0	0	0	2		
1 CGA Post appointed as Asst.TRD in PL;1 O.O.ELE/TRD/10/2019 dt.21.08.2019 / NPS form yet to be submited by employee								
1 CGA Post appointed as Asst.TRD in PL;1 O.O.ELE/TRD/10/2019 dt.03.09.2019 / PRAN form yet to be Received								
33 RRC candidates appointed as Asst.TRD in various. O.O. till 31.10.2019								

The above table furnished by the DPO/TPJ includes some posts for centralized activities like TPC manning, drawing and technical staff utilized at Sr.DEE/o/TPJ, Trip shed etc. The work study has left over the above centralized activities staff, only the TRD depots staff of whole division is taken for manpower calculation. Therefore, the sanction and actual statement given by the DPO/TPJ is revised and tabulated as below (Excl. centralized staff).

Sl.No	Category	GP	Per	Temp	Sanc.	Act.	Vac	Ex
1	SSE/TRD	4600	0	21	21	9	12	0
2	JE/TRD	4200	0	12	12	13	0	1
3	Sr.Tech/TRD	4200	0	25	25	20	5	0
4	Tech-I/TRD	2800	0	49	49	18	31	0
5	Tech-II/TRD	2400	0	21	21	16	5	0
6	Tech-III/TRD	1900	0	29	29	31	0	2
7	TW driver	2800	0	9	9	6	3	0
8	Helper/TRD	1800	4	76	80	78	2	0
	Total		4	242	**246**	**191**	**58**	**3**
	Trainee/TRD		0	0	0	2	0	0

Since pinpointing of TRD depot wise is not implemented, the work study team has adopted for the manpower calculation of the entire division based on the depot wise TKM details given by the Sr.DEE/TRD/o/TPJ.

3.6 As per the current **benchmark issued by RB in the Month of Sept - 2019, (Placed as Annexure – II), it is shown that MLDT division of ER is at 0.04 men per electrified TKM.** Current Indian railways average is 0.30 men per electrified TKM for Non-Suburban Area.

3.7 Further, the Railway board is given the yardstick of Operation & Maintenance of various departments be revised vide letter No. E(MPP)2019/1/12 dated on 30.09.2019 (Placed as Annexure – III). The revised Yardstick for TRD activity of Electrical department for Non-Suburban Area is fixed as **0.22/Track Kilometre**, with the following activities to be additionally outsourced.

Activity	Remarks
OHE Non – Power block	These activities to be outsourced. Only minimum Supervisory agency and related work to be in house.
OHE other works	
PSI Maintenance	All PSI activities to be outsourced. Only minimum Supervisory and supporting staff required to monitor.
PSI Operation & Manning	
Centralized Activities	Activities excluding TPC manning, drawing, and technical staff including clerical staff and helpers at home.

Hence, the work study team has taken the second part of the Railway Board's revised Yardstick for entire manpower calculation of the above TRD depots.

3.8 **Depot wise TKM particulars given by Division office:**

Sl. No.	Depot	Jurisdiction	RKM/TKM	Remarks
1	TPJ	Chord line 301-342 KM, TPJ-TP, TPJ-KKDI, BHEL Siding, TPGY Yard, GOC bye pass line & GOC 3rd line	45/168	
2	ALU	Chord line 246-300 KM, MCL & TNCL at ALU, CCL at SLTH, Dalmia at KKPM.	54/155	
3	VRI	Chord line 195-245 KM, MCL & ICL at ICG	50/137	
4	VM	Chord line 163-194 KM, VM-PDY 1 KM – 37 KM, VM-KPD 1 KM – 17 KM.	85/153	
5	TNM	VM-KPD 18 – 83 KM	65/79	
6	ARV	VM-KPD 84 – 160 KM	76/85	
7	TJ	Main line TJ-TPJ 354 – 401 KM	47/104	
8	CUPJ	Main line VM-CUPJ 163-209 KM	46/63	
		Total electrified RKM/TKM	**468/944**	
9	MV	Main line CUPJ – TJ 210-354 KM Branch line MV-TVR 0 – 37 KM	181/230	Under Electrification by RE & RVNL.
10	TVR & KIK	TJ – KIK 0 – 96 KM, NGT – VLNK 0 -10 KM	106/125	
11	VRI & CUPJ	VRI – CUPJ 0 – 57 KM	57/64	Under the scope of 100% electrification process.
		Total electrification progress RKM/TKM	344/419	

As per Railway board revised yardstick as 0.22/TKM is adopted, the man power requirement of all TRD depots as tabulated below.

3.9 **Depot wise TKM Vs Staff Requirement:**

Sl. No	Depot	RKM	TKM	Yardstick = 0.22xTKM	LR @ 12.5%	Staff Required
1	TPJ	45/168	168	36.96	4.62	41.58
2	ALU	54/155	155	34.10	4.26	38.36
3	VRI	50/137	137	30.14	3.76	33.90
4	VM	85/153	153	33.66	4.20	37.86
5	TNM	65/79	79	17.38	2.17	19.55
6	ARV	76/85	85	18.70	2.34	21.04
7	TJ	47/104	104	22.88	2.86	25.74
8	CUPJ	46/63	63	13.86	1.73	15.59
		468/944	**944**	**207.68**	**25.94**	**233.62**

From the above table is shown that the staff requirement of the all TRD depots at TPJ division is 234.

Hence the total requirement of manpower is **234** for **8 depots**. The work study team has considered the manpower calculation based on the present working of depots only.

Further the electrification work of Main line CUPJ – TJ from 210-354 KM, Branch line MV-TVR 0 – 37 KM TJ – KIK 0 – 96 KM and NGT – VLNK 0 -10 KM are under progress by RE & RVNL for future requirements. The Co-ordinating officer has mentioned that 125 TKM of RE works completed from TVR to KIK section, it is to be waiting for CRS certification. The other MV section of 230 TKM railway electrification works is targeted during March-2020. These above railway electrifications may be commissioned in next financial year.

Hence, the present sanctioned strength has allowed and may be distributed the staff in each depots mentioned in the above table. So, the work study team has decided for staff deputed for other departmental works, preventive maintenances, improvement works

like extension of Railway Electrification etc. **it is suggested that the vacancy posts may be filled by the division early to maintain the assets in fettle condition.**

Therefore, the current revised Yardstick is adopted with activities to be additionally outsourced of OHE and PSI maintenance and applicable to the present working system and continued as such. This is the most suitable calculation and which is also very close to the present utilization of staff.

3.10 At present there is no ministerial staff in these units to cater to the works of establishment, staff welfare measures, stores etc. The work study team recommends to **division may create four ministerial posts for two units each.**

3.11 **Sanction Vs Requirement for all TRD depots in TPJ division:**

The staff requirement for all TRD depots in TPJ division is assessed and calculated as below.

Sl.No	Category	GP	Sanc.	Act.	Requirement	Surplus
1	SSE/TRD	4600	12	9	12	0
2	JE/TRD	4200	21	13	21	0
3	Sr.Tech/TRD	4200	25	20	25	0
4	Tech-I/TRD	2800	49	9	49	0
5	Tech-II/TRD	2400	21	10	21	0
6	Tech-III/TRD	1900	29	46	29	0
7	TW driver	2800	9	6	9	0
8	Helper/TRD	1800	80	60	80	0
Total			**246**	**173**	**246**	**0**

Recommendation of Surrender - N I L.

CHAPTER – IV

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

CHAPTER–V

5.0 FINANCIAL SAVINGS

5.1 If the recommendations made in the study report are implemented, the annual recurring financial savings will be as under:

- **N I L REPORT -**