EAST COAST RAILWAY

WORK STUDY REPORT

ON

ELECTRIC LOCO SHED/VSKP

(WAT DIVISION)

Study No.ECoR/WS/4/2020-21

ACKNOWLEDGEMENT

The work study team extends their gratitude to Officers & Staff of Electrical Department for their co-operation to complete the work study.

SYNOPSIS

Name of the work study	Work study of Electric Loco Shed at VSKP
Department/ Division	Electrical/WAT
Authority	Proposal of PCEE
Sanction posts	788
Staff on roll	751
Vacancy	37
Methodology	• Collection of data from ELS/VSKP • Comparison of MPR with ELS/ANGL • Application of RBS's yard stick for coaching locos.
Critical Analysis	Benchmarking is a continuous process for comparing different units and identifying the best among all. This is a method for improving the productivity of a unit by targeting the practices of other units, which produces and performs better than others.
No. of posts projected surplus	66

Contents

Chapter	Description	Page No
I	Introduction	1
II	Cadre position	2
III	Brief Description	3
IV	Contract Activities	4 - 5
V	Yard Stick	6 - 7
VI	Critical Analysis	8 - 9
VII	Man Power Calculation	10
VIII	Recommendation	11

Chapter-I
Introduction

Electric traction is an environmental-friendly, pollution-free and energy-efficient mode of transport, which offers an excellent alternative to fossil fuels, as a source of energy. Electric traction has reduced the nation's dependence on import of diesel oil. In view of the hike in oil prices, it is a challenge to contain costs and make judicious use of energy for hauling trains. Taking one step forward in this direction, Indian Railway has set up a plan to electrify 100% of its network by the end of 2023. To achieve the goal for transforming into 'Green Railways', IR has started inducting Alstom built Nation's most powerful 'Made-In-India' electric locomotives. In a major development, Alstom has started delivery of 12000HP, WAG-12B electric locomotives to railways, which is all set to revolutionize freight logistics in the country.

As of July'2020, IR has a fleet of more than 7000 electric locos (approx) and average holdings for most of the electric sheds have risen across railways due to increase in locomotive production. The number is expected to rise in coming days for managing the increased volume of traffic under the wire. On other side, there is a plan to downsize railways fleet of diesel locomotives and a substantial number of diesel units are likely to face the chopping block soon.

As a result, more emphasis has been placed for the maintenance of increasing fleet of electric locos. On other hand, electric locos have been modified over the years, which has not only increases the speed of locomotive but also reduced the man days requirement for various maintenance schedules.

At present, there are two electric loco sheds (ELS/VSKP & ELS/ANGL) in ECoR for maintenance of different type of locos, one at VSKP & the other at ANGL. Being one of the two loco sheds of ECoR, ELS/VSKP maintains various major and minor schedules of electric locomotives along with occasional repairing. The subject study has been undertaken with a view to assess the staff requirement due to modernization of locomotives and outsourcing/AMC of various activities of loco sheds.

Chapter-II
Cadre Position

Cadre position of ELS/VSKP furnished by DRM(P)/WAT on Dt. 22.10.2020

Srl	Category	Pay level	Sanction	On roll	Vacancy
1	SSE	7	48	44	04
2	JE	6	23	14	09
Supervisor		**Sub- total**	**71**	**58**	**13**
3	SSE (D&D)	7	02	02	00
	JE(D&D)	6	01	00	01
	CMS	7	02	01	01
	CMA	6	01	02	(-) 01
HQs control Supervisors		**Sub- total**	**06**	**05**	**01**
3	Sr. Tech	6	96	94	02
4	Tech-I	5	193	170	23
5	Tech-II	4	31	42	(-) 11
6	Tech-III	2	172	184	(-) 12
Technicians		**Sub- total**	**492**	**490**	**02**
7	Sr. Tech (Ancillary)	6	11	09	02
8	Tech-I (Ancillary)	5	20	10	10
9	Tech-II (Ancillary)	4	03	11	(-) 08
10	Tech-III (Ancillary)	2	06	05	01
Technicians (Ancillary)		**Sub-total**	**40**	**35**	**05**
11	OS	6	07	07	00
12	Sr.Clerk	5	03	03	00
13	Jr.Clerk	2	02	02	00
14	Stenographer	2	01	01	00
	Ministerial	**Sub-total**	**13**	**13**	**00**
15	Asst. loco Shed	1	163	148	15
16	Genl. Asst. (TRS)	1	02	02	00
17	Bungalow Peon	1	01	00	01
Group 'D'		**Sub-total**	**166**	**150**	**16**
Total			**788**	**751**	**37**

Chapter-III
Brief Description

The ELS/VSKP was commissioned in the year 1982 with mere holding of 35 Electric Locomotives for iron ore traffic of K-K line. Now it holds 300 locomotives (approx) and functioning round the clock in three shifts (0600 to 1400, 1400-2200 & 2200-0600) excluding one general shift from 0800 to 1700 hrs.

It maintains both coaching and freight locomotives of various types (WAG-5, WAG-9H, WAP-4 & WAP-7). Most of the freight locomotives of the shed are working in K-K line section and very rarely operate elsewhere. Like other loco sheds, it does regular schedule maintenance, overhaul and minor maintenance including painting and washing of locomotives. Various types of locomotives maintained at ELS/VSKP is produced in below table;

Srl	Type of Locomotive	Holding	New locos under commission at ELS/VSKP	Allotted by RB
1	WAG 5	84	-	-
2	WAG 6A	02 *	-	-
3	WAG 6B	03 *	-	-
4	WAG 6C	04 *	-	-
5	WAG 9H	167	05	07
6	WAP 4	21	-	-
7	WAP 7	33	02	07
	Total	**314**	**07**	**14**

* 18 locomotives from WAG 6A, WAG 6B & WAG 6C series (06 from each type) were imported from Sweden in the year 1985. Due to non-availability of indigenous vendor for supply of spare parts, these locomotives are in the process of condemnation in phased manner, as per directives of Railway Board. At present, 09 locomotives of WAG 6A/6B/6C are available at ELS/VSKP and working for shunting purpose/inferior services only. Out of these 09 locomotives, 03 are under process for condemnation.

As per Board's instruction, 20 WAG 9H locos have transferred to DLS/VSKP. On other hand 21 locomotives have allotted by RB. After transfer/ condemnation of locomotives, the holding comes to, 312. [(314 +07+14) - (20 + 03)]

(30)

Chapter-IV
Contract Activities

Table-A: Activities under outsourcing contract/AMC

Srl	Work description	Remarks
1	Overhauling, repair, rewinding and assembling of auxiliary motors of Electric Locomotives.	Outsourcing contracts (loco works)
2	Overhauling of Co-trimount cast steel WAG 5 locomotives & Flexi coil high speed bolster type Bogie Frames of WAP 4 locomotives of ELS/VSKP.	
3	Overhauling of WAP 7 loco bogie frames.	
4	Welding works of Electric locos at ELS/VSKP.	
5	Overhauling of Compressor MN/MNUG-1000 LPM	
6	Overhauling of Pantograph (make: AM12/IRO1H/ AM92/ IR03H)	
7	Overhauling of Air dryer (M/s SIL, FTIL, KB, Trident, Prag Polymers)	
8	Rebatting and fine machining of TAO659 Traction motor suspension Bearings.	
9	Cleaning works of locomotives.	
10	Comprehensive maintenance of fire extinguishers (DCPT & Co2) including refilling of Gas, Dry chemical powder and replacement of defective spare parts.	AMC of loco equipments and M&r items.
11	Annual Maintenance Contract for Universal Axle Journal Turning & Burnishing Lathe at ELS/VSKP.	
12	Comprehensive Annual Maintenance contract for SIEMENS make Static Inverter of electric locomotives at ELS/VSKP.	
13	Annual Maintenance Contract for Hydraulic Wheel Press Cap. 500 Ton S. No.110003 20.	
14	AMC for Universal Multipurpose Armature Machine	
15	Comprehensive AMC for MEDHA MPCS of electric locomotives.	
16	AMC for CNC Axle Turning Lathe At ELS/VSKP.	
17	CAMC for UNDERFLOOR WHEEL LATHE (NGUF-114) at ELS/VSKP.	
18	AMC for Ferrous Wear Debris Monitor Analex fdm plus model no. AS-K17142, SI. No.30064 at ELS/ VSKP.	

19	Cleaning works of ELS/VSKP.	Misc
20	Transportation of railway material by truck/trailer.	Vehicle contract
21	Hiring of One road vehicle i.e., TATA Sumo/Mahindra Bolero or equivalent for the official use of Sr.DEE/TRS/WAT.	
22	Hiring of One multi utility road vehicle ie., Mahindra Bolero camper Gold or similar for carriage of railway materials of ELS/VSKP.	
23	Hiring of Non-AC Diesel road vehicles (TATA Sumo/Mahindra Bolero/ Mahindra Scorpio or equivalent) along with driver for official use of DEE(TRS)/ADEE(TRS) of ELS/VSKP.	
24	Hiring of 3.5/4.0 Ton payload LCV Truck (Six wheeler) including Driver, state permits, toll gate charges and all other taxes, insurance and maintenance etc. for carriage of railway materials of ELS/VSKP.	

Table-B: Proposal under process for outsourcing

Srl	Description of work	Remarks
1	Annual Maintenance Contract for Vertical Turret Lathe at ELS/VSKP.	Estimate under process
2	Repairs of modules (Power/rectifier/Inverter/PCB cards etc.) pertaining to BHEL-IGBT traction converter and auxiliary converter of 3-phase locomotives at ELS/VSKP.	Estimate under process

Table-C: Activities which can be outsourced

Srl	Description of work	Remarks
1	Overhauling of Traction Motor (Conventional Locomotives) at ELS/VSKP.	Can be outsourced
2	Painting of 3 phase & WAP4 locomotives at ELS/VSKP.	Can be outsourced

(28)

Chapter-V
Yard Stick/Benchmark

Table-A: Revised yardstick issued by Board (dt.30.09.2019) for electric loco maintenance in loco sheds, with activities for outsourcing as mentioned below;

Srl	Type of locomotives	Revised yardstick (Sept'2019)
1	3-phase locomotive (WAG9, WAP7)	2.5 staff/loco
2	Conventional loco (freight) with DC drive with Hitachi TM (WAG 5) and WAG 7	3 staff/loco
3	Other conventional locos with DC drive including coaching locos	3.5 staff/loco

Already a number of activities are mandated to be outsourced and are being outsourced in various loco sheds. In addition the following activities to be additionally outsourced;

- **Conventional locomotives** - DC TM overhauling; overhauling of contractors by OEMs; overhauling of Auxiliary motor.
- **Three phase locomotives** - Compressor overhauling; TM overhauling; Overhauling of Auxiliary motors.

Further activities to be outsourced can be identified by respective loco sheds and followed accordingly with approval of respective PCEE on local basis and local condition.

Table-B: IR Benchmark (staff on roll per loco) for Electric Loco Sheds

Loco shed	MPR (Staff on roll per loco)	Remarks
BSP (SECR)	1.03	The latest MPR figure uploaded by RB in the month of July'2020

Table-C: Man Power Ratio of ELS/VSKP & ELS/ANGL as per loco holding furnished by both sheds.

Srl	Loco shed	Loco Holding	Loco service	Staff on roll	MPR (Staff on roll per loco)
1	VSKP	312 (as on 16.09.2020)	Both	751	2.41
2	ANGL	216 (as on 19.10.2020)	Freight	376	1.75

Chapter - VI
Critical Analysis

As per latest man power ratio of Electric Loco Sheds uploaded by Railway Board (July'2020), ELS/BSP of SECR is maintaining locos with least man power (1.03 staff/ loco), which is the benchmark of IRs. Whereas, the present MPR of ELS/VSKP & ELS/ANGL is 2.41 & 1.75 respectively, as per the loco holding furnished by respective sheds.

Activities such as; overhauling, repair, rewinding and assembling of auxiliary motors, overhauling of WAP-7 loco bogie frames, overhauling of compressor/ pantograph/air dryer, welding works, cleaning works, overhauling of co-trimount cast steel WAG 5 locomotives & Flexi coil high speed bolster type bogie frames of WAP-4 locomotives, etc. are being outsourced at ELS/VSKP. AMCs are also in force for loco equipments and M & P items and some AMCs are in pipe line.

Since a lot of maintenance activities of both sheds are being outsourced, comparison of Man Power Ratio for similar type of locomotives is a better option, than application of yard stick.

After comparing the MPR of both sheds it can be said that, there is a wide gap between MPR of two sheds, which needs to be minimized by optimum utilization of available human resource. Though ELS/ANGL has the advantage of maintaining only one type of locomotive (WAG 7), the man power ratio of 1.75 staff per loco cannot be ignored completely for this reason. On other side, ELS/VSKP has also the advantage of maximum number of 3-phase locomotives (159 out of 312 holding), which require less maintenance in comparison to other locomotives. So, there should not be any hesitation to compare the MPR of ELS/VSKP with MPR of ELS/ANGL, since both are within the same Zone.

Benchmarking is a continuous process for comparing different units and identifying the best among all. This is a method for improving the productivity by targeting the practices of other units, which produces and performs better than others.

(26)

As per Railway Board's yard stick it is apparent that;

1. Manpower requirement for maintenance of conventional locos WAG 5 & WAG 7 is same for both locomotives.

2. The manpower requirement for maintenance of 3-phase locomotive WAG 9 is less, in comparison to manpower requirement for conventional locos. (WAG 5 & WAG 7)

Taking into account above two aspects of Board and latest MPR of ELS/ANGL, logically it can be said that;

1. Since ELS/ANGL is maintaining WAG 7 locomotives with 1.75 staff per loco, ELS/VSKP can also maintain similar type of locomotive (WAG 5) with same Man Power Ratio i.e. 1.75 staff per loco.

And

2. 3-phase locomotive WAG 9H can be maintained with less than 1.75 staff per loco.

To bring down the MPR gap of two sheds, the staff strength of ELS/VSKP has to be reduced in phased manner, at least 50% of excess posts initially in 1st ~~phase~~. Taking into consideration the above aspect, the man power requirement of ELS/VSKP is calculated in the next chapter.

Chapter-VII
Man Power Calculation

Taking into consideration the MPR of ELS/ANGL and Railway Board's yard stick , the staff requirement of ELS/VSKP is calculated in below table.

Table-A: Staff requirement of ELS/VSKP

Srl	Type of loco	RB yard stick/ ANGL MPR	Present holding	Staff requirement	Remarks
1	WAG 5	1.75 staff/loco	84	147	As per MPR of ELS/ANGL
2	WAG 9H	1.75 staff/loco	159	278.3	As per MPR of ELS/ANGL
3	WAG 6A/ 6B/6C	1.75 staff/loco	06 *	10.5	As per MPR of ELS/ANGL
4	WAP 7	2.5 staff/loco	42	105	As per RB's yard stick, since chg. locomotives are not maintained at ANGL
5	WAP 4	3.5 staff/loco	21	73.5	
		Total	**312**	**614.3 say 615**	

* out of 09 locomotives 03 are under process for condemnation.

Table-B: Staff of ELS cadre working outside ELS

Srl	Station/work centre	No. of staff engaged
1	Trip shed/VSKP	18
2	VZM	01
3	KRPU	05
4	BCHL	08
5	CC/loco	03
6	MDTC	01
7	Sr.DEE(OP)	02
8	DRM Secretariat	03
	Total	**41**

Total staff requirement for; Electric Loco Maintenance/Wheel shop activities at ELS/VSKP and outside ELS/VSKP = 615 (Table-A) + 41 (Table-B) = **656**

Table-C: Sanction, requirement and reduction of post

Present sanction	Requirement	Excess	Proposed surrender (50% of excess posts)	Proposed sanction
788	656	132	66 *	722

* Department may identify the category of posts to be surrendered.

(24)

Chapter - VIII
Recommendation

- Out of 788 sanction posts, 66 posts may be surrendered and surplus staff re-deployed accordingly.