WORK STUDY TO REVIEW THE STAFF STRENGTH OF DIESEL SHED/GOC – TIRUCHCHIRAPPALLI DIVISION

SOUTHERN RAILWAY

PLANNING BRANCH

G.275/WSSR-191819/2018-19

WORK STUDY TO REVIEW THE STAFF STRENGTH OF DIESEL SHED/GOC TIRUCHCHIRAPPALLI DIVISION

STUDIED BY

WORK STUDY TEAM
OF
PLANNING BRANCH

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SRSR

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(i)

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(ii)

TERMS OF REFERENCE

Work study to review the staff strength of Diesel Shed/GOC.

(iii)

METHODOLOGY

1) Collection of data.
2) Observation of present system of working.
3) Interaction with DME/ADME and supervisors of Diesel shed/GOC.
4) Analysed the data collected and assessed the manpower requirement based on the present and future workload of Diesel Locos duly incorporating the Yardstick/Benchmarking.

(iv)

SUMMARY OF RECOMMENDATION

REVISED RECOMMENDATION

The following posts mentioned in the Table is found surplus, the same may be surrendered and credited to the Vacancy Bank.

(Total - 22 Posts)

Sl. No.	Category	Grade Pay/Level	No. of posts
1	JE	4200/6	4
2	Sr.Tech / SSD	4200/6	3
3	Tech.Gr.I / SSD	2800/5	5
4	CMS	4600/7	3
5	CMA	4200/6	1
6	Lab Attendant	1900/2	2
7	Lab Assistant	1800/1	1
8	Turner Gr.II	2400/3	3
TOTAL			**22**

CHAPTER - I

1.0 INTRODUCTION

1.1 Locomotives are the most significant assets of the Railways which provide motive power for both Passenger and Freight services. Timely availability and reliability of performance of Locos are critical to the train operations. For this, timely, regular and adequate maintenance for ensuring their good running condition is necessitated.

1.2 In order to cater the requirements, each locomotive is assigned to a designated loco shed to monitor as per the schedules and unscheduled maintenance as and when needed at 4 Diesel loco sheds and 3 Electric loco sheds over Southern Railway. TNP, GOC, ED and ERS are the four Diesel sheds whereas RPM, AJJ, and ED are Electric loco sheds.

In addition to the above mentioned activities, two workshops viz., CWS/GOC and LW/PER. is also functioning for Periodic overhauling, heavy repairs and Midterm Rehabilitation. CWS/GOC is maintaining Diesel Locos whereas LW/PER for Electric locos and DEMUs.

1.3 In Indian Railways, two kinds of Locos are rolling viz., Diesel and Electric. Diesel engines are of two types namely ALCO and EMD. The BG locos are available in different versions and variants like WDM2, WDM3A, WDP3A, WDG3A, WDP4B, WDP4D, WDG4, WDG4D and MG Locos are YDM2 and YDM4 and DEMUs of 700 & 1400 HP. Generally the HP more than 4000 is termed as HHP (High Horse power) i.e, Generation X and the remaining is ALCO.

1.4 Today`s modern Diesel locomotive with electric transmission have all the benefits of modern technology. Even though diesel locomotive is able to work under all conditions and terrains compared to Electric

locomotives, Indian Railway prefers electric ones because the expenditure incurred on Fuel is very high i.e., 30% of the Ordinary Working Expenses, the second biggest component of Expenditure.

1.5 **The classification Codes of Locos** :

W - indicates Gauge - Broad Gauge; Y for Metre gauge;
D - indicates Traction - Diesel; A- for AC traction.
P - indicates Service - Passenger; G for Goods, M for Mixed and S for Shunting, U for EMU and R for Rail cars.
3A - indicates Power - 3100 (3 X 1000 +100) and A represents 100 Hp Whereas B and D is 200 and 500 respectively

In addition, each loco is numbered with 5 digits for easy identification. In HHP /EMD Locos, the letter `D` in the end denotes Dual Cab.

1.6 Diesel shed, Golden rock is an engine shed or otherwise known as Loco shed for maintenance of Diesel locos, located north of GOC Railway station falling under TPJ division is the largest of four diesel loco sheds in Southern Railway with a holding of 106 Main line locos and 5 shunting locos.

1.7 The shed started functioning in the year 1975 sprawling over a total area of 1,69,000 square metres, It initially homed YDM-4 class MG locomotives, further expanded to hold BG locomotives in the year 1993 and again in the year 2000 to equip more than 100 BG locomotives. The shed also houses a Diesel Traction Training Centre (DTTC) from 1988 to impart theoretical and practical training to newly recruited ALP, serving LPs, Engineers and other technical staff.

1.8 This is the first Diesel Shed in Southern railway to be awarded with the prestigious ISO-9002 certification in the year 1998 for reliability and the better performance of locos by persistent enhancement in

maintaining the quality. Moreover the Shed takes more care in environmental related issues and Safety measures.

1.9 Due to technological advancement and introduction of electrical locos, and aged diesel locos, the workload of maintaining diesel locos is reduced to a larger extent.

1.10 An attempt has been made to review the staff strength of Diesel Shed/ GOC in commensurate with the present and future workload duly taking into account of increased Electric locos. It is to be mentioned that the number of Main line Diesel Locos owned by Southern Railway is steadily decreasing for the past few years.

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CHAPTER – II

2.0 PRESENT SCENERIO

2.1 The Diesel Shed/GOC is headed by Divisional Mechanical Engineer who is assisted by two ADMEs who in turn have a team of supervisors.

2.2 WDP locos of GOC shed serve the following coaching terminals : VM, MV, TPJ and MDU. WDS locos perform shunting in different places of TPJ and MDU Divisions. Now-a-days WDM2 locos are used for shunting purposes. Staff of this shed is deputed at four points viz., VM, MV, TPJ and MDU for Trouble Shooting Attention.

2.3 Diesel Shed/GOC is equipped with 6 Light Schedule Bays and 2 Heavy schedule Bays. Apart from this, One Wheel Lathe, One Loco wash Bay, one ETP and Four EOT cranes is also provided. Further, one RCD is functioning with 2 storage tanks with a capacity of 439 KL and one Bio diesel tank with 20 KL capacity. One CMT lab and DTTC is also attached to the Diesel Shed.

2.4 The detailed Category wise Sanction, Actual and Vacancy statement is shown in **Annexure I & II**.

The actual strength of both Mechanical and Electrical staff as on 18.09.2019 is 588 against the sanctioned strength of 682, out of which 348 are Mechanical staff whereas 215 are Electrical Staff. This includes the staff of CMT Lab, Canteen and Power side leaving behind a Net vacancy of 94 staff.

2.5 The maintenance of locos are performed by two sections namely,

i) Heavy Schedule Section.

ii) Light Schedule Section.

2.6 The works carried out in these sections is checking of locos on the track for minor repairs attending Trip Schedule, Monthly at Light Schedule Bays Quarterly, half yearly and Yearly schedules of locos at Heavy Schedule Bays. . In order to detect leaky joints, faulty valves and clamp Intactness, Initial Running Check (IRC) is done prior to Schedule attention. After Schedule attention, the Final Running Check (FRC) is done before Despatch of Loco for Traffic.

2.7 The heavy Schedule works are carried out though the following units/Section.

- Air Brake
- Under Truck
- Pump and Blower
- Compressor
- Cylinder Head/Exhaust Arm & Injector Arm (HHP)
- Fuel Injection Pump/Woodward Governor
- Power Pack
- Heat Exchanger
- Turbo Supercharger
- Control Gear
- Small Motor-DC
- Speedometer
- Speed Sensor/Pulse generator
- Traction Motor
- Wiring
- Battery
- Auxiliaries
- DEMU

2.8 The maintenance of Diesel and DPC (DEMU) locos is carried out through

the following units and the activities involved in each section is detailed

under the respective heads.

(I) Air Brake Section:

Overhauling and testing of		
○ A9 Brake Valve ○ SA9 Brake Valve ○ C3W Distributor Valve ○ C2W Relay Valve ○ D24B Feed Valve ○ AFM Valve ○ Horn Magnet Valve ○ Sander Magnet	○ Air Dryer Valve ○ F2 Feed Valve ○ F1 Selector Valve ○ Angle Cock ○ D1 Emergency Valve ○ Wiper Motor ○ Run Release Valve ○ Limiting Valve	○ 24 A Double Check Valve ○ MU2B Valve ○ 28VB Valve ○ H5A Air Relay Valve ○ HB5 Air Relay Valve ○ PVERI/PVBC Piston Valve ○ PVBIT Piston Valve

List of Registers:

- Schedule Inspection Register
- Sanding Gear Inspection Record
- Air Drier Schedule Attention Register

(II) Under Truck Section:

Truck Stripping and ***Attention/Overhauling of***		
○ Bogie Fame ○ Brake Rigging ○ Brake Cylinder ○ Pipelines ○ Axle and Axle Box ○ Wick Lubricator ○ Wheel and Traction Motor Assembly ○ Suspension Components ○ Traction Motor Suspension Resilient Pad Assembly	○ Bogie Fame ○ Brake Rigging ○ Brake Cylinder ○ Pipelines ○ Axle and Axle Box ○ Wick Lubricator ○ Wheel and Traction Motor Assembly ○ Suspension Components ○ Traction Motor Suspension Resilient Pad Assembly	○ Break in Test ○ Chassis ○ Truck Application ○ Couplers, Buffers and Guards. ○ Bolster and Bogie Frame ○ Wheel and Axle Assembly ○ Coupler assembly, Side Buffer and Coil Spring. ○ Wheel Turning of Locos

(III) Pump & Blower Section:

Overhauling and Testing of		
○ Front Truck Traction Motor Blower ○ Rear Truck Traction Motor	○ Blower ○ Lube Oil Pump ○ Water Pump	○ After Cooler Gear Unit ○ Scavenging Oil Pump ○ Main Lube Oil and Piston Cooling Oil Pumps.

(IV) Compressor Section:

Overhauling of	
○ Compressor ○ Inlet, Discharge Valve and Unloader Valve Assembly	○ Inter Cooler Assembly ○ Lube Oil Pump Assembly

(V) Cylinder Head Section:

Overhauling of	
○ Cylinder heads ○ FIP Support Assembly ○ Valve Lever Assembly	○ Valve Lever Casing, FIP Support Cover, Sump Door and Explosion Door ○ Valve Bridge Assembly ○ Rocker Arm Assembly

(VI) Fuel Injection Pump & Governor:

Overhauling /Attention	
○ Fuel Injection Pumps ○ Fuel Injector High Pressure	○ Woodward Governor ○ Driver Gear

(VII) Power Pack:

Overhauling/Renewal/Attention/Alignment of		
○ Cylinder Liners ○ Main Bearing ○ Piston and Connecting Rod Assembly ○ Cam Shaft and Gear ○ Exhaust Manifold ○ Water Riser Pipe ○ Exhaust Chamber ○ Accessory End Flexible Drive and Coupling Rubber Bushes ○ Engine Block Pressure	○ Air Inlet Elbows ○ Over Speed Trip Assembly ○ Water Glow Rod Guage ○ Expansion Tank ○ Engine Sump ○ Engine Cranking ○ Load Testing ○ Main Alternator Assembly ○ Engine Block to Main Alternator	○ Changing Traction Alternator/Generator ○ Extension Shaft ○ Power pack One Revolution ○ Measuring of Power Pack Assembly Lead Wire ○ Main Bearing Lower ○ Connecting Rod Bearing ○ Unloading, Overhauling and Assembling of Power

(VIII) Turbo Supercharger Section:

Overhauling/Changing/Attention to		
○ GE Turbo ○ ABB-VTC304 Turbo ○ ALCO 720 Turbo ○ Water Cooled Large After Cooler ○ Cleaning and Blowing Air Cooled After Cooler	○ Twin After Cooler Housing ○ Turbo Super Charger ○ Dynamic Balancing of Turbo Rotor Assembly ○ Soak Back Pump ○ Fuel Pipelines,	○ Fuel Booster Pump ○ Relief and Regulator Valve ○ Fuel Oil Glow Rod Gauge ○ Specific Fuel Consumption ○ Test Stands.

(IX) Heat Exchanger Section:

Attention/Overhauling/Testing/Regulating		
○ Lube oil relief and Bypass valves. ○ Online Centrifuge ○ Lube oil Strainer ○ Lube Oil Filter Assembly ○ Lube oil system	○ Lube oil relief and Bypass valves. ○ Online Centrifuge ○ Lube oil Strainer ○ Lube Oil Filter Assembly ○ Lube Oil Cooler	○ Cooling water system pipelines ○ Radiator Fan Assembly ○ Plate type Lube oil cooler ○ Right Angle Gear Box ○ Hot oil Detector ○ Lube oil pump for

(X) Light Schedule (Mechanical)

Overhauling /Attention	
○ Trip Schedule (T1) Schedule ○ Trip Schedule (T2) Schedule	○ Seasonal Precautions: Summer/Winter ○ Super Check of Locos

(XI) DEMU:

Attention to	
○ Trip Schedule for 700 HP & 1400 HP ○ Monthly Schedule (Both Mechanical & Electrical) ○ Quarterly Schedule	○ Half yearly Schedule ○ Quality Plan – Trip – Electrical

(XII) Auxiliaries Section:

Overhauling of	
○ Auxiliary Generator/Exciter Generator ○ Eddy Current Clutch ○ Braking Blower	○ Electronic/Dust Bin Blower Motor ○ Dynamic Brake Grid Blower Motor

(XIII) Battery Section:

Overhauling of

○ Quarterly Schedule of Maintenance ○ Half yearly Schedule of	○ Yearly Schedule of Maintenance ○ Commissioning of New

(XIV) Control Gear Section:

Overhauling/Attention to:		
○ Resistor Panels ○ Relays ○ Magnetic Contactors ○ Power Contactors ○ Magnet Valves ○ Meter Calibration - TA/BE Meter ○ Meter Calibration- Speedometer ○ GP Relays of HHP Locos ○ GR Relays of EMD Locos ○ TCC Blower Contactor	○ Electro-Pneumatic Governor/Horn/Sander ○ Master Controllers ○ Breakers, Switches and Wheel Slip Buzzer and Alarm gang ○ BKT/REV Power Switches ○ Twin Beam Head Light ○ SCR Assembly ○ Battery Charging Assembly ○ ST Contactor ○ STA Contactor	○ Voltage Regulation Panel ○ Engine Control Panel ○ Transition Panels with Cards ○ Excitation Control Panel ○ Electronic Components ○ DCL Motor ○ DCL Switch Assembly ○ Braking Contactor ○ TA Rectifier ○ Radiator Fan Contactor ○ Generator Field Contactor ○ Generator Field Decay Contactor

(XV) Light Schedule (Electrical)

Attention to	
○ Track through Schedule ○ T1 and T2 Schedule	○ M2 Schedule ○ Trip Schedule

List of Registers:

- Calibration History Register
- Verification History Register

- Customer Complaints Register
- Locomotive History Register
- T1/T2 Schedule Card
- M2 Schedule Card
- Trip/Monthly Schedule Card
- Rework/Deviation Approval Register
- Staff Training File
- Summer Precautions Register

(XVI) Small Motors Section (DC):

Overhauling of		
○ DC Fuel Pump ○ AC Fuel Pump ○ DC Crank Case Exhaust Motor	○ AC Crank Case Exhaust Motor ○ AC Dust Exhaust Motor ○ Axle Driven Alternator	○ Starting Motor ○ Governor Booster Pump ○ DC Turbo Lubrication Motor ○ AC Turbo Lubrication

(XVII) Speedometer Section:

Attention to	
○ Schedule of Maintenance ○ Yearly Schedule Attendance of Radar	○ Speed Time Distance Recorder ○ Pulse Generator/OPSS

(XVIII) Traction Motor Section:

Attention/Assembling of

○ Magnet Frame ○ Armature ○ Bush Arm and Assembly Parts	○ Dismantling ○ Pinion Mounting ○ Final Attention ○ Predespatch Examination

(XIX) Wiring Section:

Attention to	
○ Stripping of Components ○ Wiring Attention ○ Lighting Attention Grid Attention ○ Sequence Checking	○ No Load Testing ○ Load Testing ○ Welding Precautions for HHP Medha & EMD Locos

2.9 Time Office:

Apart from ensuring the employees Sign on and Sign Off, the activities in Time office includes,

- General Correspondence of Staff matters.
- Staff Training Programme.
- DAR Cases/ Award.
- Attending OLIC and other meetings conducted by DME/Dsl/GOC and other officials.
- Coordinating with SSE/General in day to day work.
- Preparation of Salary bill for all Group `C` and Group `D` employees.
- Forwarding of TA/NHA/NDA Statements.
- Preparation of Act Apprentice staff bills.
- Making entry of Tokens numbers from the Sign On Board in the Token Book and cross check the token book with daily staff position furnished by the Sections- in- charge.
- Forwarding of daily staff position to DME/Dsl/GOC depicting percentage of staff on duty and ineffective strength of both Mechanical and Electrical Wings.

- Maintenance of nearly 22 Attendance Registers.

2.10 Planning and Progress:

The section deals with monitoring of the Incoming Locos, despatch of Locos for Traffic and is responsible for the daily outage and Laid up of Main line locos. As on October 2018, the total holding is 111 of which 5 are allotted for shunting purposes. 2 locos/shift is dispatched for Traffic. Daily average is 8 per day.

2.11 Railway Consumer Depot (RCD)

The RCD attached to Diesel Shed is equipped with three storage Tanks of IOCL with a holding capacity of 229, 210 and 20 KL. The 20 KL storage tank is Bio diesel. Daily 3 loads of 12KL is received by the depot and approximately 35 KL is issued daily for Locos. In terms of number of Issue Vouchers, it is 13 locos on an average per day.

There are 15 Fueling points spread over at three places, of which 8 are in the yard, 3 in Mid-point and 4 in the Diesel Shed.

The activities involved in this section is,

- Dip Measurement to be taken daily at 08.00 hrs and 16.00 hrs in addition to the arrival of Truck (before and after filling)
- Decanting work.
- Monitoring of Flow meter at the time of distribution of fuel to locos.
- Taking fuel oil samples for periodical lab testing.
- Releasing of air lock of hoses at regular intervals.
- Checking of pipelines and valves then and there and attention of leakage of pipe/Hose joints temporarily.
- Keeping the premises clean without dry leaves.
- Data entry in ROAMS (Rolling stock Asset Management System) with regard to daily Fuel issue vouchers (FB 27) before 10.00 hrs daily.

- Daily stock position to be given at 24.00 hrs to Power controller.

- Preparation of monthly statements to Dy CME/Fuel and PFA on the first week of every month.

2.12 Laboratary:

A laboratory under the head of ACMT with a team of supervisors is attached with this shed. The following activities are involved in this section.

- Testing of Lube oil taken from the incoming Locos to check viscosity, Flash point, Water contamination, Presence of Hydrogen and Total Base Number.
- Testing of Coolant water taken from the Incoming Locos to check corrosion inhibitors, Hardness, Chloride content and Presence of Hydrogen in water.
- Testing of HSD oil from the incoming Locos to check water contamination and sediments.
- Suitability for any new items received by suppliers through stores. Some of them are Gasket Casing, Hexagonal Head Bolt, Soap used in Loco washing, Lube oil.

2.13 Material Control Cell:

This section deals with Indenting, Processing and Procurement of Stock items used for Locomotives as and when needed through the office of PCMM. As on date, there are about 1000 Mechanical items and 430 Electrical items. Besides this, Inspection and certification of stores received and chasing of vital items from Shops and open market are involved.

2.14 Machinery & Plant:

The section deals with the Receipt, Commissioning and Repairs of machineries and Plants provided in the Diesel shed. Approximately 146 items are included in the M&P list. Some of the major items are EOT Cranes, Wheel Lathes, Fork Lifts, Power Drilling Machines, Welding Plants, Hydraulic Press, Air Compressor, Platform Truck, Lorries and one Chevrolet Tavera Vehicle.

2.15 Pit Wheel Lathe:

If any non-conformity noticed in the Initial Running Check, the Section checks the wheel Diameter, Gauge and Height of the Incoming Locos (TMR).

2.16 Deployment of Section wise staff strength of Electrical Wing :-

Sl. No.	Section	SSE	JE	Sr.Tech	Tech Gr.I	Tech Gr. II	Tech Gr. III	KHP	TOTAL
1	SSE/Elec	1	0	0	0	0	0	0	1
2	SSE/E/Shift/ Running	3	2	7	11	5	12	5	45
3	Wiring	2	2	10	7	4	4	2	31
4	Fuel Bunk	0	0	0	0	0	0	1	1
5	Traction Generator	1	0	3	3	0	1	1	9
6	Auxillary	0	0	3	7	0	2	0	12
7	MCC	1	0	1	0	0	1	4	7
8	Computer	1	0	1	0	0	0	0	2
9	SSE/R/Mech	0	0	0	0	0	0	1	1
10	Traction Motor	1	0	9	9	4	0	4	27
11	Small Motor	1	0	3	2	2	1	0	9
12	Speedometer	0	0	2	0	0	1	0	3
13	Power side	1	0	2	2	1	2	2	10
14	Battery	0	0	2	2	2	0	2	8
15	Under Truck	0	0	0	0	0	0	1	1
16	Modification	0	0	0	0	0	0	1	1
17	Control Gear	1	0	5	13	1	1	3	24
18	DEMU	1	0	4	4	2	3	3	17
19	AC Shed (Trip Shed)	0	0	0	0	0	2	0	2
20	TSP/MDU	0	0	2	0	0	1	0	3
21	TSP/VM	0	0	0	0	2	0	0	2
22	JE/Training	0	0	0	0	1	0	0	1
23	Deputation	1	0	0	0	0	0	0	1
	TOTAL	**15**	**4**	**54**	**60**	**24**	**31**	**30**	**218**

2.17 Deployment of Section wise staff strength of Mechanical Wing :-

Sl. No.	Section	SSE	JE	Sr. Tech	Tech Gr.I	Tech Gr. II	Tech Gr. III	KHP	P. MAN	TOTAL
1	SSE/G	1	0	0	0	0	0	0	0	1
2	TA to Sr.DME	1	0	0	0	0	0	0	0	1
3	Sr.DME/O/GOC	1	1	0	0	0	0	0	0	2
4	SSE/M/Shift/ Running	6	1	8	10	2	1	11	5	44
5	Under Truck	5	1	10	17	10	1	6	0	50
6	Modification	2	0	5	5	1	3	16	0	32
7	Fuel/RCD	1	0	2	2	1	1	8	0	15
8	Turbo & Fuel Oil System	1	1	5	5	2	0	1	0	15
9	FIP & Governor	1	0	6	8	2	0	0	0	17
10	Material Control Cell	1	1	0	2	0	0	1	0	5
11	Computer Centre	0	0	0	1	0	0	2	0	3
12	Compressor	2	0	4	9	2	0	0	0	17
13	Mechanical Store	0	0	3	2	0	0	1	0	6
14	M&P	1	0	2	1	1	0	0	0	5
15	Air Brake	1	2	4	7	2	3	3	0	22
16	Statistical	0	1	1	3	0	0	1	0	6
17	Power Pack	5	0	12	10	4	2	5	0	38
18	Heat Exchanger	2	0	4	5	1	0	2	0	14
19	Pump & Blower	1	0	3	4	1	0	0	0	9
20	Pit Wheel Lathe	1	0	1	2	2	1	1	0	8
21	Cylinder Head	1	0	8	5	1	1	4	0	20
22	DEMU	2	1	1	5	2	0	3	0	14
23	Time Office	0	0	1	0	0	0	1	0	2
24	DTTC	0	0	0	0	1	0	0	0	1
25	AC Loco shed (Trip Shed)	0	0	0	0	1	0	1	0	2
26	TSP/MDU	0	0	0	0	0	1	0	0	1
27	TSP/VM	0	0	1	1	1	0	0	0	3
28	JE/Trainee	0	0	0	2	0	1	0	0	3

	TOTAL	**36**	**9**	**81**	**106**	**37**	**15**	**67**	**5**	**356**

2.18 Staff strength of LAB :-

Sl. No.	Category	No of Staff
1	CMS	6
2	CMA	2
3	Lab Attendant	4
4	Lab Assistant	1
	Total	**13**

2.19 Staff strength of Motor Vehicle Drivers :-

Sl. No.	Category	No of Staff
1	Tech.Gr.I	1
2	Tech.Gr.II	1
	Total	**2**

2.20 staff strength of Canteen :-

Sl. No.	Category	No of Staff
1	Cook	2
2	Bearer	5
	Total	**7**

CHAPTER – III

3.0 CRITICAL ANALYSIS

3.1 In the present technologically advanced scenario, many of the components provided in the HHP and also modern ALCO types are of high end technologies like Microprocessor Excitation, Propulsion Controlled System, Microcontroller based Governors, PTLOCs, IGBT, DC Link, CCB which requires higher educational and intelligence level. The constant need of up gradation of proprietary software leads to outsourcing and the need of awarding AMC to OEM is inevitable. Moreover, many of the assemblies have distinct parts which have to be supplied by the original manufacturer only.

3.2 In this context, it has already been awarded AMC to OEM like Medha, EMD and other like companies for the following activities.

- IGBT based TCC along with LCC.
- Microprocessor based control system.
- Computer controlled bench top rotating disc electrode Spectrometer.
- SLI system of Cummins engine of 140 T BD crane.
- Power pack items HS- SPARTs at TPJ and MDU.
- D-Check for Cummins make engine of DPC.
- Housekeeping, Cleaning and gardening of premises.

3.3 Other activities having potential for outsourcing is listed below.

- Painting of Locos.
- Overhauling of Engine Assemblies like Cylinder head, Fuel Injection pumps, Injectors, Water and Lube oil pumps
- Supply and filling up of sands
- Maintenance of TCC
- Overhauling of Accessories like FTTM Blowers, ECC, Radiator and Radiator Fan etc.
- Overhauling of RTTM Blowers.

3.4 Since manpower is the biggest component of the expenditure of Indian Railways, rightsizing of its manpower is essential to increase efficiency and economy. For this purpose, Railway Board has issued frequent policy guidelines in restricting the intake of staff and utilization of the existing manpower to the optimum level.

Keeping this objective in view, Railway Board has been conducting Benchmarking exercise for all the departments. Member Staff has directed all the Railways to take the following action on Benchmarking Report.

(a) For the activity centres/divisions with MPRs (Man Power Ratio) above the average should bring down their MPR to the IR average.

(b) Other activity centres/divisions already having the benchmark below the Indian Railway average should try to move towards the best benchmarking figures on the IR.

3.5 As far as locomotives are concerned, focus has now shifted at the Apex level to have a phased elimination of diesel locos and proliferation of Electric engines. Instructions were given to stop Rehabilitation and investment on diesel locos, instead scaling up of electrification of the entire rail network for ecofriendly rail transportation. It is to be mentioned at this juncture that nearly 50% of its Route Kilometers are electrified as on March 2018 and steps are being taken by CORE/ALD to complete the electrification of the entire RKM by the year 2022 under `Mission Electrification` involving RVNL, IRCON and PGCIL for speedy implementation in RE works. 6000 Route Kms is targeted for 2018-19.

3.6 In this context, as far as Southern Railway is concerned, progress of electrification as on March 2018 is 70%. Southern Railway comprises mainly the states of Kerala and Tamilnadu. In Kerala state, 855 out of

1024 RKM are electrified which accounts for 84% whereas in Tamilnadu it is 55.5% i.e., 2034 out of 3669 RKMs. The Target for 2018-19 is 237 Kms.

Hence, it is imperative to have a hard look at reviewing the staff strength involved in the maintenance of diesel locos in the event of electrification works being in full swing.

3.7 Loco holding of mainline locos in Diesel Shed/GOC is 111, of which 52 locos are of ALCO, 54 of HHP/EMD and 5 Shunting locos.

3.8 **The types of schedules and the periodicity are as follows:**

Type of heavy schedule	WDM-2	WDM-3A	WDM-3D	WDG-2	WDP-4D
Quarterly	Once in 4 months	Once in 4 months	Once in 4 months	Once in 4 months	Once in 3 months
Half yearly	12 months	12 months	12 months	12 months	
Yearly Schedule					
M 24	24 months	24 months	24 months	24 months	
M 48	48 months	48 months	48 months	48 months	
M 72	72 months	72 months	72 months	72 months	
POH	96 months	96 months	96 months	96 months	

a. **Passenger Locos:-**

Type of Light schedule	WDM-3A	WDP-3A	WDP-4B	WDP-4D
T1	Between 7 – 10 days	Between 7 – 10 days	Between 7 – 10 days	Between 7 – 10 days
T2	Once in 15 days	Once in 15 days	Once in 15 days	Once in 15 days
Monthly	Once in 30 days	Once in 30 days	Once in 30 days	Once in 30 days

b. Freight Locos:-

Type of Light schedule	WDG-3A	WDG-4	WDG-4D	WDM-2
T1	20 days	20 days	20 days	20 days
T2	20 days	20 days	30 days	20 days
Monthly	Once in 30 days	Once in 30 days	Once in 40/60 days	Once in 60 days

3.9 WDM-2 and WDM-3A are presently used for yard purposes and in general, locos of any old version which have run for more than 20 years is decommissioned from Main line traffic. It is visible from the data furnished, 23 locos are of above 18 years and 8 are of above 25 years which accounts for 30% of the present holding resulting in lesser maintenance.

3.10 Performance of Locos is determined by the number of Statistical and Incidence failures. As on August 2018, the number of Statistical failures is 20 whereas it is 25 in the case of Incidence.

3.11 The duty hours of Running Shift i.e., Trip and Monthly schedule is round the clock. Totally 4 shifts are running including one General shift as follows

06.00-14.00 hrs
14.00-22.00 hrs
22.00-06.00 hrs
10.00-18.00 hrs (General Shift)

Quarterly, Half yearly and Yearly maintenance are done in General shift i.e., 07.30 to 16.30 hrs with Sunday Holidays.

3.12 The workforce deployed per shift in the Light Schedule is

Mechanical - 4 Technicians and 3 Helpers/Shift
Electrical - 6 staff including Helpers/Shift
Shunter - 2 per shift
Points man - 2 per shift

3.13 With regard to the contract works engaged in maintenance of diesel locos, the details of running and Tender finalization stage is appended below.

Sl.No.	Name of the work	Contract value-Rs	Period of contract
1	Annual Maintenance contract for IGBT based TCC along with LCC/EMD	1,58,06,525	3 years
2	Annual Maintenance Contract for IGBT based TCC along with LCC/Medha for 25 locos	2,06,63,500	3 years
3	AMC for microprocessor based control system Medha Model MEP660	46,72,800	1 year
4	AMC for control unit and OH of actuator	41,12,300	2 years
5	D-check for 14 Nos of 1400 HP Model Cummins make engine of DPC.	3,41,14,094	1 year
6	Annual Maintenance Contract for IGBT based TCC along with LCC/Medha make.	2,67,52,960	3 years
7	AMC for Cummins engines of HS-PART available at TPJ & MDU.	25,36,260	Tender finalization stage
8	AMC for SLI system of Cummins Engine of 140 T BD Crane.	14,97,420	
9	Servicing of preventive maintenance of computer controlled bench top rotating disc electrode speedometer	7,96,500	
10	AMC for Power Pack items of HS SPARTs available at TPJ & MDU	1,13,95,456	
	TOTAL	**12,23,47,815**	

It is quite visible from the above contract works, prime importance is given for most of the important components which requires frequent attention particularly in Diesel Power Cars (DEMU). This has an impact of reduced manpower.

3.14 Coming to the conclusion, the Bench mark figures of June 2018 furnished by Railway Board depicts that the Current Benchmark for ALCO locos stands at 3.03 men/Loco whereas Indian Railway average is 4.15 men/Loco. In the case of EMD locos, the Bench mark and IR

average is 3.13 and 3.76 respectively. This is more or less equal to the Yardstick prescribed by the Mechanical directorate i.e., 3.7 men/loco of High Horse Power.

It is to be mentioned that the Bench marking norms clearly indicates that the men on roll for a particular activity includes the actual number of Officers, Supervisors, Artisans, direct and indirect staff, Support staff and all other Group`C` and `D` staff utilized.

Since adoption of current benchmark will adversely affect the present working system, the work study team has taken the Indian railway average for arriving at the requirement of manpower and also on need base for DPC, Power side and Canteen.

3.15 Accordingly,

The IR average for ALCO Locos - 4.15 staff/Loco (Present holding is 52)

The IR average for EMD Locos - 3.76 staff/Loco (Present holding is 54)

ALCO Locos - 52 x 4.15	:	216
EMD Locos - 54 x 3.76	:	203
DPC (DEMU)	:	31
Power side	:	6
Points man	:	5
Trip Shed (AC loco)	:	4
M.V.Driver	:	2
TSP/M/MDU	:	1
TSP/M/VM	:	3
TSP/E/MDU	:	2
TSP/E/VM	:	2
Canteen	:	7
Total	:	**482**

3.16 However, owing to various types of planning involved in the maintenance like Quality, Verification and Calibration, the study allow the present utilization of Supervisors, Technicians in RCD and LAB.

Number of Supervisors/Mechanical : 45
Number of Supervisors/Electrical : 19
Technicians/RCD : 14
Supervisors & Technicians/LAB : 13
Total : 91
Grand Total (482 + 91) :573

It is to be noted that 19 staff working on Re-engagement basis in various units is not taken into account.

The Supervisors and other staff can be operated in addition at needy units as desired by the administration.

3.17 Sanction Vs Requirement

Category	Sanction	Actual	Req.	Surplus
SSE	51	51	51	0
JE	26	13	18	8
Sr.Tech	122	118	122	0
Tech Gr.I	243	162	187	56
Tech Gr.II	36	44	36	0
Tech Gr.III	70	51	51	19
SSD	25	17	17	8
Ancillary Artizans	18	13	13	5
Helper	52	94	52	0
Tech Gr.I (Power side)	4	2	4	0
Tech Gr.II & III(Power side)	0	1	0	0
Helper (Power side)	2	2	2	0
CMS	11	6	5	6
CMA	3	2	2	1
Lab Attendant	7	4	5	2
Lab Assistant	2	1	1	1
Asst. Manager/Canteen	1	0	1	0
Cook	2	1	2	0
Vendor	6	0	3	3
Cleaner	1	6	1	0
TOTAL	**682**	**588**	**573**	**109**

CHAPTER - IV

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

Co-ordinating Officer views / comments vide letter No.T/M/D/P.639/MPP/1885 dated 28.01.2019 was received on 05.02.2019 though e-mail. Based on this, the planning branch remarks is furnished below:

Co-ordinating Officer's views :-

1. In Para 3.2, it has been mentioned that House-keeping, cleaning and gardening of premises has been out-sourced, but actually, this entire activity is being carried-out by Shed staff only. The cleaning of toilets in Shed premises only has been out-sourced.

Planning Branch Remarks:

Noted. The housekeeping, cleaning and gardening of the premises can well be managed by the spare staff utilized in the offices.

Co-ordinating Officer's views

2. In Para 3.7, the loco holding of Main-line locos in Diesel Shed/GOC is shown as 111 of which, 52 locos are of ALCO type, 54 are of HHP and 5 shunting locomotives. But, actually the holding of main-line locomotives during the time of Work Study was 118 locomotives (i.e., 55 ALCO + 54 HHP + 5 shunting locos + 5 MG locos).

Planning Branch Remarks :

As per the DSL Loco summary of September, the holding of Main line locos is shown as 111 and there is no separate benchmark for shunting locos which means it is inclusive. Moreover shunting locos needs lesser maintenance as it runs only shorter distance with permissible speed.

Regarding 5 MG locos, regular maintenance is carried out through deputation of 5 staff to ONR.

However, additional 45 staff is allowed for the increase in the holding of 12 locos at the rate of 3.76 men/loco.

Co-ordinating Officer's views

3. In Para 3.9, it has been mentioned that WDM2 and WDM3A locomotives are used only for Yard purpose and locomotives more than 20 years old are de-commissioned from main-line traffic. But, WDM3A locomotives are used for Mail / Express trains and no loco is withdrawn from the main-line traffic after 20 years of service. Hence, the statement that 23 locomotives account for lesser maintenance is not correct.

Planning Branch Remarks :

Agreed to. Generally the locos above the age of 25 are decommissioned from mainline traffic and the same is mentioned in the report.

Co-ordinating Officer's views

4. In Para 3.13, it is mentioned that out-sourcing of Diesel Power Cars has an impact of reduced manpower. Actually, the maintenance of engine portion of the Diesel Power Car has only been out-sourced in DEMU and all the other mechanical components and complete electrical components including Traction Alternator, Traction Motor are maintained by Diesel Shed/GOC only.

Further, the complete wiring and fans in the Trailer coaches are also maintained by Diesel Shed/GOC only. Also, as per the contract conditions entered by ICF with M/s. Cummins for maintenance of Engines in Diesel Power Car (Annexure-I) Diesel Shed/GOC is supposed to give 3 manpower for the labour portion. Only supervisor is provided by M/s. Cummins. Hence, no manpower reduction is achieved.

Planning Branch Remarks :

Noted. But the daily outage of DPC is 10 and all electrical and mechanical components as said by the co-ordinating officer are now

managed with the existing staff and it is to be mentioned that separate sections for Traction Motor, Traction Alternator and wiring are functioning in the diesel shed.

However, nearly 60% **(29 staff** in addition to the existing staff strength of 31) of the staff required by the Co-ordinating officer is allowed on need base even though there is no separate sanction for maintenance of DEMU.

5. <u>Co-ordinating Officer's views</u>

In Para 3.15, the following mistakes have been committed in the calculation of manpower requirement:

a) The population of ALCO locomotives has been shown as 52 whereas, the actual population is 66. Hence, the manpower requirement of ALCO loco maintenance is 66 x 4.15 = 274 instead of 216 shown in the table.

b) The population of HHP locomotives has been taken as 54 but, after the Work Study, 12 HHP locomotives have been transferred from Diesel Shed/Erode to Diesel Shed/GOC during the months December18 & January''19 vide CMPE/Dsl/S.Rly's letter No.TP.41/13/DSL/BG/Power Plan dated 23.11.2018 (Annexure-ll). Hence, the requirement of manpower for EMD loco maintenance is 66 x 3.76 = 248 instead of 203 as shown in the table.

c) The manpower requirement for Diesel Power Car has been taken as 31. But, as per Railway Board norms for DEMU, vide letter No.98/M(L)/466/35 dated 17.2.2010, the total manpower requirement for DPCs is 96, as shown in (Annexure-lll).

d) The number of Pointsmen required has been taken as the actual number of Pointsmen available i.e., 5. But, due to vacancies in Pointsmen, 3 Khalasis of Diesel Shed/GOC are used as Pointsmen.

e) The number of Motor Vehicle Drivers has been shown as 2 whereas, the current sanction and actual is 3.

f) The staff required for Trouble Shooting Points has been taken based on the actual available. But, for the vacancies, staff are being deputed from Diesel Shed/GOC and hence, the actual requirement is 16 instead of 8 as shown in the table.

g) It is also observed that 3 posts out of 10 of Canteen have been surrendered during the month of Dec'18 as per the requirement of 1% surrender of posts for 2018-19. Hence, the manpower requirement for Canteen is taken as 7 only.

Plannning Branch remarks:

Noted. Since Trouble shooting points are managed with difficulty,**4 staff is allowed additionally on Need basis at 3 staff each for MDU,TPJ, VM and MV.**

Co-ordinating Officer's views

6. Vide Para 3.16, the requirement of supervisors has been taken based on the actual strength. However, the posts of supervisors cannot be surrendered as the existing new type of locomotives necessitates extensive supervision and continuous monitoring of AMCs.

In view of the above remarks, the total sanction required for maintaining the locomotives currently homed in Diesel Shed/GOC will work out as follows:

Sl. No.	Activity	Manpower as per work study	Actual man power required for current loco holding
1	Maintenance of ALCO Locos	216	274
2	Maintenance of HHP locos	203	248
3	Maintenance of Diesel Power Cars	31	96
4	Pointsmen	5	8
5	Motor vehicle drivers	2	3
6	Manning of Trouble Shooting Points	8	16
7	Trip Shed (AC loco)	4	4
8	Canteen	7	7
9	Supervisors (Mechanical)	45	51
10	Supervisors (Electrical)	19	26
11	Technicians / RCD	14	14
12	Supervisors & Technicians (Lab)	13	23
Total		**567**	**770**

It can be seen from the above table that the actual requirement for present loco holding is 770 as against the current sanction of 682. Hence, the surrender of 109 posts as recommended in the Work Study Report is not feasible.

Planning Branch remarks:

Partially agreed to with regard to the increase in supervisory cadre and sufficient number of supervisors has already been allowed in the draft work study report.

However, 4 more JEs are allowed on need base.

With regard to CMT Lab, three more CMS has been allowed on Need basis.

Revised Overall Sanction Vs Requirement:

Category	Sanction	Actual	Req.	Surplus
SSE	51	51	51	0
JE	26	13	22	4
Sr.Tech	122	118	122	0
Tech Gr.I	243	162	243	0
Tech Gr.II	36	44	36	0
Tech Gr.III	70	51	70	0
SSD	25	17	17	8
Ancillary Artizans	18	13	15	3
Helper	52	94	52	0
Tech Gr.I (Power side)	4	2	4	0
Tech Gr.II & III(Power side)	0	1	0	0
Helper (Power side)	2	2	2	0
CMS	11	6	8	3
CMA	3	2	2	1
Lab Attendant	7	4	5	2
Lab Assistant	2	1	1	1
Asst. Manager/Canteen	1	0	1	0
Cook	2	1	2	0
Vendor	6	0	6	0
Cleaner	1	6	1	0
TOTAL	**682**	**588**	**660**	**22**

CHAPTER - V

5.0 FINANCIAL SAVINGS

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

Sl. No.	Category	Grade Pay/Level	No. of post	Money Value	Annual Financial Savings
1	JE	4200/6	4	80551	3866448
2	Sr.Tech / SSD	4200/6	3	80551	2899836
3	Tech.Gr.I / SSD	2800 / 5	5	66218	3973080
4	CMS	4600/7	3	102079	3674844
5	CMA	4200/6	1	80551	966612
6	Lab Attendant	1900/2	2	45290	1086960
7	Lab Assistant	1800/1	1	40821	489852
8	Turner Gr. II	2400/2	3	58097	2091492
TOTAL			**22**		**1,90,49,124**

ANNEXURE – V

SCALE CHECK OF DIESEL SHED/GOC AS ON 18.09.2018
Mechanical

Sl. No	Category	Sanction	Actual	Vacancy
1	SSE/M	34	36	-2
2	JE/M	17	9	8
3	Sr. Technician	73	72	1
4	Technician Gr. I	146	97	49
5	Technician Gr.II	22	22	0
6	Technician Gr.III	42	22	20
7	Helper	36	65	-29
8	Artizans	18	13	5
9	M.V.Driver	0	2	-2
9	SSD	18	12	6
10	CMT LAB	23	13	10
11	Canteen	10	7	3
TOTAL		**439**	**370**	**69**

ANNEXURE - VI

SCALE CHECK OF DIESEL SHED/GOC AS ON 18.09.2018

Electrical

Sl. No	Category	Sanction	Actual	Vacancy
1	SSE/E	17	15	2
2	JE/E	9	4	5
3	Sr. Technician	49	46	3
4	Technician Gr. I	97	65	32
5	Technician Gr.II	14	22	-8
6	Technician Gr.III	28	29	-1
7	Helper	16	29	-13
8	SSD	7	5	2
9	Power side	6	5	1
TOTAL		**243**	**220**	**23**

ANNEXURE VII

ABBREVIATIONS USED IN THE STUDY REPORT

Sl.No.	ACRONYM	EXPANSION
1	AFM	Air Flow Measurement (Valve)
2	ABB	ASEA Brown Boveri Company
3	ALCO	American Locomotive Company
4	AC	Alternate Current
5	ACMT	Assistant Chemical and Metallurgist
6	ADME	Assistant Divisional Mechanical Engineer
7	AJJ	Arakkonam
8	ALP	Assistant Loco Pilot
9	ALD	Allahabad
10	AMC	Annual Maintenance Contract
11	BKT	Braking (Switch)
12	BE	Braking Effort (Meter)
13	CCB	Computer Controlled Brake
14	CORE	Central Organization for Railway Electrification
15	CMS	Chief Metallurgical Superintendent
16	CMA	Chief Metallurgical Assistant
17	DL	Drain Line (Filter)
18	DEMU	Diesel Electric Multiple Unit
19	DCL	Direct Current Link (motor)
20	DPC	Diesel Power Car
21	DC	Direct Current
22	DTTC	Diesel Traction Training Centre
23	DSL	Diesel
24	DME	Divisional Mechanical Engineer
25	DAR	Disciplinary & Appeal Rules
26	Dy CME	Deputy Chief Mechanical Engineer
27	EMD	Electromotive Division

28	EOT	Electrically Operated Travelling Crane
29	ERS	Ernakulam
30	ETP	Effluent Treatment Plant
31	ECC	Electrical Control Cabinet
32	FIP	Fuel Injection Pump
33	FB	Fuel Book
34	FRC	Final Running Check
35	FTTM	Front Truck Traction Motor (Blower)
36	GE	General Electric Company
37	GP	General Purpose (Relay)
38	GR	Ground Relay
39	GOC	Golden Rock
40	HHP	High Horse Power
41	HSD	High Speed Diesel
42	IRC	Initial Running Check
43	IOCL	Indian Oil Corporation Limited
44	IGBT	Insulated Gate Bipolar Transistor
45	IRCON	Indian Railway Construction Company
46	JE	Junior Engineer
47	KL	Kilo Liter
48	LW	Loco Works
49	LP	Loco Pilot
50	LCC	Line Commutated Converters
51	M	Monthly (Schedule)
52	MV	Mayiladuthurai
53	MDU	Madurai
54	MCC	Material Control Cell
55	MCBG	Micro Control Based Governor
56	MBCS	Microprocessor Based Control System
57	MPR	Man Power Ratio
58	NDA	Night Duty Allowance
59	NHA	National Holiday Allowance
60	OLIC	Official Language Implementation Committee
61	OHE	Over Head Equipment
62	OEM	Original Equipment Manufacturer
63	OPSS	Optical Sensor
64	PCMM	Principal Chief Materials Manager
65	PFA	Principal Financial Advisor
66	PVERI	Equalizing Reservoir Pneumatic Interlock (Piston Valve)
67	PVBC	Pneumatic Valve Brake Cylinder (Piston Valve)
68	PVBIT	Pneumatic Break in Two valve (Piston valve)
69	PGCIL	Power Grid Corporation of India Limited
70	RKM	Route Kilometre
71	RCD	Railway Consumer Depot
72	RPM	Royapuram
73	REV	Reverser (Power switch)
74	ROAMS	Rolling stock Asset Management System

75	RTTM	Rear Truck Traction Motor (Blower)
76	RVNL	Rail Vikas Nigam Limited
77	SSE	Senior Section Engineer
78	SCR	Silicon Controlled Rectifier (Assembly)
79	SLI	Scalable Link interface (System)
80	SSDC	Steam Surplus Diesel Category
81	STA	Starting (contactor)
82	SFC	Specific Fuel Consumption
83	SPART	Self Propelled Accident Relief Train
84	T	Trip (Schedule)
85	TA	Traction Alternator (Meter)
86	TA	Travelling Allowance
87	TMR	Tread Mid Route
88	TPJ	Thiruchchirapalli
89	TNP	Tondairpet
90	TSP	Trouble Shooting Point
91	TCC	Traction Control Converter
92	VM	Villupuram

Comparative statement

Revised Overall Sanction Vs Requirement:

Category	Draft	CO`s Views	Revised
SSE	51	77	51
JE	18		22
Sr.Tech	122	649	122
Tech Gr.I	187		243
Tech Gr.II	36		36
Tech Gr.III	51		70
SSD	17		17
Ancillary Artizans	13		1
Helper	52		52
Tech Gr.I (Power side)	4		4
Tech Gr.II & III(Power side)	0		0
Helper (Power side)	2		2
CMS	5	23	5
CMA	2		2
Lab Attendant	5		5
Lab Assistant	1		1
Asst. Manager/Canteen	1	7	1
Cook	2		2
Vendor	3		3
Cleaner	1		1
Technicians/RCD	Included in Technician category	14	Included in Technician

			category
TOTAL	**573**	**770**	**657**

Working Sheet:

Sanction	**Requirement as per Draft**	**Surplus as per Draft**	**Requirement by Co-ordinating officer**	**Revised by Plg. branch**	**Surplus recommended in final report**
682	573	109	770	660	22

Reasons for variations:

- Due to increase of holding of Locos from 111 to 123 from 18.12.2018, revision is needed. (12 locos are transferred to this depot from ED after submission of Draft Work Study Report in the month of October 2018).

- Additional staff is allowed on need basis for DPC (DEMU) Unit in commensurate with the requirement of the Co-ordinating Officer.

- Additional staff for Trouble shooting Points on need basis.
- Additional JEs are allowed on Need basis.
- Additional staff in the Category of CMS is allowed on Need basis.

UNITWISE ALLOCATION

Unit	As per Draft	As per CO`s views	As per Revised
ALCO Locos	216	274	216
EMD Locos	203	248	248
DPC	31	96	60
Power side	6	0	6
Points man	5	8	5
Trip shed (AC Loco)	4	4	4
MV driver	2	3	2
TSP/M/MDU	1	16	12
TSP/M/VM	3		
TSP/E/MDU	2		
TSP/E/VM	2		
Canteen	7	7	7
Supervisors/Mech	51	51	51
Supervisors/Elec	13	26	22
Technicians/RCD	14	14	14
Supervisors/Technicians/ CMT	13	23	13
TOTAL	573	770	660