भारत सरकार / GOVERNMENT OF INDIA
रेल मंत्रालय / Ministry of Railways
दक्षिण रेलवे / Southern Railway

प्रधानकार्यालय/ Headquarters Office,
Planning Branch,
चेन्नै - 600 003/Chennai - 600 003.

No.G.275/WSSR-341920 / 2020-21 Dated: 29.12.2020.

DRM / MAS

Sub : Work study to review the Staff Strength at SSE/Signal/AJJ East MAS Division.

Ref: (1) SDGM's D.O. letter No.G.275/Annual Prog./2019-20 dated 22.05.2019.

(2) DPO/I/MAS's letter No. M/P(C&P)135/WSSR/18-19 dated 21June 2019.

*****

A work study on the above subject was conducted by Headquarters Planning Branch and a report on the same is attached.

As the report is to be finalized within eight weeks, it is requested to take expeditious action and advise this office in this regard.

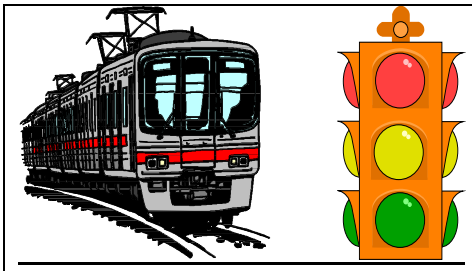
A copy of the work study report may be given to organized labour.

This has the approval of SDGM.

29.12.2020

(D. JAYARAMAN)
Dy. Chief Planning Officer
for Senior Deputy General Manager.

Copy to: PCSTE/MAS
(Encl: One copy of the study report)
The Director (E&R)/Rly.Bd/NDLS for information.
(e - copy of the study report)



WORK STUDY TO REVIEW THE STAFF STRENGTH AT SSE/SIGNAL/AJJ EAST - CHENNAI DIVISION

G.275/WSSR – 341920/2020-21

SOUTHERN RAILWAY

PLANNING BRANCH

G.275/WSSR-341920/2020-21

WORK STUDY TO REVIEW THE STAFF STRENGTH AT SSE/SIGNAL/AJJ – EAST CHENNAI DIVISION

STUDIED BY

WORK STUDY TEAM
OF
PLANNING BRANCH

DECEMBER 2020

(i)

INDEX

(i)

ACKNOWLEDGEMENT

The study team conveys its deep gratitude to DRM/MAS, ADRM/MAS, Sr.DSTE / MAS, DSTE/MAS, ADSTE/AJJ, SSE/SIG/AJJ-EAST & other supervisors and staff of Signal department/ MAS Division for having rendered required data, valuable guidance and co-operation for completion of the study ..

(ii)
TERMS OF REFERENCE

Work study to review the staff strength at SSE/SIGNAL/AJJ-EAST/MAS Division.

(iii)
METHODOLOGY

The following methodology has been adopted while conducting the study.

1. Collection of data.
2. Discussion and interaction with Officers and Unit officials.
3. Field Unit observation.
4. Working out the requirement on application of benchmark ratio and need basis.

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(iv) SUMMARY OF RECOMMENDATIONS:

REVISED RECOMMENDATIONS

1) One Post of SSE in GP 4600 is found surplus may be surrendered and credited in to Vacancy bank.

(**1 Post**)

2) Five Post of Helper in GP 1800 are found surplus may be surrendered and credited in to Vacancy bank

(5 Posts)

Total = 6 Posts

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CHAPTER – I

1.0 INTRODUCTION

1.1 Indian Railway is an Organization having Welfare and Social obligation to the Nation for Safety, Security & Punctuality in train running operation. Capital and labour being the basic factors which contributed towards infrastructure and production. The Organization is also to be viewed as financially viable to make use of its machinery and manpower to achieve maximum utilization.

1.2 In Indian Railways, Signal & Telecommunication Department plays a vital role in the operation of trains with safety, punctuality and velocity. The Signal Branch is primarily responsible for the Signal network of entire Indian Railways to provide safe and efficiency in transportation system. Signaling systems provide safety, enhance line capacity and improve flexibility of the operations.

A railway signal is a visual display device that conveys instructions or provides advance warning of instructions regarding the drivers authority to proceed. The driver interprets the signal's indication and acts accordingly,

1.3 Signals are the relevant sentinel providing Safety in train operations. Procedures and practices in maintenance and operation are therefore vital to provide the Safety. The Signaling System is being continuously updated to meet the growing needs of traffic and hence new procedures are being evolved and implemented by Supplementary instructions, corrections and modifications to the Signal Engineering.

Signaling system has undergone a drastic advancement in technology such as MACL Signals, centralized RRI/SSI, automatic block system, data logger,BPAC,

Audio frequency Track circuiting, Intermediate Block Signals, Train Actuated Warning System, Anti-collision Device, etc. This is going to be a continuous process in future also.

The most important terms in the terminology of S&T is interlocking between signals, points, Track Block Instruments, Level Crossing Gates which will facilitate their operation in a prescribed sequence to ensure safety.

1.4 The Signal and Telecommunication Department is responsible for the installation and maintenance of the Signalling system essential for the safe and speedy movement of trains and the Telecommunication systems required for the effective utilisation of the large task force of locomotives, other rolling stock and track as well as for the administration of the enormous Railway Network. In terms of the involvedness in Signalling and Telecommunication installations, Southern Railway occupies the place of pride among the various Indian Railway systems.The current systems of Signalling and Telecommunication provided in Southern Railway are mentioned below:

1.5 SIGNALLING

1.5.1 Multiple Aspects Colour Light Signalling (MACLS):

The Mechanical signals of Semaphore type (which are rope operated) are progressively replaced by Electrical signalling with Multiple Aspect Colour Light Signals (MACLS). MACL signals have better visibility, quick operation and less maintenance. MACL signals are working through underground cable.

1.5.2 Route Relay Interlocking (RRI)/ Panel Interlocking (PI) and Central ControlPanels in Signal Control System:

In early days, mechanical signals, (which are operated from lever frame and interlocking through mechanical means) were installed. These mechanical signalling are mostly replaced by Electrical central control panel. In Electrical

signalling, the signals are operated from central panel and interlocking is achieved electrically through specially designed signalling relays. The interlocking logic of signals and points are centrally controlled by large no. of signalling relays and achieved through safety circuits of foolproof methods.

In the central panel, by mere operations of signal knobs and route buttons, routes are set automatically and signals are cleared with unconditional safety.

The entire station is track circuited. Points and signals are operated by individual knobs/slides in small yards.

1.5.3 Electronic Interlocking (EI):

As technological development, the interlocking is achieved by means of solid state with electronics and software programming. Electronic interlocking signalling control system is being now inducted to achieve economy and flexibility.

This is a sophisticated Microprocessor based interlocking system through Microprocessor devices and software programming. In this system, there is less number of relays; alteration/additions in the yard are possible without much extra wiring. This system adopts the usage of latest CENLEC(European committee for Electrotechnical Standardisation) standard of software validation.

1.5.4 Absolute block System and Automatic Block System with Continuous Track Circuiting:

Trains are dealt with Single line, double line on absolute Block system and Double line & Quadruple line on Automatic block sections. Automatic Block signalling system are mostly used when the train traffic become more packed full and busy, especially in suburban area and also to increase line capacity. This eliminates the manual absolute block working and trains are signalled automatically depending

upon the movement of trains ahead without much dependence of human element. This apart from ensuring safety & speed of train also detects any rail discontinuity in the controlled section.

Automatic Signalling is provided in Quadruple line &Fourth line between Chennai–Arakkonam, Arakkonam-Jolarpettai on double line, Chennai Central-Gudur on double line, Chennai Beach-Tambaram Suburban & Chennai Egmore-Tambaram A & B lines section, Chennai Beach to Chennai Egmore on 3rd line, Tambaram-Chengalpattu double line, Basin Bridge -Washermenpet, Washermenpet - Vysarpadi, Korukkupet - Vysarpadi, Washermenpet - Korukkupet & Korukkupet-Ennore third line and Chennai Beach-Velachery (Mass Rapid Transit System) double line section.

1.5.5 BPAC (Block Proving by Axle Counter):

This enhances the Safety of the train by proving the complete arrival of the train and removes dependency of human element (Station Master) in verifying the complete arrival of the train.

Also it helps in eliminating the delay associated in granting line clear for the train reception.

1.5.6 Tokenless Block Working:

In the absolute Block system on single line, Token Block instruments were used. The token will be handed over to the driver of the train after granting line clear to enter in to the Block section. The driver has to reduce the speed for picking up the token.

The process of handing over and picking up of token at every station is consuming painstaking time. Sometimes resulting in token missing and also takes more time during crossing which in turn causes more detention to trains.

All the above mentioned drawback are overcome in the system of tokenless block working also it helps to increase line capacity on single line sections.

1.5.7 Track Circuiting:

The track circuiting in the reception lines of the stations ensures the safety by preventing the reception of a train on occupied line. Track circuit detects the presence of the train on the track. This is the backbone of the signalling system. This ensures complete safety to the train in case of human failure. Due to high utilisation of the track capacity, this ensures safe, speedy, punctual movement for train services.

1.5.8 Audio Frequency Track Circuits (AFTC):

In Railway electrified sections, the conventional DC track circuits are found vulnerable to the interference of currents generated by the thyristor/Chopper controlled locomotives and hence Joint less Audio Frequency track circuits have been found to be the solution in such sections.

The AFTC does not require insulated joints and can work for longer lengths and is suitable for AC electrified areas. These track circuits are more reliable because failures due to block joint shorting are avoided. AFTCs installed in BG automatic section on Egmore–Chengalpattu, Gummidipundi-Gudur, Katpadi-Jolarpettai, and Villivakkam - Arakkonam & Chennai Beach-Velachery sections.

1.6 Replacement of Over-aged Assets:

Over-aged signalling assets are to be normally replaced on age–cum-condition basis after a codal life of 25 years for A & C routes and big yards on all routes, 25 to 28 years for B & D routes and 30 years for E route. Thus overaged signalling assets are being slowly but surely replaced with new one due to which reliability and security has been improved considerably.

1.6.1 Level Crossing- Provision of Safety Devices:

As a precautionary measure to ensure safety to trains and road users, Interlocking of Level Crossing gates with the signalling arrangements in the station limits as well as outside stations limits is more important due to increased train and vehicular traffic. The LC gates are being taken up for interlocking on the basis of train vehicle units (TVUs).. This will ensure safety to road users.

In addition to the above, unmanned gates are taken up for manning by Engineering Branch and at such manned gates, telephone facilities are provided from the nearest station so that gate will be closed well in advance before the train approaches these manned gates.

1.6.2 Data Loggers:

These are microprocessor-based equipment, logging the events of the change of status of the various functions in field and Relayroom as well as recording the precise time also.

For monitoring the operation of important signalling gears like Track circuits, Points, Signals, Battery chargers, Batteries etc. in Panel interlocked/RRI installations, Data loggers have been installed.

The Dataloggers are used as predictive maintenance tool regarding deterioration of the performance of signalling gadgets. The Dataloggers are also useful devices for detecting the cases of passing the signal at danger by the driver and also gives important clues in case of accidents. This being modern equipment useful for predictive maintenance, more number of such equipments is programmed for improving the system reliability.

Also these Dataloggers are networked to through Rly OFC system or BSNL channels with Divisional HQ office, S&T Test room, Zonal HQ's and Railway Board for remote monitoring and taking print-outs as and when needed.

1.6.3 Integrated Power Supply System (IPS):

With the introduction of more and more modern Electrical Signalling Systems, the continuous availability of power supply is more important and essential. To get reliable power supply, the concept of Integrated Power Supply (IPS) has been introduced wherein the different signal power supplies like 110 VAC, 110 VDC, 24 VDC etc. are derived from the common system, which work on common battery, modular power packs. This IPS will enhance the reliability of working of the signalling system.

IPS system, as a measure of improving reliability of power supply to various signalling gadgets, has been introduced at more stations. It also reduces the maintenance load involved in maintaining a large number of individual battery sets and avoids blanking of signals.

1.6.4 LED Signals for Colour Light Signalling (LED):

LED signals (which have long life and better visibility) are now introduced as a measure of improving reliability. The colour light signals and the light aspects of mechanical signals (lit by incandescent bulbs having limited hours of working and getting fused either prematurely or due to ageing and voltage fluctuations resulting in frequent replacement) are replaced by LED type progressively. This type of LED signal has enhanced the reliability by reducing the incidences of signal lamp fusing besides consuming less power.

1.6.5 Keeping the above objectives in view, an analysis is made to study the present system of functioning in SSE/SIGNAL/AJJ/EAST Unit of Chennai Division through Benchmarking and need basis as a means of reducing cost and improving productivity. It is the process of comparing the performance with the most successful competitor who is managing with optimum productivity level. With the increased DESUs and further scope of growing technology, the workload Vs requirement of the manpower is critically examined in the subsequent chapters.

CHAPTER - II

2.0 PRESENT SCENARIO

2.1 The Signal Department of MAS Division is functioning under the overall control of Sr.DSTE who is assisted by DSTE, ADSTE, SSEs ,JEsand staff of all categories in extending Co-operation for smooth and efficient functioning of the Department with sub units/sections.

2.2 This study is pertaining to SSE/SIG/AJJ/EAST and the existing system of manning this depot comprises location, jurisdiction, scale check, deployment, activities and authority of control.

2.2.1 Location

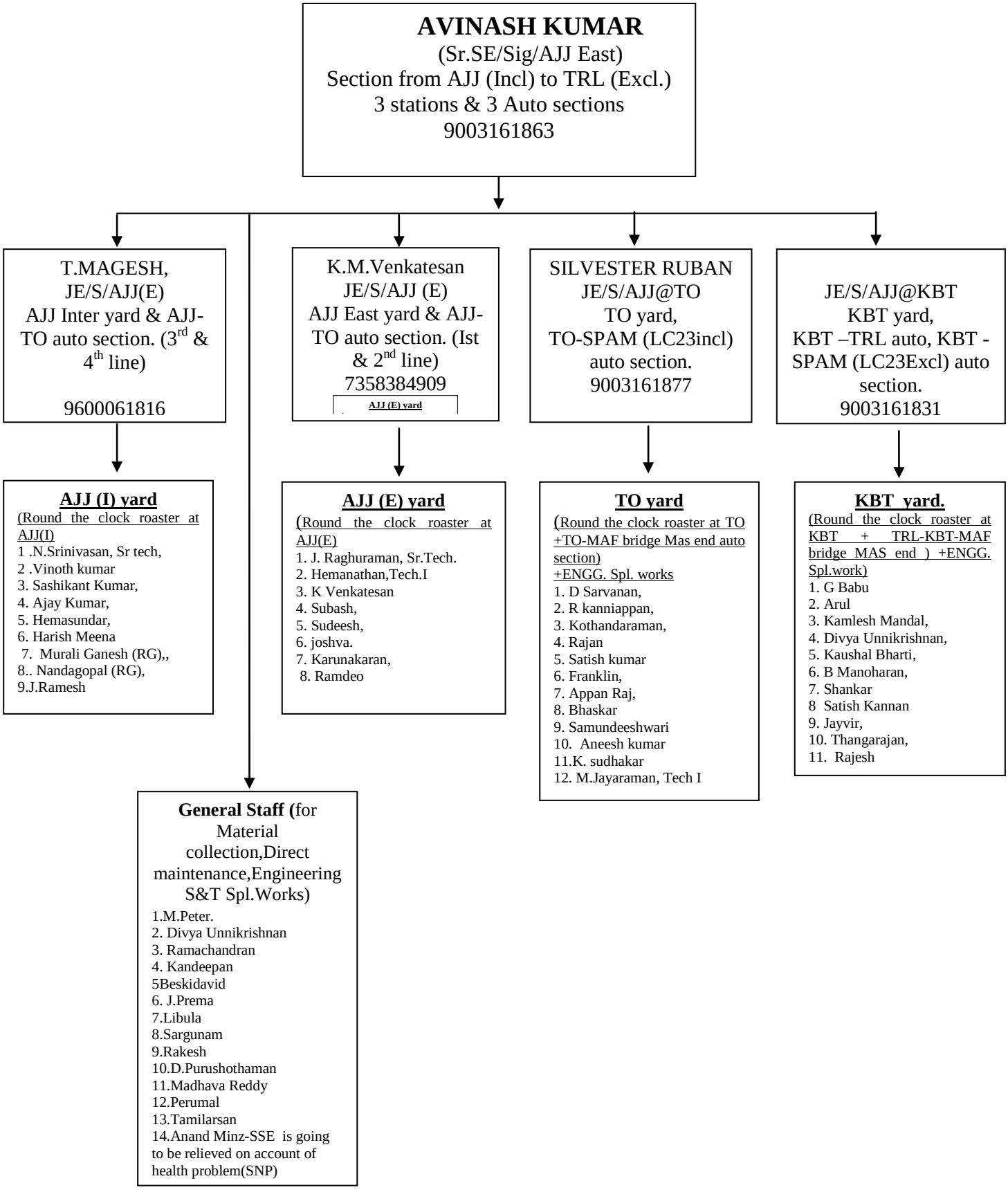
Office of the SSE/SIGNAL/AJJ/EAST is situated in the ARAKKONAM JUNCTION station.

Jurisdiction –SSE/SIGNAL/AJJ-EAST

- AJJ East Yard,
- INTER Yard AJJ,
- AJJ-TO Auto section
- TO Yard
- TO-KBT Auto section
- KBT Yard

  KBT-TRL (Excluding TRL)

Tree chart for Sr.SE/Sig/AJJ East Section



2.3 **The following are the stations in the jurisdiction of SSE/SIGNAL/AJJ/EAST**

1.AJJ
2.TO
3.KBT

2.4 **Types of signaling and system of working:**

1. Automatic block system
2. Multiple Aspect Color Light Signaling (MACLS)

2.5 **Duty hours of staff**

Excluded-Supervisory staff
Continuous Roster for other staff

2.7 The actual staff strength of this Depot is 57 as against the sanctioned strength of 72. The sanctioned strength is taken from the letter of Sr.DPO/MAS. Actual is taken from the field. **The scale check statement is placed as Annexure-I**. The assets details are placed in **Annexure-II.** This unit is responsible for efficient upkeep of Signaling assets. SSE/SIGNAL/AJJ/EAST is responsible for the maintenance and functioning of the signal installations under his charge and co-ordination with ASTE/AJJ, DSTE/MAS, Sr.DSTE/MAS for all technical matters. In addition he has to carry out testing, overhauling, carrying out of alterations to the existing signals and interlocking installation in accordance with appropriate plans and instructions.

2.8 The present staff position is detailed as below.

SL. NO	Category	Sanction	Actuals	Vacancy
1	SSE	3	1	2
2	JE	3	4	-1
3	Sr.Tech	6	6	0
4	Tech-I	11	13	-2
5	Tech-II	3	7	-4
6	Tech-III	13	5	8
7	B.Smith-I	1	0	1
8	Helper	31	21	10
9	Cable Jointer-III	1	0	1
Total		72	57	15

SSE/Sig/AJJ-East is suitably distributed the staff wherever required for smooth functioning of the unit. It comes under round the clock roster for the technicians and helpers.

2.9 SIGNAL UNITS

As per the signaling assets installed under the control of SSE/SIGNAL/AJJ/EAST the lever units are given below :

ASSETS OF SSE/SIG/AJJ/EAST (SIGNAL UNITS)

	Station		AJJ		AJJ-TO		TO		TO-KBT		KBT		KBT-TRL	
Item no		Unit value	Qty	Unit	Qty	Unit	Qty	Unit	Qty	Unit	Qty	Unit	Qty	Unit
10	Colour Light Signal 2 Aspect	5.0	24	120	3	15	5	25	0	0	3	15	3	15
11	Colour Light Signal 3/4 Aspect	6.0	9	54	4	24	14	84	14	84	12	72	4	24
12	Route Indication Per Route	5.0	31	155	0	0	58	290	0	0	7	35	0	0
13	Colour/Position Light Shunt Signal And Shunt Permit Indicator	4.0	35	140	3	12	0	0	0	0	0	0	3	12
14	Calling On Signal Cls Area	0.5	27	13.5	2	1	12	6	0	0	8	4	2	1
15	Illuminated AAG Signs And Guards Repeater Signals	0.5	2	1	0	0	0	0	0	0	0	0	0	0
16	Auto Signal/APB Signal Only	8.0	0	0	24	192	0	0	34	272	0	0	12	96
17	Ibs Siganl/Midsection Lc Gate Stop Signal	10.0	0	0	0	0	0	0	0	0	0	0	0	0

	Station		AJJ		AJJ-TO		TO		TO-KBT		KBT		KBT-TRL	
Item no		Unit valu	Qty	Unit	Qty	Unit	Qty	Unit	Qty	Unit	Qty	Unit	Qty	Unit
18	Slot Or Control For Signal, Point, Siding,Crank Handle, Intercabin, Station Masters,Level Crossing Gate Mechanical Or Electrical	2.0	8	16	0	0	0	0	0	0	0	0	0	0
21	Single Rail Dc Track Circuit	4.0	113	452	0	0	66	264	0	0	54	216	0	0
22	Double Rail Dc Track Circuit	5.0	0	0	29	145	6	30	33	165	13	65	26	130
23	50 Cycle Ac Track Circuit	6.0	0	0	0	0	0	0	0	0	0	0	0	0
26	Dc Coded Track Circuit	12.0	0	0	0	0	0	0	0	0	0	0	0	0
27	Axle Counter Complete/Including Multi Entry & Aftc	20.0	1	20	0	0	0	0	0	0	0	0	0	0
28	Digital Axle counter Per Controlled Track	5.0	0	0	0	0	0	0	0	0	0	0	0	0
31	Electrical Switch Lock	3.0	0	0	0	0	0	0	0	0	0	0	0	0
32	Key Locked Point	3.0	2	6	2	6	0	0	2	6	0	0	2	6
33	Rod Worked Facing Point With Lock	3.0	2	6	0	0	0	0	0	0	0	0	0	0
34	Rod Worked Facing Point With Out Lock/Lock	2.0	0	0	0	0	0	0	0	0	0	0	0	0
35	Double Wire Operated Facing Point Without Lock	2.5	0	0	0	0	0	0	0	0	0	0	0	0

	Station		AJJ		AJJ-TO		TO		TO-KBT		KBT		KBT-TRL	
Item no		Unit value	Qty	Unit	Qty	Unit	Qty	Unit	Qty	Unit	Qty	Unit	Qty	Unit
36	Double Wire Operated Facing Point And Lock	3.0	0	0	0	0	0	0	0	0	0	0	0	0
37	Electrically Operated Point And Lock	6.0	68	408	14	84	32	192	0	0	6	36	12	72
39	Outlying Siding Point	28.0	0	0	0	0	0	0	0	0	0	0	0	0
51	LC Gate Telephone Only Within Station Limit	2.0	1	2	0	0	3	6	0	0	1	2	0	0
52	LC Gate Telephone Only Outside Station Limit	10.0	0	0	1	10	0	0	1	10	0	0	0	0
53	LC Gate Swing Gates Interlocked With In Station Limit	3.0	0	0	0	0	0	0	0	0	0	0	0	0
54	LC Gate Lifting Barrier Winch Operated With In Station Limit	4.0	0	0	0	0	0	0	0	0	0	0	0	0
55	LC Gate Lifting Barrier Motor Operated With In Station Limit	6.0	3	18	0	0	3	18		0	1	6	0	0
56	LC Gate Swing Gates Interlocked Outside Station Limit	15.0	0	0	0	0	0	0	0	0	0	0	0	0
57	LC Gate Lifting Barrier Winch Operated Outside Station Limit	20.0	0	0	0	0	0	0	0	0	0	0	0	0
58	LC Gate Lifting Barrier Motor Operated Outside Station Limit	30.0	8	240	3	90	0	0	2	60	0	0	2	60
61	Single Line Token Block Instruments Per Pair	5.0	0	0	0	0	0	0	0	0	0	0	0	0
62	Single Line Token Less Block Instruments Per Pair	6.0	0	0	0	0	0	0	0	0	0	0	0	0
63	Double Line Block Instruments Per Pair	6.0	0	0	0	0	0	0	0	0	0	0	0	0
64	Extra Weightage For Re Area	1.0	3	3	0	0	0	0	0	0	0	0	0	0
65	Key Transmitter Per Pair	1.0	21	21	2	2	17	17	2	2	8	8	2	2
66	Block Panel With Interface Equipments	4.0	0	0	0	0	0	0	0	0	0	0	0	0

			AJJ		AJJ-TO		TO		TO-KBT		KBT		KBT-T	
Item no		Unit value	Qty	Unit	Qty	Unit	Qty	Unit	Qty	Unit	Qty	Unit	Qty	Unit
71	Route Relay/Panel Interlocking Equipment Complete Per Route	2.0	` ` `	0	0	0	0	0	0	0	0	0	0	0
72	Centralised Trafic Control Equipment Complete Per Route	6.0	0	0	0	0	0	0	0	0	0	0	0	0
73	Mechanised Hump Yard Per Line	5.0	0	0	0	0	0	0	0	0	0	0	0	0
74	Mechanised Hump Yard - Retarder Each	50.0	0	0	0	0	0	0	0	0	0	0	0	0
75	Aws Per Magnet	2.0	0	0	0	0	0	0	0	0	0	0	0	0
76	Indicator Boards-Shunting Block Limit Sighting And Others	0.5	0	0	0	0	0	0	0	0	0	0	0	0
77'a	Data loggers Up To 256 Ports	10.0	0	0	0	0	0	0	0	0	0	0	0	0
77'b	Data loggers More Than 256 Ports	20.0	1	20	0	0	1	20	0	0	1	20	0	0
78	Generators	25.0	3	75	0	0	0	0	0	0	0	0	0	0
80	Point To Point Communication	1.0	0	0	0	0	0	0	0	0	0	0	0	0
Total			362	**1770**.5	87	**581**	217	**952**	88	**599**	114	**479**	68	4**18**

Total Signal Units : 4799.5 say 4800

2.10 TYPES OF SIGNAL FAILURES

The following are the various classifications of Signal failures which affect the Train operation:

i) Signal failures.
ii) Track failure.
iii) Point failure.
iv) Miscellaneous failure.

Department wise Failures

i) Signal
ii) Operating
iii) Engineering
iv) OHE and
v) Miscellaneous

2.11 FAILURE STATUS

The following are the failures which affect the train operations in the Signal Department and the same is tabulated for the period from January ary to December of 2017,2018.For the year 2019 is up to July.

YEAR	No of Failures	
	Total	Signal
2017	79	44
2018	109	56
2019 JAN-JULY	36	28
TOTAL	224	128
Average Total Failure /Month	224/31=7.22	128/31=4.12

- Average Total failures per month from 2017,2018,2019(upto July) = 7.22
- Average Signal failures per month from 2017,2018,2019(upto July)=4.12

2.12 The total no. of signal units of AJJ/EAST is stated as **4759** by SSE/Signal/AJJ East While calculating , it is arrived 4800 signal units which is very meagre difference. For arriving man power , 4800 signal units are taken.

DESU and Total no.of Signal Units for MAS division are **352342** and **142307** respectively as per the data given by SSE/Signal/AJJ/EAST .

2.13 Outsourcing

Many activities can be outsourced in the unit of SSE/SIGNAL/AJJ/EAST as being done in other divisions of Southern Railway.

Some of such activities recommended by Railway Board is listed below and it seems that some activities are outsourced as on date.

- Trenching and laying/renewal of cables
- Loading/unloading (Sometimes by Department staff)
- Solar panel maintenance
- Related works with tracks, points & crossings
- Repair& Return Contract (RCC) for charger, Inverter, IPS, Data logger, Digital Axle counter, SSI etc
- Truck/pick up van on hiring basis (to attend failures and inspection).

CHAPTER III

3.0 CRITICAL ANALYSIS

3.1 The outturn and workload of SSE/SIGNAL/AJJ/EAST has been analyzed with the sanctioned strength and actual deployment of staff. The man power requirement for entire activities has been worked out based on the present suitable concept of benchmark technique.

3.2 On critical examination of the scale check of SSE/SIGNAL/AJJ-EAST it could be seen that the total sanction strength and actual strength in category wise is as follows:

Sl. No.	Category	Pay Band + GP	Sanction	Actual
1.	SSE	9300-34800 +4600	3	1
2	JE	9300-34800 +4200	3	4
2.	Sr.Tech	9300-34800 +4200	6	6
3.	B/Smith-I	5200-20200 + 2800	1	0
4	Tech I	5200-20200 + 2800	11	13
5.	Tech II	5200-20200 + 2400	3	7
6.	Tech III	5200-20200 + 1900	13	5
7.	Helper	5200-20200 +1800	31	21
8.	Cable Jointer-III	5200-20200 + 1900	1	0
Total			**72**	**57**

3.3 DESU, DETU & DISTUs:

DESU i.e Divisional Equated Signal Units is derived from the total signaling assets of the concerned depot.. Divisional Equated Signal Units which varies from Division to Division.DESU of Southern Railway (all divisions) is placed in **Annexure – III**. The study confined with SSE/SIGNAL/AJJ-EAST.

3.4 STAFF REQUIEMENT:

In general, the staff requirements worked out considering the yardsticks n vogue. Since, the yardstick is very old and lot of changes has been taken in the system of working, Railway Board has formulated a new concept to work out the staff requirement which is Benchmarking. This is very useful, zero based and helps in system improvement comparing by unit to unit. It is one of the best tool available to identify the slack areas of the organisation itself and thereby implementation of the best practices followed at best areas, so that the identified slack area can also become the best in a phased manner.

Keeping the above concept in view, thorough examination of the collected data is analyzed by the study team, requirement of manpower is arrived, to create a healthy competition and to improve the related efficiency.

3.5 APPLICATION OF UNIFORM YARSTICK:

The application of yardstick for shunt signals, calling on signals, shunting permitted indicators, route indicators, LED lamps etc., under broad categories is not very scientific as some of the subsidiary signals have no light in normal aspect and their working time depends on failures, shunt moves, reception of obstructed roads, etc Which is occasional only. So, also, the allocation of equal points for all roads is not very scientific since the dealing of trains is mainly on main lines, especially at Intermediate stations. The sub-categorization of certain equipments like panel / RR, LC gates are not very rational especially for routine maintenance and inspection.

There is no guideline to the extent of reduction of signal units on account of outsourcing and AMC in some activities like BPAC, Data logger, IPS etc. So, a detailed analysis of the signal units seems to be necessary in the study.

3.6 DESU based calculation:

DESU i.e., Divisional Equated Signal Units is a derived unit from Signal units after the addition of many other factors and constants like Annual Train Kilometers, Route Kms etc and the abbreviations in the formula are as under.

A1	=	Total No. of signal units =142307
F	=	Annual Train Kms
H	=	Passenger & proportion of Mixed trains
J	=	Goods including goods proportion of mixed trains
K	=	Departmental trains
L	=	EMU Trains

Total F (MAS Div) (H+J+K+L) = 27454.941

Calculation of A2

G = Total Route Kms	=	697.00
F/G - 7.3	=	32.090
A2 = A1 x (F/G-7.3) x 3.42/100	=	156179.577

Calculation of A3

Signal units/Route Kms	=	204.171
Value of Y	=	0.000
A3 = A1 x Y/100	=	0.000

Calculation of A4

Z=F/G	=	39.39
A4 = A1 x Z x 0.94/100	=	52691.657

Calculation of A5

A5 = G x 1.67	=	1163.990
DESU= A1+A2+A3+A4+A5	=	352342.224
DESU	=	352342

3.7 The failure analysis shown in para No.2.11 does not provide any perfect guidance or norms for the arrival of man power requirement. Apart from attending failures, signal maintainer has to perform the routine, preventive check and maintenance.

Also in changing scenario of signaling ie., Electronic Signalling system, warrants outsourcing of certain activities such as maintenance activities through EOM/AMC contracts for the electronic items like charger inverter, CVT, IPS, Data logger, AFTC, Digital Axle Counter etc.

There fore the study team has adopted benchmarking methodology to arrive the man power requirement for rightsizing the man power to improve the efficiency coupled with productivity.

SSE/SIG/AJJ-EAST unit comprises of four sections i.e AJJ Inter Yard, AJJ East yard. TO Yard and KBT yard. Further these sections are taking care of AJJ-TO auto section (3^{rd}&4^{th} line),AJJ-TO auto section(1^{st}& 2^{nd} line),TO-SPAM auto section (LC 23 incl)and KBT-TRL auto/KBT-SPAM(LC23 Excl) auto section.

Presently, the deployment of Supervisory staff is as follows,

Sl. No	Designation	Sanction	Actual
1	SSE	3	1
2	JE	3	3
3	Technicians, Artizan, & Helpers	66	53
Total		72	57

It is observed that SSE is over all incharge of this unit.

- Looking after & planning all the works under his control.
- Ensuring all schedule maintenance, preventive maintenance ,attendance of failures etc..
- Periodical inspection in his unit
- Accompany with S&T department officers and other officers coming for inspection
- Leave, salary, Roster of employees, rest, RC, safety working of staff, and other staff welfare matters.
- Periodical reports sending to HQ
- Ensuring technical updates & educate the staff.
- Other related official works etc..

JE's are the incharge of their allotted section, and responsible for all works under their section.

Four sub sections are there. 3 JEs are there against sanctioned strength of 3. One JE is temporarily posted in KBT Sub section without sanction.

Artizan, Technicians and helpers are 53 against the sanctioned strength of 66.

3.8 Calculation:

SIGNAL UNITS FOR AJJ-EAST = 4800 (4759 signal Units stated by SSE/Signal/AJJ East)

MULTIPLICATION FACTOR=DESU OF MAS DIVISION/SIGNAL UNITS OF MAS DIVISION

352342/142307 = 2.476

DESU for AJJ-EAST Section is 4800 X2.476 = 11885

Manpower ratio report issued by Efficiency &Research Directorate Railway Board in the Month of June 2019 (Placed as Annexure - IV) .

MAS division falls under the classification **'Divisions more than 120 DISTUs'.**
The Current Best Manpower Ratio is in Agra Cantt (AGC) of NCR at 0.52

The current IR average with more than 120 DISTU's which has the manpower of 2.80 per 1000 DESU.

Current IR average of bench marking norms of June 2019 given by E&R Directorate Railway Board is adopted.

Manpower requirement as per Bench Marking,

DESU for AJJ-EAST Section is 11885

FOR 1000 DESU, 2.8 men required as per IR average by Railway board,
For 11885 DESU,
11885X2.8/1000=33.2 i.e **33 men**
As per Bench marking SSE/SIGNAL/ AJJ-EAST requires 33 men.
But, Work study team has come to a conclusion after thoroughly analysed the work force ,failures, day today activities in field visit of each section.

3.8.1 JE/Sig/AJJ Inter Yard

Continuous roster-3 Shift
1Technician+1Helper=2 per shift
3X2 = 6 per day
RG 16.66%=1
LR 12.5% = 1
Total Requirement =8 (Actual staff available 9)

But work study team in the field visit realised the necessity of additional staff on need base .Because, in station ,LC nearby station requires necessary attention to be given to avoid failures in that areas. so, additionally one staff is allowed to manage.

Required staff=8

Additional staff allowed=1

Total staff allowed=9

3.8.2 JE/Sig/AJJ East Yard

Continuous roster-3 Shift

1Technician+1Helper=2 per shift

3X2 = 6 per day

RG 16.66%=1

LR 12.5% = 1

Total Requirement=8 (Actual staff available 8)

Required staff=8

8 staff is allowed to continue.

3.8.3 JE/Sig/TO section

1Technician+1Helper=2 per shift

3X2 = 6 per day

RG 16.66%=1

LR 12.5% = 1

Total Required =8 (Actual staff available 12)

But work study team during the field visit realised the necessity of additional staff requirement on need base to attend failures at station master's cabin, LC near by the station premises .These failures will cause more time detention of trains , because the staff deputed for attending maintenance, schedules may be in the

mid section .If any failure occurs staff in mid section will be called and they come road by any means of transport will take time to reach and attend the failure. Hence, avoiding this, work study team considered the need of staff and failure rate may be reduced by allowing additional staff in this area.

Required staff=8

Additional staff allowed=4

Total staff allowed=12

3.8.4 JE/Sig/KBT section

1Technician+1Helper=2 per shift

3X2 = 6 per day

RG 16.66%=1

LR 12.5% = 1

Total Required =8 (Actual staff available 11)

But work study team during the field visit realised the necessity of additional staff requirement on need base as explained in para 3.8.3 in this report and in addition to that KBT section is up to TRL (Exclusive).More stopping express trains and EMU's are there. Hence, frequent check is required for avoiding failures. This is to be achieved by very good routine maintenance, attending schedules, preventive maintenance etc..

For doing the above, staff on duty should be regular. Absenteeism, sick, various kinds of leave of staff may affect the routine works.

Considering above facts , 3 additional staff allowed by the work study team. SSE/JE should ensure the optimise utilisation the man power existing and additionally allowed .

Required staff=8

Additional staff allowed=3

Total staff allowed=11

Total staff (Technician +Helper) required = 9+8+12+11=40

Note; (Additional Staff allowed by the Work study team includes RG & LR)

3.8.5 General Staff Requirement

On Need base the following staff are allowed.

General shift 9 hrs to 17 hrs .

Stores in charge for issuing /receiving materials

& Scrap disposal = 1

Collection of Material from Various sources & = 6

Accompany with SSE for inspection

Engineering ,Operating, Electrical & S&T special works

& Unforeseen activities at SSE/O/AJJ (1Artizan+3 staff) =2

Office works at SSE/O/Sig/AJJ-East =1

Cable Joint works are now a days done by outsourcing/ Departmental Technicians. So, No separate Cable Jointer is required.

Total=10

RG &LR for general duty staff = 3

Total General Staff Required

(Tech, Helper, Artizan) 10+3 = 13

Total Staff Required

(Tech, Helper, Artizan**)** **40+13 = 53**

3.8.6 Requirement of Supervisory staff

Overall Incharge SSE/SIG/AJJ-EAST 1

JE s for 3 sub sections
(AJJ Inter, AJJ East Yard, TO, KBT) 3

But, 4 Sub sections are there. Now, KBT Sub section is managed by one JE without Sanction. So, Work study team allowed one SSE instead of JE for managing KBT sub section and inspection of SSE/Sig/AJJ-East section whenever required.

Total 5 supervisors are allowed on Need basis.(2SSE+3JE).They themselves may suitably plan for their rest and leave.

Grand total=53+5=58

Technician, Artizan and Helper category staff may be suitably utilised as per the convenience of the administration.

3.9 Composite Requirement

Sl. No	Category	Sanction	Actual	Requirement	Surplus
1	SSE	3	1	2	1
2	JE	3	4	3	0
3	Sr. Technician	6	6	6	0
4	Technician Gr-I	11	13	10	1
5	Technician Gr-II	3	7	3	0
6	Technician Gr-III	13	5	12	1
7	Black smith Gr -I	1	0	1	0
8	Helper	31	21	21	10
9	Cable Jointer-III	1	0	0	1
Total		**72**	**57**	**58**	**14**

3.10 **Sanction Vs Requirement**

Sl.No	Category	Sanction	Actual	Requirement	Surplus
1	SSE	3	1	2	1
2	Technician-Gr-I	11	13	10	1
3	Technician-Gr-III	13	5	12	1
4	Helper	31	21	10	10
5	Cable Jointer	1	0	0	1
Total		59	40	34	14

SUMMARY OF RECOMMENDATIONS:

RECOMMENDATION No- 1

One Post of SSE in GP 4600 is found surplus may be surrendered and credited in to Vacancy bank.

(**1 Post**)

RECOMMENDATION No- 2

One Post of Technician Gr-I in GP 2800 is found surplus may be surrendered and credited in to Vacancy bank.

(**1 Post**)

RECOMMENDATION No- 3

One Post of Technician Gr-III in GP 1900 is found surplus may be surrendered and credited in to Vacancy bank.

(**1 Post**)

RECOMMENDATION No-4

Ten Post of Helper in GP 1800 are found surplus may be surrendered and credited in to Vacancy bank

(10 Posts)

RECOMMENDATION No- 5

One Post of Cable Jointer in GP 1900 is found surplus may be surrendered and credited in to Vacancy bank.

(**1 Post**)

Total = 14 Posts

CHAPTER – IV

4.0 Planning Branch's Remarks on co-ordinating officer's Views :

Co-Ordinating Officer's Views:

It is not at all advisable to reduce any no. of staff in AJJ/Signal/East section due to the following reasons furnished below:

- AJJ yard is one of the major yards in MAS Division which has 8 passenger lines and 5 Goods lines. Train movements available in all four directions such as CGL side, RU side, KPD side and MAS side. 150 + Trains are running through AJJ yard daily. If any failure at Yard will badly disrupt train movements as well as detention to trains.
- Present sanctioned strength is 72 which has to be increased further since it was based on DESU/Signal Units before 4th line commissioning (up Fast line AJJ – TRL). So, staff got additional load after commission of 4th line.

Planning Branch's Remarks:

Actual staff available in SSE/Signal/AJJ East is 57 against sanctioned strength of 72. Distribution of staff is shown in Chapter II as Tree chart for SSE/Signal/AJJ East Unit. Actual staff position is shown in chapter III para 3.2.

Work study Team has arrived the man power based on DESU, signal units data given by Unit of Signal /AJJ East. As per DESU, SSE/Signal/AJJ East Unit requires 33 staff only based on Benchmarking for the month of June 2019 issued by Rly.Board. But, the work study team analysed and carefully considered the importance of the unit, sections divided by administration for comfortable maintenance, allowed the staff with RG & LR. It is shown in Chapter III para 3.8.1 to 3.8.4
(i-e AJJ/Inter yard, AJJ/East Yard, TO section , KBT section required 32 staff) (8+8+8+8=32 staff).

But, the work study team has considered and allowed additional staff of 8 on need base to attend unforeseen works if any apart from routine maintenance, preventive maintenance, schedules and failures(Total 32+8=40 staff).

Additional staff allowed is available in this report Chapter III para 3.8.1 to 3.8.4

But, As reiterated by Co-ordinating officer, the work study team now considers the continual additions in signal assets and staff welfare working in this unit, the following 3 staff are additionally allowed as per the following table.

Table-1

Sl.No	Section	Staff Required	Staff allowed In Draft report	Staff Additionally Allowed on need basis	Total
1	AJJ-Inter yard	8	9	1	10
2	AJJ-East yard	8	8	1	9
3	TO section	8	12	-	12
4	KBT section	8	11	1	12
Total		32	40	3	43

Co-Ordinating Officer's Views:

- Signalling staff always busy with daily routine maintenance work. Besides, they also support for sister department like, Engineering, Electrical etc. for TTR, TBR, CTR, TRR etc. works.

Planning Branch's Remarks:

Duly considering the increase in train movement day by day , increase in signal assets and Men & Women staff working in this unit, their PL,ML, CCL ,Training if any and other relieving activities like SJAB, SCOUT, Territorial Army, Sports etc.. the following additional staff are allowed on need base.

General staff Requirement allowed on need base

Table-2

Sl.No	Section	Staff Required	Staff allowed In Draft report	Staff Additionally Allowed on need basis	Total
1	Stores in-charge issue /receipt	1	1	1	2
2	Material collection & Accompany With SSE in inspection	6	6	1	7
3	Engg,Optg, Elec, S&T special Works	2	2	1	3
4	Office Works SSE/O/AJJ East	1	1	-	1
5	Cable Jointer	1	0	1	1
	Total	10	10	4	14
	RG 16.66% & LR 12.5%	-	3	1	4
	Total	10	13	5	18

Total Staff requirement=(Table 1+Table2) of Planning branch's remarks
= 43+18 = 61

Supervisor's Requirement = **5** (Chapter III para 3.8.6)

Grand total = 61+5 = 66

Co-Ordinating Officer's Views:

- No. of routes has been increased to 354 (after AJJ stage I and stage II construction work at AJJ yard, increased to 108 at TO yard, increased to 70 at KBT yard (after 4th line commissioning). All these major yards (AJJ, TO, KBT) are deputed staff as per continuous roster which is essential for train running without any detention.
- Moreover, AJJ-TRL section is quad rash auto section, even if any minor failures, at LC gates (11 gates) will disturb all 4 lines that ultimately detention to more number of trains.
- However, no. of failures from Signal department side is 70% (approx) with respect to total no. of failures in AJJ – TRL sections (Ref. 2.11 section in this report).

Planning Branch's Remarks.

For maintaining all the assets and attending failures, sufficient staff are allowed in this report. The existing and additionally allowed staff are adequate to maintain all the above said attention.

The various procedures as per G & SR can be followed to run the trains while in signal failure .

It is observed that the maintenance of S&T equipment by the staff is appreciable in SSE/Signal/AJJ East. Failure percentage can also be reduced in future by more vigilant in routine maintenance.

Also, the Work study team allows 8 additional staff for better maintenance of Signal Assets and hence the total man power arrived in this work study is justified.

Co-Ordinating Officer's Views:

Look at small case study, which is mentioned below

Case study:

If any failure, occurs in the busy route for more than 1 hrs or 1.5 hrs. due to repercussion, let us considered if any one of Express train is cancelled / running late.

Train composition

	General	Sleeper	III AC	II AC	I AC
No.of coaches	5	12	4	2	1
No.of seats per coach	72	72	64	48	26
No.of seats in with respect to coach	5x72 = 360	12 x 72 = 864	4 X 64 = 256	2 x 48 = 96	1 x 26 = 26
Total No. of seats = 1602					

No. of signal failures - 4 per month
(Ref: 2.11 in this report)
Average cost of seat - Rs.250
Total revenue loss to Railway - 1602 x 12x4 x 250 = Rs.1,92,24,000

Total revenue loss per year due to signal failure as per case study = Rs.1,92,24,000 which is in percentage more than saving what work study is showing. So not advisable to reduce staff.

Planning Branch's Remarks:

Refunds of fare is given to the passengers in the case of total obstruction of movement of trains due to derailments, passenger agitation, breaches, etc., While analysing the refunds statistics it is observed that money is not refunded fully to the passengers on account of signal failures. However, based on the additional work load sufficient additional man power is provided wherever necessary while calculating the overall requirement of man power in SSE/Sig/AJJ-(East)

In addition to that, if signal / LC failure occurs, there are various procedures instructed in G&SR to run the train safely.

Hence, there will be no need of cancellation of trains and loss to railway due to running late of train on account of Signal failure. At the same time, good maintenance and regular checks is already existing in SSE/Sig/AJJ-(East) to reduce the failures.

Hence, the above said case study cannot be considered.

Work study team concludes the surplus of staff identified in the work study SSE/Signal/AJJ East stands good after allowing additional 8 staff to the unit.

Composite of Sanction Vs Requirement

Sl. No	Category	Sanction	Actual	Requirement	Surplus
1	SSE	3	1	2	1
2	JE	3	4	3	-
3	Sr. Technician	6	6	6	-
4	Technician Gr-I	11	13	11	-
5	Technician Gr-II	3	7	3	-
6	Technician Gr-III	13	5	13	-
7	Black smith Gr -I	1	0	1	-
8	Helper	31	21	26	5
9	Cable Jointer-III	1	-	1	-
Total		72	57	66	6

Sanction	Actual	Requirement	Surplus
72	57	66	6

REVISED RECOMMENDATIONS

1) One Post of SSE in GP Rs.4600 (Level -7) is found surplus may be surrendered and credited in to Vacancy bank.

(**1 Post**)

2) Five Post of Helper in GP Rs.1800 (Level-1) are found surplus may be surrendered and credited in to Vacancy bank.

(5 Posts)

Total = 6 Posts

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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	Pay Level	No. of Posts	Money Value	Savings
1	SSE	4600	L-7	1	109571	13,14,852
2	Helper	1800	L-1	5	43817	26,29,020
TOTAL				**6**		**39,43,872**

7

SOUTHERN RAILWAY

No. M/P(S&T)535/IX/Misc.

Divisional Railway Manger's Office,
Personnel Branch, Chennai Division,
Chennai – 3, Date: 25.07.2019.

Ch.Work Study Inspector/Plg.,

Sub: Work study to review the staff strength at SSE/S/AJJ.E MAS Division.

>>> <<<

With reference to the letter cited above the details are furnished below;

SIGNAL			
	AJJ.E		
	SAN	ACT	VAC
SSE	3	3	0
JE	3	2	1
MCM	6	6	0
TECH-I	11	10	1
TECH-II	3	3	0
TECH-III	13	6	7
HELPER	31	29	2
B/SMITH MCM	0	0	0
B/SMITH –I	1	0	1
B/SMITH-II	0	0	0
CJ-III	1	0	1

/Sr. Divisional Personnel Officer/MAS

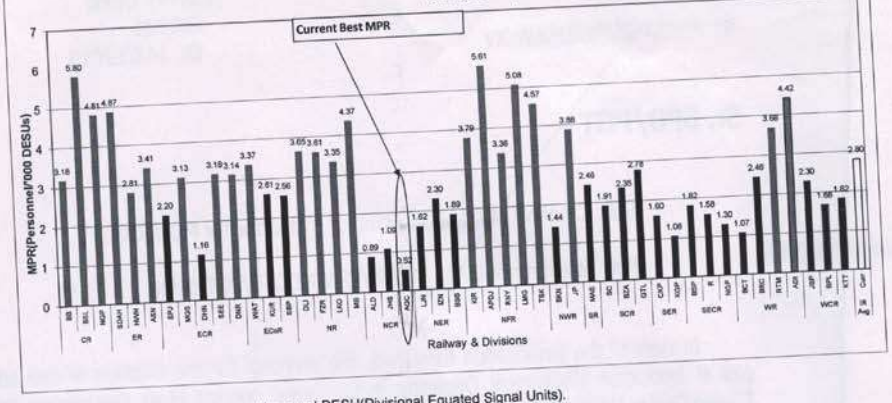
SOUTHERN RAILWAY - DIVISIONAL EQUATED SIGNAL UNITS (DESU) FOR 2018-19

(BASED ON SIGNAL UNITS AS ON 31.03.2019 AND STATISTICAL DATAS)

S.No.		DESCRIPTION	MAS	SA	PGT	TVC	TPJ	MDU	TOTAL
I	A1	**Total No. of signal Units (A1)**	**142307.000**	**84142.000**	**68098.000**	**70557.500**	**80561.000**	**77823.000**	**523488.500**
II	F	Annual Train Kms. (F)							
	(i)	Passenger & proportion of mixed trains. (H)	12725.729	9525.882	8218.112	10379.682	5695.512	7375.042	53919.959
	(ii)	Goods including Goods Proportion of Mixed Trains (J)	3957.040	2597.757	1190.509	532.215	820.279	363.052	9460.852
	(iii)	Department Trains (K)	128.631	65.984	74.407	17.528	51.608	38.694	376.852
	(iv)	EMU as Trains are run (L)	10643.541	322.254	112.072	534.940	1384.230	0.000	12997.037
		TOTAL H+J+K+L = **(F)**	**27454.941**	**12511.877**	**9595.100**	**11464.365**	**7951.629**	**7776.788**	**76754.700**
	A2	**CALCULATION OF A2**							
	(a)	Total Route Kms. **(G)**	**697.000**	**859.000**	**577.000**	**625.000**	**1029.000**	**1294.000**	**5081.000**
	(b)	F/G - 7.3	32.090	7.266	9.329	11.043	0.428	-1.290	
		A2=A1 X [F/G-7.3] x 3.42/100 (A2)	**156179.577**	**20907.989**	**21727.464**	**26647.455**	**1177.926**	**-3433.708**	
III	A3	**CALCULATION OF A3**							
	a.	SIGNAL UNITS/ROUTE Km.- (A1/G)	204.171	97.953	118.021	112.892	78.291	60.141	
	b.	VALUE OF Y	0.000	0.000	0.000	0.000	0.000	0.000	
	c.	**A3 = SIGNAL UNITS x Y/100 (A3)**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	
IV	A4	**CALCULATION OF A4**							
	a.	Z = F/G	39.39	14.57	16.63	18.34	7.73	6.01	
	b.	**A4 = A1 X Z x 0.94 /100 (A4)**	**52691.657**	**11520.464**	**10644.761**	**12165.810**	**5851.853**	**4396.447**	
V	A5	**CALCULATION OF A5**							
		A5 = 1.67 x G **(A5)**	1163.990	1434.530	963.590	1043.750	1718.430	2160.980	
	DESU	A1 + A2 + A3 + A4 + A5	352342.224	118004.984	101433.814	110414.515	89309.210	80946.719	852451.465
	DESU		**352342**	**118005**	**101434**	**110415**	**89309**	**80947**	**852452**
	DETU		**501725**	**140345**	**149087**	**184924**	**112838**	**75313**	**1164232**
	DISTUs		**854067**	**258350**	**250521**	**295339**	**202147**	**156260**	**2016684**

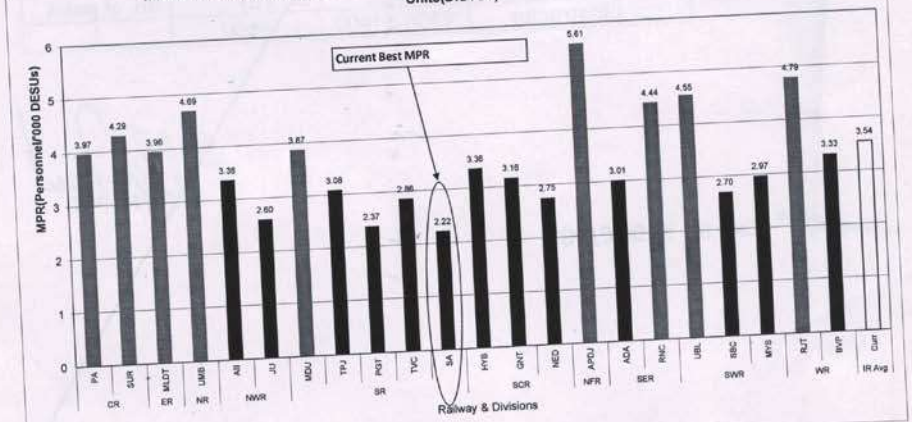
SIGNALLING STAFF IN DIVISIONS

Man Power Ratio of Signal-Divisions more than 120 Divisional Integrated Signalling & Telecom Units(DISTUs)



CURRENT IR AVERAGE: 2.80 Men per thousand DESU(Divisional Equated Signal Units).
CURRENT Man Power Ratio: Agra cantt (AGC) of NCR at 0.52
EXCEEDING THE AVERAGE: 22 Divisions are above the current IR average.

Man Power Ratio of Signal-Divisions less than 120 Divisional Integrated Signalling & Telecom Units(DISTUs)



CURRENT IR AVERAGE: 3.54 Men per thousand DESU(Divisional Equated Signal Units).
CURRENT Man Power Ratio: SA division of SR at 2.22
EXCEEDING THE AVERAGE: 09 Divisions are above the current IR average.

CHAPTER – IV

4.0 Planning Branch's Remarks on co-ordinating officer's Views :

It is not at all advisable to reduce any no of staff in AJJ/signal/East section due to following reasons furnished below.

→ AJJ yard is one of the major yards in MAS division which has 8 passenger line and 5 good line. Train movements available in in all four directions such as CGL side, RU side, KPD side and MAS side. 150+ trains are running through AJJ yard daily. If any failure @ yard will badly disrupt to train movements as well as detention to trains.

→ present sanctioned strength is 72 which has to be increased further since it was based on DESU/signal units before 4th line commissioning (UP Fast line b/w AJJ – TRL). So, staff got additional load after commission of 4th line.

→ Signaling staff always busy with daily routine maintenance work. Besides, they also support for sister dept like Engg, Electrical – etc for TTR, TBR, CTR, TRS – etc works.

→ no of routes has been increased to 354 (after AJJ stage-I & stage-II construction work at AJJ yard, increased to 108 at TD yard, increased to 70 at KBT yard (after 4th line commissioning). All these major yards (AJJ, TD, KBT) are deputed staff as per continuous roster which is essential for train running without any detention

→ Moreover AJJ – TRL section is Quadrash auto section, Even if any minor failure at Level gates (10 gates) will disturb all four lines that ultimately causes detention to more no of trains.

→ However, no of failures from signal Dept side is 70% (approx) w.r.t total no of failures in AJJ – TRL section. Look at small case study which is mentioned below. (ref. 2.11 section in this report)

Case study

* If any failure occurs in this busy route for more than 1hrs or 1.5 hrs, Due to repercussion, let us consider if any one express train is cancelled/running late.

Train composition.

	GN	SL	3AC	2AC	1AC
	↓	↓	↓	↓	↓
No of coaches	5	12	4	2	1
No of seats per Coach	72	72	64	48	26
No of seats in train w.r.t Coach	5×72	12×72	4×64	2×48	1×26

Total no of seats (5×72 + 12×72 + 4×64 + 2×48 + 1×26)
= 1602

No of failures per month = 4 (ref. 2.11 section in this report)

Avg cost of seat (approx) = 250/-

Total revenue Loss per year due to single failure as per case study
= 1, 92, 24, 000/-

which is 100% more than saving what work study is showing. So, not advisable to reduce staff.