

# EASTERN RAILWAY

WORK STUDY REPORT

ON

REVIEW OF MANPOWER VIS-A-VIS WORKLOAD  
OF PAINT SHOP AT LILUAH C&W WORKSHOP

**(STUDY NO.WSER- 11 / 18-19)**

**Submitted on 28.09.2018**

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BY  
CENTRAL PLANNING ORGANISATION  
GM'S EFFICIENCY CELL  
EASTERN RAILWAY  
KOLKATA

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### **ACKNOWLEDGEMENT**

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The study team is also very thankful to Senior Section Engineer, Junior Engineer and other staff of Paint Shop (N-Shop) for providing necessary information in connection with the subject study.

### **METHODOLOGY ADOPTED**

The following methodology has been adopted in carrying out the study:

- Collection of data
- Discussion with concerned officers and SSE of Paint shop
- Study of existing workload
- Critical analysis of workload and manpower

### **TERMS OF REFERENCE**

The subject workstudy has been undertaken by the GM's Efficiency Cell of Eastern Railway in the financial year 2018-19 under the following terms of reference:-

- (i) Evaluate the quantum of existing workload.
- (ii) Examine the deployment of Staff against workload.
- (iii) To identify saving achievable in terms of manpower.

### **SUMMARY OF RECOMMENDATION**

<b><i>Sl. No.</i></b>	<b><i>Recommendation</i></b>	<b><i>Para reference</i></b>
1	It is recommended that the revised total requirement of manpower to carry out the entire workload of the Paint shop will be 487 posts which would result in surrender of <b><u>159 posts</u></b> as against the present total sanctioned strength of 646 posts.	3.16

### **EXECUTIVE SUMMARY**

<i>Study Name &amp; No.:</i>	“REVIEW OF MANPOWER VIS-A-VIS WORKLOAD OF PAINT SHOP AT LILUAH C&W WORKSHOP” <b>(STUDY NO.WSER-11/18-19)</b>		
<i>Year of conducting the study:</i>	<b>2018-19</b>		
<i>Terms of reference:</i>	(i) Evaluate the quantum of existing workload. (ii) Examine the deployment of Staff against workload. (iii) To identify saving achievable in terms of manpower.		
<i>Methodology:</i>	<ul style="list-style-type: none"> <li>• Collection of data</li> <li>• Discussion with concerned officers and SSE of Paint Shop</li> <li>• Study of existing workload</li> <li>• Critical analysis of workload and manpower.</li> </ul>		
	<b>Artisan staff</b>	<b>Erstwhile Group “D” (only Helper Category)</b>	<b>TOTAL</b>
<i>Existing Sanctioned Strength</i>	621	25	646
<i>Existing Men on Roll</i>	486	11	497
<b>Vacant post</b>	<b>135</b>	<b>14</b>	<b>149</b>
<b>Revised Requirement</b>	<b>487</b>		
<b>Proposed Surrender</b>	<b>159</b>		

<b>Justification</b>
<p>For assessment of Revised requirement of manpower in Paint Shop (N-Shop) at Liluah workshop, study team analyzes the effective utilization of manpower vis-a- vis assessment of Monthly Production.</p> <p>The review of manpower of Paint Shop at Liluah workshop is assessed considering the outturn of the shop for the year 2016-17, 2017-18 and 2018-19 (<i>upto June’18</i>).</p> <p>For assessment, study team takes reference from <u>Chapter IV of ‘Indian Railway Mechanical Code’</u> regarding various aspects of "<b>Production Control Organization</b>" to analyze in a more scientific way.</p>

## **CHAPTER-I**

### **1.0 INTRODUCTION:**

Indian Railways is the life-line of nation for providing Transportation facility over the length and breadth of the country. Its vision is to provide efficient, affordable, customer-focused, environmentally sustainable integrated transportation solutions and to be the vehicle of inclusive growth, connecting regions, communities, ports and centres of industry, commerce, tourism and pilgrimage across the country.

- 1.1 Indian Railways manufactures much of its rolling stock and heavy engineering components at its six manufacturing plants, called Production Units, which are managed directly by the Ministry. Popular rolling stock builders such as CLW and DLW for electric and diesel locomotives; ICF and RCF for passenger coaches are Production Units of Indian Railways. Over the years, Indian Railways has not only achieved self-sufficiency in production of rolling stock in the country but also exported rolling stock to other countries. Each of these production units is headed by a General Manager, who also reports directly to the Railway Board. Thus, Indian Railways manages and maintains all those infrastructures. Management of those huge infrastructures have to be done in accordance with the organization's vision.
- 1.2 Besides the above, in Indian Railways, various Railway Workshops plays a very vital Role in connection with POH/ROH/IOH/NPOH repair of different kinds of Wagons, coaches (*both AC & Non-AC*) and Locomotives (*both Diesel & Electric*).
- 1.3 To cope up with the above changing scenario, Infrastructural development is not only required in the area of manufacturing & periodical overhauling of various types of passenger coaches, goods wagons and Diesel/Electric Locomotives only, overall infrastructural development is necessary in whole Indian Railway system.
- 1.4 For any kind of development, money is the most important but limited resources. An organisation, like Indian Railways, may also provide a good financial support for its development, if good financial discipline can be practised and expenditure due to man, materials & overheads can be managed optimally & economically.
- 1.5 In view of the above, Rly. Board issued nos. of circulars, orders, etc. The Zonal Railways also implement various measures for financial discipline.
- 1.6 At this juncture, the role of Railway Efficiency & Research Directorate is also very important in connection with 'Benchmarking', 'Rationalising of Man-Power', etc.

- 1.7 Indian Railway is facing tremendous financial crunch after implementation of 6<sup>th</sup> Pay Commission. Operating ratio is gradually increasing. Though Indian Railway is not a business organization but to survive, it is always essential to make the organization in profit i.e. operating ratio should be less than 1. Performance Efficiency Index shown in the corporate plan published by the Eastern Railway is given below.

2013-14	:	173.32%
2014-15	:	177.27%
2015-16	:	180.75%
2016-17	:	165.25%
2017-18	:	178.76% (Proposed)

- 1.8 The aim of conducting this Workstudy is to review the manpower of Paint Shop (N-Shop) of Liluah Workshop for optimization. In the analysis, the effective utilization of human resource is considered keeping in mind of the present working pattern. The objective is to explore financial savings of the Railways. The impact of the participation of external agencies is also explored in the analysis done in ongoing Chapters.

**CHAPTER-II****2.0 Existing Scenerio:**

In Eastern Railway, there are three major Workshops for POH/ROH/IOH/NPOH repair of different kinds of Wagons, coaches (*both AC & Non-AC*) and Locomotives (*both Diesel & Electric*). These Workshops are as follows-

- (I) Liluah Carriage & Wagon Workshop/Liluah/E.Rly.
- (II) Kanchrapara Carriage & Wagon Workshop & Kanchrapara Locomotive Workshop/Kanchrapara/E.Rly.
- (III) Jamalpur Locomotive Workshop/Jamalpur/E.Rly.

2.1 Liluah Carriage & Wagon Workshop (An ISO-9001:2008 & ISO-14001-2004 Certified Organisation) is one of the IR's oldest & biggest Railway Carriage Repair Workshop of India. The Liluah Workshop is functioning under Chief Workshop Manager.

2.2 The Workshop is engaged in periodical overhauling of all kinds of coaches & wagons. It also facilitates repair and overhauling of components. The above mentioned activities are performed in different shops.

2.2.1 Different shops or workpoints along with their respective activities are as under:

<b>S.No.</b>	<b>Shops</b>	<b>Activities catered by the shops</b>
1	M	Coaching Repair Shops
2	CR	
3	MR	
4	N	Paint Shop
5	T	Trimming Shop
6	L	Wagon Repair Shop
7	J	Sheet metal works, shearing, bending, drilling, punching, pressing work, etc
8	A	Blacksmith
9	C	Tin smith
10	E	Spring shop
11	G	Machine shop
12	HT	Heat treatment
13	K	Wheel shop
14	TR	Tool room
15	H	Mill Wright

2.3 The N Shop i.e Paint shop is concerned with the Painting work of Coaches. The general workload concerned with this shop mainly consists of cleaning work, painting work and finishing work. The total workload of Paint shop in accordance to their nature of activities is divided among 11 sections mentioned as under:

- i) Polish Section
- ii) Exterior Coach Cleaning Section
- iii) Interior Coach Cleaning Section
- iv) Exterior Coach Painting Section
- v) Interior Coach Painting Section
- vi) U/F Cleaning and Painting Section
- vii) Sign writing Section
- viii) Misc. Painting Section
- ix) Anti corrosion Section
- x) Rajdhani Section
- xi) Bahar Line

2.4 The existing position of Supervisory category, Artisan category and Erstwhile Group-D category staff of Paint Shop (*N-shop*) as on 01.08.18 are mentioned underneath (*ANNEXURE I*).

2.4.1 The category-wise Sanctioned strength vis-à-vis On-roll position of Supervisors of Paint Shop (*as on 01.08.18*) is tabulated as under:

S. No	Category	Sanctioned Strength	On-Roll Strength	Vacancy
1	Sr. Section Engineer	21	14	07
2	Junior Engineer	11	03	08
<b>Total</b>		<b>32</b>	<b>17</b>	<b>15</b>

2.4.2 The category-wise Sanctioned strength vis-à-vis On-roll position of Artisan category staff of Paint Shop/LLH Workshop (*as on 01.08.18*) is tabulated as under:

S. No	Category	Sanctioned Strength	On-Roll Strength	Vacancy
1	Sr. Tech.	174	171	3
2	Technician I	342	262	80
3	Technician II	54	32	22
4	Technician III	51	21	30
<b>Total</b>		<b>621</b>	<b>486</b>	<b>135</b>



2.4.2.1 It is observed that out of total 486 On-roll Artisan staff, 60 Artisan staff work in other shops and utilized to cater other shop's workload. Only, 426 Artisan staff are deployed in various sections of Paint Shop for contributing shop's outturn, as shown below (*ANNEXURE II*).

Category	Sanctioned Strength	On-Roll Strength		Vacancy
		Working in N Shop	Working in other shop	
Artisan staff	621	426	60	135
<b>Total</b>	<b>621</b>	<b>486</b>		<b>135</b>

2.4.3 Sanctioned strength vis-à-vis On-roll position of Erstwhile Group 'D' staff of Paint Shop (*as on 01.08.18*) is tabulated as under:

S. No	Category	Sanctioned Strength	On-Roll Strength	Vacancy
1	Helper	25	11	14
2	Peon	2	1	1
3	Safaiwala	3	1	2
<b>Total</b>		<b>30</b>	<b>13</b>	<b>17</b>

2.5 Section-wise deployment of Supervisors, Artisan staff and Erstwhile Group-D staff (*only helper category staff*) is tabulated as under:

S. No.	Sections	Men on roll			
		Supervisors	Artisan & Erstwhile Group'D'		
			Artisan staff	Helper	Total
1	<b>Overall In-charge</b>	<b>1</b>	--	--	--
2	Polish Section	1	3	1	<b>4</b>
3	Exterior Coach Cleaning Section	2	51	0	<b>51</b>
4	Interior Coach Cleaning Section	2	55	4	<b>59</b>
5	Exterior Painting Section	2	78	0	<b>78</b>
6	Interior Coach Painting Section	2	57	3	<b>60</b>
7	U/F Cleaning & Painting Section	1	45	0	<b>45</b>
8	Sign Writing Section	2	40	1	<b>41</b>
9	Misc. Painting Section	2	20	1	<b>21</b>
10	Anti corrosion Section	0	32	0	<b>32</b>
11	Rajdhani Section	1	41	1	<b>42</b>
12	Bahar Line	1	4	0	<b>4</b>
<b>TOTAL</b>		<b>17</b>	<b>426</b>	<b>11</b>	<b>437</b>

- 2.6 The workload carried out by the various sections of Paint Shop [as per **Work Instructions for Coach Painting** (Doc. No. LLH/WI/C/N/04 & LLH/WI/C/N/AC/04)] is mentioned in details in paragraphs below:

2.6.1 **Polish Section:**

Various wooden panels, furniture and wooden amenities of Saloon coaches, Tourist cars, Inspection Coaches, etc are polished by the staff of this section including S.W items.

2.6.2 **Exterior Coach Cleaning Section:**

The workload carried out by the staff of this section is listed below:

- a) Inspection of exterior body panel is done along with representative of inspection wing.
- b) Removal of old paint is done by paint remover followed by cleaning with fresh water.
- c) Cleaning the roof by Barnish brush.
- d) Cleaning the exposed portion of the trolley including Axle front cover with caustic soda water solution.
- e) Removal of old paint from door hand holds with paint remover and silicon carbide water.

2.6.3 **Interior Coach Cleaning Section :**

The workload carried out by the staff of Interior Cleaning section is listed below:

- a) Checking and cleaning the interior thoroughly and extensively including lavatory with the help of cleaning compound. Special attention is given while cleaning sun-mica panels, ceilings, floor, sill and runner, mouldings, pipe fittings, etc.
- b) Removal of old paints is done from lavatory pipes and other components.
- c) After completion of interior painting, sun-mica panels, wash basins, sil & runner, mirror, mouldings and floor are cleaned with the help of paint remover.

2.6.4 **Exterior Coach Painting Section:**

Both Normal spray painting with Alkyd Paint and PU painting are done depending on the type of coaches. The workload carried out by the staff of this section in regards to different types of painting is listed below:

2.6.4.1 **For Normal Spray Paint:**

- a) After proper cleaning and drying, the coach surface is rubbed with sand paper and primer is applied.
- b) One coat of brass filler is applied followed by putty and allowed to dry.

2.6.4.2 **For PU Paints:**

In PU painting, complete repainting is done after every 36 months. The conventional coaches, which arrives after 18 months for POH, Touch-up paint is applied. The details for both Touch-up painting and Complete repainting with PU paint are discussed below.

2.6.4.2.1 **Touchup painting with PU paint**

- a) Cleaning is done of the affected area with Sodium Hydroxide solution followed by washing with water and then washing with Phosphoric acid solution.
- b) The affected area is rubbed with sand paper and cleaned with water.

- c) Touch up is done with Epoxy Zinc Phosphate Primer by spray/ brush.
- d) Polyester putty is applied by touching knife and allowed to dry. After drying, the surface is again rubbed with emery paper.
- e) Surfacer is applied to the affected area and allowed to dry. After drying, the surface is rubbed slightly.
- f) PU top coat is applied by airless spray/spray.

#### 2.6.4.2.2 Repainting of coaches already Painted with PU Paints

- a) The coach is washed with soap water and dried. The glazed coat and finished coat is rubbed with emery paper and cleaned with water.
- b) Then the surface is cleaned with Sodium Hydroxide solution followed by washing with water and then washing with Phosphoric acid solution.
- c) Touch up is done as and where required with Epoxy Zinc Phosphate Primer by spray/ brush.
- d) Polyester putty is applied as and where required by touching knife and allowed to dry. After drying, the surface is again rubbed with emery paper.
- e) Surfacer and two coats of PU top coat is applied.

#### 2.6.5 Interior Coach Painting Section

The workload carried out by the staff of this section is listed below:

- a) After checking and ensuring that the interior portion of the coach washed, cleaned and dried properly, putty is applied wherever necessary after rubbing with sand paper.
- b) 1<sup>st</sup> coat is applied on ceiling and dried. After that 2<sup>nd</sup> coat is applied after rubbing with sand paper.
- c) One coat of undercoat is applied on mouldings and frames after rubbing with sand paper and allowed to dry.
- d) Finish coat is applied thoroughly including body panels, pillars, luggage portions, lavatories.
- e) Putty is applied on inside glass frames of A/C coaches and painting is done. Lavatory pipes, alarm signals, Coat hooks and other amenities are painted.

#### 2.6.6 U/F Cleaning and Painting Section

Majority of the workload of this section is outsourced to the external agencies. The workload carried out by staff of U/F section is listed below. The workload of this section can be broadly divided into two components:

##### 2.6.6.1 Conventional Coach

##### 2.6.6.1.1 ICF Trolley:

- a) Cleaning, shot blasting and applying of red oxide is being done by external agency through works contract.
- b) After drying of Red Oxide, one coat of R/M Black paint or synthetic black paint is applied.
- c) After repair, when the trolley is placed in Brake gear, the front and side portion of the trolley is thoroughly cleaned and painted.

#### 2.6.6.1.2 ICF U/Frame:

Cleaning and painting of Underframe is done fully by External agency.

#### 2.6.6.2 LHB Coach

##### 2.6.6.2.1 LHB Trolley:

- a) Cleaning the surface with wire brush and removing the scales and loose paints by hammering.
- b) Foreign material is removed by scraping.
- c) The trolley is made dust free by applying pneumatic high pressure air.
- d) Surface grinding is done to smoothen the uneven corrosion affected area.
- e) Two coats of high performance epoxy anticorrosive primer is applied and allowed to dry.
- f) One coat of epoxy based elastified top coat is applied and allowed to dry.

##### 2.6.6.2.2 LHB U/Frame:

- a) After lifting the coach, the Underframe member i.e Troughfloor, Solebar, Cross bar, Bolster, Head stock are thoroughly scrapped and cleaned with wire brush, hammer, and duster to make it rust and dust free.
- b) Synthetic enamel paint is applied on Sole bar and Cross bar and epoxy based top coat (MDTS 094) is applied on body bolster and head stock as and when required.

#### 2.6.7 Sign writing Section

The workload carried out by staff of Sign writing is listed underneath:

##### 2.6.7.1 Sign writing by Stenciling:

- a) Stencil of prescribed sizes are prepared for marking on the body panels of painted coaches.
- b) Marking is done on the coach with stencil according to its type.
- c) Lettering the legends accurately on the coach by artist brush and paint.
- d) Line impression is created on coach by string and red oxide powder and line molding and line cutting is completed.
- e) Stenciling of various charts and safety items is done on the end panel of coaches.
- f) Numbering and marking of charts is done on the inside portion of coaches.
- g) Various statutory warnings, safety items, passenger amenities, etc are displayed in the interior portion of coaches.

##### 2.6.7.2 Sign writing by Silk Screen Printing:

- a) Marking is done on the coach panel.
- b) Readymade silk screen frame of various types are placed on the marked panel.
- c) Silk screen ink is applied by means of rubber squiser for necessary impression.
- d) Silk screen frame is withdrawn carefully and final touch is given to the unfinished work if required by artist brush.

### 2.6.8 Miscellaneous Painting Section

The workload of staff of this Miscellaneous Section is listed below:

- a) Various coaching amenities of all types of coaches is immersed in caustic soda bath and thoroughly cleaned by fresh water. Special attention is given to steel pan and basin.
- b) Caustic cleaning items are allowed to dry and then spray painted with ROZ primer/under coat. After drying, 2<sup>nd</sup> coat spray painting is done and allowed to dry.
- c) After cleaning, air pipes, branch pipes, MS moulding, other coaching amenities, seat angle, emergency hammer notice, etc are painted by hand brush.
- d) Various types of corrosion items such as channel, connecting sheet, body patch, various brackets, etc are painted by hand after cleaning.
- e) Cleaning and painting of coaching components and amenities are done.

### 2.6.9 Anti corrosion Section

The staff of Anti corrosion section are scattered at various shops to carry out their designated workload. The workload carried out by the staff of this section is mentioned below:

#### 2.6.9.1 Phosphating Section:

- a) 1<sup>st</sup> coat Red Oxide zinc chrome primer is applied on both side of phosphate trough floor.
- b) After drying properly one coat of anticorrosive Bituminous Black emulsion is applied on both sides.
- c) Tissue paper fixed-up on the same trough floor after applying one coat Bituminous Black emulsion and finally covered up the tissue paper with another coat of Bituminous Black emulsion.
- d) Tissue Paper is Fixed-up at coach on welding joint as and when required.

#### 2.6.9.2 MCR & SCR shops:

- a) All the new coach components that require anti corrosive treatment i.e body panel, sole bar, buffer tube, guard pillar, modified sole bar, head stock, diagonal set inner, Head stock (*outer & inner*), etc are cleaned properly and painted with red oxide zinc chrome primer and allowed to dry.
- b) After drying, one coat of Bituminous Black emulsion is applied and allowed to dry.
- c) Mainly all coaches Laboratory portion i.e Head stock to B.S door both side cleaning is done properly. After that, two coats of red oxide zinc chrome primer is applied on that portion.
- d) Underneath of the coaches is painted with one coat of anti-corrosive Bituminous Black emulsion.
- e) Buffer base of the coaches are cleaned and one coat of ready mixed black paint is applied.
- f) All under slung tanks are cleaned and painted.
- g) Over head tank structure is cleaned and painted if required after removing the O/H tank.

### 2.6.10 Rajdhani Section

This section is separately looking after the work of painting and cleaning of allotted AC coaches, Satabdi or Rajdhani (*POH & IOH*). Work procedure described for exterior coach cleaning (*para 2.6.2*), interior coach cleaning (*para 2.6.3*), exterior coach painting (*para 2.6.4*) and interior coach painting (*para 2.6.4*) are followed in the coaches allotted to Rajdhani section.

### 2.6.11 Bahar Line

Cleaning and painting of late finished work on traffic out coaches (POH & IOH) by MR shop, M shop, CR shop, P shop or other shop are to be done by this section. Compliance of the report made by NTXR and Div. TXR during inspection before traffic out coaches.

- 2.7 It is observed that a no. of workload of Paint Shop have being outsourced to External Agencies through Works Contract/ Contract. The details of Works Contract presently running pertaining to various activities of Paint Shop is mentioned as under:

#### 2.7.1 Works Contract for “Mechanised Scrapping, Cleaning & Painting of Under-frame in all type Coaches” (ANNEXURE III)

<b>Description of item :</b>	Scraping, Cleaning & Painting of Coach Under Frame
<b>Tender Notice No. :</b>	LRC.3/Contract/UF/Pt.II Dtd. 09/11/16
<b>Unit:</b>	Coaches
<b>Quantity :</b>	7200 (Seven thousand two hundred) Coaches
<b>Rate per Unit :</b>	Rs. 800/- (Rupees Eight hundred only)
<b>Total Amount :</b>	<b>Rs 57,60,000/-</b> ( Rupees Fifty seven lakh sixty thousand only)
<b>Contractor Name :</b>	M/s Rupesh Kumar Shankar, Sonamukhi, Jholy, P.O.-Hijli, Kharagpur, Dist.- Paschim Medinipur, Pin-721306
<b>Duration of Contract :</b>	Three years

#### 2.7.2 Vinyl Wrapping of Exteriors except End Panels of Duronto Express (LHB/ICF/ Hybrid) Coaches and Yuva Express (ICF) Coaches through Works Contract. (ANNEXURE IV)

<b>Description of item :</b>	<u>Vinyl Wrapping of Exteriors except End Panels of Duronto Express (LHB/ICF/ Hybrid) Coaches and Yuva Express (ICF) Coaches</u>	
<b>Tender Notice No. :</b>	LRC.3/Contract/V-Wrap./Pt.I Dtd. 20/12/16	
<b>Unit:</b>	Square Feet(Sft)	
<b>Quantity :</b>	1,33,700 (One lakh thirty three thousand seven hundred only) Square Feet	
<b>Rate per Unit :</b>	Material	Rs. 155.50/- (Rupees One hundred fifty five point five zero only)
	Labour	Rs. 5/- (Rupees five only)
	<b>Total</b>	<b>Rs. 160.50/-</b> (Rupees One hundred sixty point five zero only)
<b>Total Amount :</b>	<b>Rs. 2,14,58,850/-</b> ( Rupees Two crore fourteen lakh fifty eight thousand eight hundred fifty only)	
<b>Contractor Name :</b>	M/s Techno Experts, E.J.192, Chahar Bagh, Jalandhar, Pin-144001	
<b>Duration of Contract :</b>	36 (thirty six) months	

2.7.3 **Buffing of SS Squatting Pan and SS Basin in-situ condition in outgoing all type of Coaches by Mechanical and Machinery process at Bahar Line, through Works Contract.** (ANNEXURE V)

<b>Description of item :</b>	Buffing of SS Squatting Pan and SS Basin in-situ condition in outgoing all type of Coaches by Mechanical and Machinery process at Bahar Line
<b>Tender Notice No. :</b>	LRC.3/Contract/Buffing Dtd. 19/07/18
<b>Unit:</b>	Nos.
<b>Quantity :</b>	7200 + 14400 = 21600 Nos.
<b>Rate per Unit :</b>	Rs. 122.00/- (for 7200 nos. Quantity), Rs. 101.80/- (for 14400 nos. Quantity)
<b>Total Amount :</b>	Rs. 8,78,400/- + Rs. 14,65,920/- = <b>Rs 23,44,320/-</b> ( Rupees Twenty three lakh forty four thousand three hundred twenty only)
<b>Contractor Name :</b>	M/s Rupesh Kumar Shankar, Sonamukhi, Jholy, P.O.-Hijli, Kharagpur, Dist.- Paschim Medinipur, Pin-721306
<b>Duration of Contract :</b>	12 (twelve) months

2.7.4 Though this Works contract is executed through Lifting Bay, but the workload of cleaning and applying red oxide on Trolleys were performed by staff of Paint Shop. The details of Works contract is as under:

**Sand blasting of all ICF Coach Bogies along with the components through Works Contract.** (ANNEXURE VI)

<b>Description of item :</b>	Sand blasting of Coach Bogies including the following components for each Bogie Set	
	Bogie Frame	1 No.
	Bolster	1 No.
	Lower Spring Beam	2 Nos.
	Brake Beam	4 Nos.
	Anchor Link	2 Nos.
	Equalising Stay	2 Nos.
<b>Tender Notice No. :</b>	LRC.3/Contract/S. Blastg/Pt.I Dtd. 11/06/12	
<b>Unit:</b>	Bogie Set	
<b>Quantity :</b>	4800 (Four thousand eight hundred) Bogie Sets	
<b>Rate per Unit :</b>	Rs. 2,480/- (Rupees Two thousand four hundred eighty only)	
<b>Total Amount :</b>	<b>Rs 1,19,04,000/-</b> ( Rupees One crore nineteen lakh four thousand only)	
<b>Contractor Name :</b>	M/s AGARWAL ENGINEERING WORKS, A-46, I.D.A Kukatpally, Hyderabad- 500037	

- 2.8 The table below shows the out-turn of coaches of N-Shop i.e Paint Shop for the Year 2016-17, 2017-18 and 2018-19 (*Apr'18 – Jun'18*):

<b>S. No.</b>	<b>Month</b>	<b>Out-turn</b>		
		<b>2016-17</b>	<b>2017-18</b>	<b>2018-19</b> <i>(Apr'18 – Jun'18)</i>
1	April	219	212	200
2	May	241	233	208
3	June	238	208	218
4	July	222	217	--
5	August	238	223	--
6	September	211	182	--
7	October	191	187	--
8	November	221	199	--
9	December	234	206	--
10	January	215	206	--
11	February	211	184	--
12	March	230	209	--
<b>Total</b>		<b>2671</b>	<b>2466</b>	<b>626</b>
<b>Average outturn/ month</b>		<b>222.58</b>	<b>205.50</b>	<b>208.67</b>

- 2.9 The section-wise vis-à-vis month-wise Allowed time and Time Taken for the corresponding outturn for the Year 2016-17, 17-18 and 18-19 (*upto June'18*) are shown in tables below:



2.9.1 The section-wise vis-à-vis month-wise Allowed time & Time taken (*in round figure*) of Paint shop for the Year 2016-17 is tabulated in tables below:

S. No.	Sections	April'16			May'16			June'16		
		Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved
1	Polish Section	1037	698	339	1149	773	376	1120	758	362
2	Exterior Coach Cleaning Sec.	12236	8218	4018	13086	8788	4298	13463	9053	4410
3	Interior Coach Cleaning Section	16472	11073	5399	18037	12110	5927	17768	11983	5785
4	Exterior Painting Section	17733	11909	5824	20961	14075	6886	20881	14056	6825
5	Interior Coach Painting Section	15810	10623	5187	17302	11620	5682	17316	11683	5633
6	U/F Cleaning & Painting Section	11183	7528	3655	12489	8393	4096	12363	8325	4038
7	Sign Writing Section	9641	6493	3148	10665	7178	3487	10550	7135	3415
8	Misc. Painting Section	4443	3039	1404	5018	3372	1646	4770	3230	1540
9	Anti corrosion Section	6720	4515	2205	7608	5113	2495	7061	4778	2283
10	Rajdhani Section	9552	6413	3139	10775	7243	3532	10690	7203	3487
11	Bahar Line	1270	858	412	1334	903	431	1123	753	370
<b>TOTAL</b>		<b>106097</b>	<b>71367</b>	<b>34730</b>	<b>118424</b>	<b>79568</b>	<b>38856</b>	<b>117105</b>	<b>78957</b>	<b>38148</b>
<b>Total Working hours in the Month</b>		<b>167.5</b>			<b>185</b>			<b>185</b>		

S. No.	Sections	July'16			August'16			September'16		
		Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved
1	Polish Section	1180	795	385	1329	915	414	1165	795	370
2	Exterior Coach Cleaning Sec.	13351	8967	4384	14273	9585	4688	13166	8885	4281
3	Interior Coach Cleaning Section	17693	11890	5803	18190	12213	5977	16772	11319	5453
4	Exterior Painting Section	19894	13360	6534	20518	13780	6738	18800	12625	6175
5	Interior Coach Painting Section	15689	10538	5151	17019	11438	5581	14981	10063	4918
6	U/F Cleaning & Painting Section	12068	8123	3945	13132	8838	4294	12474	8380	4094
7	Sign Writing Section	10198	6865	3333	10678	7370	3308	9600	6656	2944
8	Misc. Painting Section	4827	3264	1563	4790	3220	1570	4445	2991	1454
9	Anti corrosion Section	7097	4796	2301	7991	5404	2587	7398	4977	2421
10	Rajdhani Section	10628	7158	3470	10937	7373	3564	10151	6820	3331
11	Bahar Line	1262	848	414	1221	828	393	1168	785	383
<b>TOTAL</b>		<b>113887</b>	<b>76604</b>	<b>37283</b>	<b>120078</b>	<b>80964</b>	<b>39114</b>	<b>110120</b>	<b>74296</b>	<b>35824</b>
<b>Total Working hours in the Month</b>		<b>177.5</b>			<b>187.5</b>			<b>172.5</b>		

S. No.	Sections	October'16			November'16			December'16		
		Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved
1	Polish Section	1024	698	326	1172	788	384	1371	923	448
2	Exterior Coach Cleaning Sec.	11374	7643	3731	12651	8499	4152	13832	9290	4542
3	Interior Coach Cleaning Section	14928	10017	4911	16868	11323	5545	18170	12191	5979
4	Exterior Painting Section	16700	11222	5478	18581	12503	6078	19919	13386	6533
5	Interior Coach Painting Section	13535	9093	4442	15332	10288	5044	16298	10938	5360
6	U/F Cleaning & Painting Section	10421	6995	3426	12074	8118	3956	13117	8808	4309
7	Sign Writing Section	8648	5850	2798	9924	6673	3251	10481	7043	3438
8	Misc. Painting Section	4028	2710	1318	4452	3001	1451	4699	3159	1540
9	Anti corrosion Section	6182	4162	2020	7548	5078	2470	7915	5326	2589
10	Rajdhani Section	8686	5838	2848	9842	6757	3085	10132	6813	3319
11	Bahar Line	1012	687	325	1082	730	352	1189	805	384
<b>TOTAL</b>		<b>96538</b>	<b>64915</b>	<b>31623</b>	<b>109526</b>	<b>73758</b>	<b>35768</b>	<b>117123</b>	<b>78682</b>	<b>38441</b>
<b>Total Working hours in the Month</b>		<b>152.5</b>			<b>175</b>			<b>190</b>		

S. No.	Sections	January'17			February'17			March'17		
		Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved
1	Polish Section	1119	753	366	1120	753	367	1302	875	427
2	Exterior Coach Cleaning Sec.	12752	8570	4182	12094	8128	3966	13431	9015	4416
3	Interior Coach Cleaning Section	16346	10976	5370	15180	10195	4985	16295	10950	5345
4	Exterior Painting Section	18400	12360	6040	17751	11951	5800	19372	13029	6343
5	Interior Coach Painting Section	15038	10095	4943	14432	9693	4739	16338	10968	5370
6	U/F Cleaning & Painting Section	11588	7805	3783	10575	7100	3475	11845	7953	3892
7	Sign Writing Section	9570	6430	3140	8646	5810	2836	9639	6486	3153
8	Misc. Painting Section	4414	2972	1442	4372	2939	1433	4593	3090	1503
9	Anti corrosion Section	7403	4982	2421	7046	4739	2307	7856	5285	2571
10	Rajdhani Section	9343	6320	3023	8790	5905	2885	9836	6620	3216
11	Bahar Line	1163	790	373	1318	890	428	1449	988	461
<b>TOTAL</b>		<b>107136</b>	<b>72053</b>	<b>35083</b>	<b>101324</b>	<b>68103</b>	<b>33221</b>	<b>111956</b>	<b>75259</b>	<b>36697</b>
<b>Total Working hours in the Month</b>		<b>172.5</b>			<b>165</b>			<b>185</b>		

2.9.2 Similarly, the section-wise vis-à-vis month-wise Allowed time & Time taken (*in round figure*) of Paint shop for the Year 2017-18 is tabulated underneath:

S. No.	Sections	April'17			May'17			June'17		
		Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved
1	Polish Section	1027	690	337	1248	839	409	1250	845	405
2	Exterior Coach Cleaning Sec.	11934	8010	3924	13264	8902	4362	12498	8623	3875
3	Interior Coach Cleaning Section	13934	9360	4574	16234	10895	5339	15033	10298	4735
4	Exterior Painting Section	17113	11494	5619	19600	13162	6438	18448	12590	5858
5	Interior Coach Painting Section	14244	9560	4684	14800	9938	4862	13338	9123	4215
6	U/F Cleaning & Painting Section	10892	7313	3579	11879	7978	3901	10808	7265	3543
7	Sign Writing Section	8798	5913	2885	9615	6458	3157	9146	6188	2958
8	Misc. Painting Section	4013	2717	1296	4553	3064	1489	4261	2864	1397
9	Anti corrosion Section	7174	4825	2349	7612	5126	2486	7245	4872	2373
10	Rajdhani Section	8751	5880	2871	9703	6523	3180	9182	6208	2974
11	Bahar Line	1368	925	443	1200	810	390	1238	833	405
<b>TOTAL</b>		<b>99248</b>	<b>66687</b>	<b>32561</b>	<b>109708</b>	<b>73695</b>	<b>36013</b>	<b>102447</b>	<b>69709</b>	<b>32738</b>
<b>Total Working hours in the Month</b>		<b>162.5</b>			<b>187.5</b>			<b>177.5</b>		

S. No.	Sections	July'17			August'17			September'17		
		Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved
1	Polish Section	1296	873	423	1260	863	397	1008	678	330
2	Exterior Coach Cleaning Sec.	13216	9023	4193	13785	9280	4505	11601	8033	3568
3	Interior Coach Cleaning Section	15801	10618	5183	15965	10720	5245	12494	8697	3797
4	Exterior Painting Section	19120	12839	6281	19370	13007	6363	16560	11130	5430
5	Interior Coach Painting Section	14214	9613	4601	14566	9935	4631	12426	8345	4081
6	U/F Cleaning & Painting Section	11679	7840	3839	8176	5499	2677	10519	7013	3506
7	Sign Writing Section	9412	6340	3072	10087	6770	3317	8205	5600	2605
8	Misc. Painting Section	4570	3070	1500	1256	848	408	3591	2417	1174
9	Anti corrosion Section	7410	4984	2426	12198	8188	4010	6790	4567	2223
10	Rajdhani Section	9534	6438	3096	9560	6610	2950	8073	5543	2530
11	Bahar Line	1227	833	394	4543	3054	1489	1092	745	347
<b>TOTAL</b>		<b>107479</b>	<b>72471</b>	<b>35008</b>	<b>110766</b>	<b>74774</b>	<b>35992</b>	<b>92359</b>	<b>62768</b>	<b>29591</b>
<b>Total Working hours in the Month</b>		<b>182.5</b>			<b>187.5</b>			<b>155</b>		

S. No.	Sections	October'17			November'17			December'17		
		Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved
1	Polish Section	1106	765	341	1086	793	293	1050	705	345
2	Exterior Coach Cleaning Sec.	11521	7733	3788	12897	8988	3909	12370	8314	4056
3	Interior Coach Cleaning Section	13051	8764	4287	14801	9958	4843	13705	9205	4500
4	Exterior Painting Section	16456	11053	5403	18655	12612	6043	17940	12049	5891
5	Interior Coach Painting Section	12560	8440	4120	13606	9424	4182	13726	9220	4506
6	U/F Cleaning & Painting Section	10171	6830	3341	11145	7495	3650	10774	7236	3538
7	Sign Writing Section	7803	5416	2387	8823	6463	2360	8946	6008	2938
8	Misc. Painting Section	3791	2550	1241	4328	2905	1423	4175	2803	1372
9	Anti corrosion Section	6792	4564	2228	7786	5238	2548	7035	4729	2306
10	Rajdhani Section	8133	5478	2655	9587	6440	3147	8679	5829	2850
11	Bahar Line	904	610	294	1280	870	410	1262	858	404
<b>TOTAL</b>		<b>92288</b>	<b>62203</b>	<b>30085</b>	<b>103994</b>	<b>71186</b>	<b>32808</b>	<b>99662</b>	<b>66956</b>	<b>32706</b>
<b>Total Working hours in the Month</b>		<b>160</b>			<b>180</b>			<b>177.5</b>		

S. No.	Sections	January'18			February'18			March'18		
		Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved
1	Polish Section	1027	690	337	502	340	162	551	370	181
2	Exterior Coach Cleaning Sec.	12458	8380	4078	11882	8420	3462	12583	8545	4038
3	Interior Coach Cleaning Section	13297	8987	4310	13114	8930	4184	13934	9358	4576
4	Exterior Painting Section	17516	11765	5751	17220	11876	5344	18720	12593	6127
5	Interior Coach Painting Section	13271	8913	4358	12725	8805	3920	13706	9205	4501
6	U/F Cleaning & Painting Section	10542	7081	3461	10650	7150	3500	11289	7580	3709
7	Sign Writing Section	9314	6255	3059	9045	6333	2712	9828	6600	3228
8	Misc. Painting Section	4151	2800	1351	4181	2818	1363	4147	2791	1356
9	Anti corrosion Section	7177	4834	2343	6640	4470	2170	7424	4993	2431
10	Rajdhani Section	8797	5913	2884	8523	5732	2791	9545	6410	3135
11	Bahar Line	1171	795	376	1084	735	349	1041	703	338
<b>TOTAL</b>		<b>98721</b>	<b>66413</b>	<b>32308</b>	<b>95566</b>	<b>65609</b>	<b>29957</b>	<b>102768</b>	<b>69148</b>	<b>33620</b>
<b>Total Working hours in the Month</b>		<b>172.5</b>			<b>170</b>			<b>185</b>		

2.9.3 The section-wise vis-à-vis month-wise Allowed time & Time taken (*in round figure*) of Paint shop for the Year 2018-19 (*April'18 to June'18*) is tabulated below:

S. No.	Sections	April'18			May'18			June'18		
		Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved	Allowed Time	Time Taken	Time Saved
1	Polish Section	514	345	169	417	280	137	656	453	203
2	Exterior Coach Cleaning Sec.	12210	8208	4002	13077	8784	4293	11444	7905	3539
3	Interior Coach Cleaning Section	12564	8453	4111	13398	8999	4399	12404	8565	3839
4	Exterior Painting Section	17508	11766	5742	18700	12579	6121	17256	11951	5305
5	Interior Coach Painting Section	12382	8317	4065	13431	9020	4411	12305	8493	3812
6	U/F Cleaning & Painting Section	10295	6914	3381	11049	7455	3594	10032	6920	3112
7	Sign Writing Section	9266	6223	3043	9345	6428	2917	8420	5808	2612
8	Misc. Painting Section	3766	2538	1228	5064	3405	1659	4345	3005	1340
9	Anti corrosion Section	6969	4703	2266	7047	4740	2307	7032	4864	2168
10	Rajdhani Section	9269	6228	3041	10141	6810	3331	9314	6440	2874
11	Bahar Line	890	608	282	1015	690	325	975	675	300
<b>TOTAL</b>		<b>95633</b>	<b>64303</b>	<b>31330</b>	<b>102684</b>	<b>69190</b>	<b>33494</b>	<b>94183</b>	<b>65079</b>	<b>29104</b>
<b>Total Working hours in the Month</b>		<b>165</b>			<b>187.5</b>			<b>177.5</b>		

### **CHAPTER-III**

#### **3.0 CRITICAL ANALYSIS**

The subject work study has been conducted to review the manpower deployed in Paint shop (N-Shop) of Luluah Workshop under the control of Dy. CME Coaching and overall control of CWM/Luluah following the framed terms of reference of subject study report.

- 3.1 Keeping in view of the present financial condition of Railways and the increasing trend of operating ratio of Eastern Railway, the subject study is conducted with the objective to explore the ways to attain financial savings of the Railways along with the motive to improve the effective utilization of staff.
- 3.2 The need for conducting the study in Paint Shop is felt necessary by the study team in consideration with grounds mentioned underneath:
- 3.2.1 With the increase in use of spray painting in place of painting through brush, lesser time is required and hence more productivity is achieved with lesser manpower. The quality of painting is also better.
- 3.2.2 **Schedule for painting of coaches (followed in LLH Workshop):**

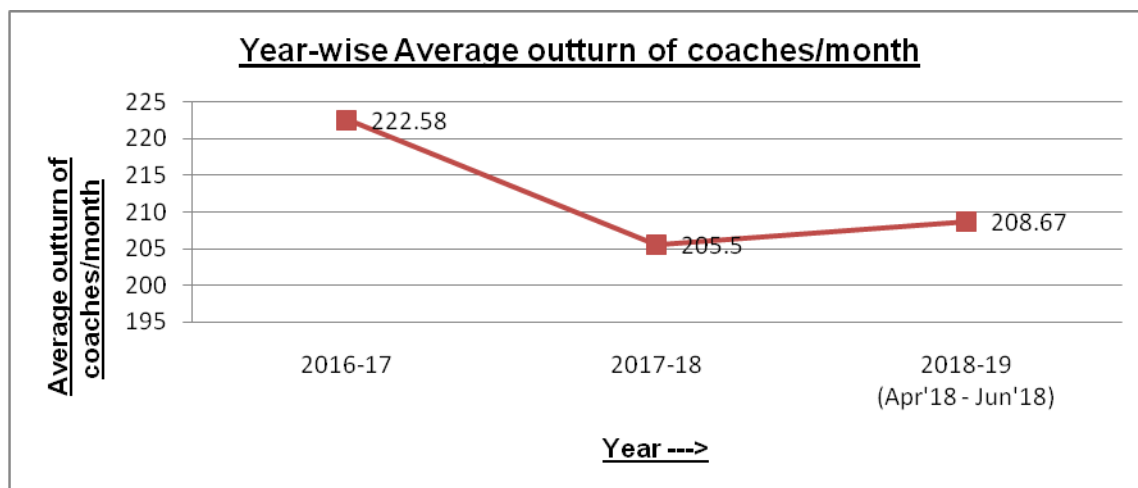
<b>Conventional Coaches</b>		<b>LHB Coaches</b>
<b><u>Alkyd Painted Coaches</u></b> (Manufactured before year 2010)	<b><u>PU Painted Coaches</u></b> (Manufactured on and after year 2010)	<b><u>Rajdhani /Shatabdi Coaches</u></b> (All PU Painted)
Complete exterior painting is done at every POH after 18 months (POH duration of Conventional Coaches – 18 months)	Touch - up painting is done on exterior portion after 1 <sup>st</sup> POH (i.e after 18 months) Complete exterior painting is done at 2 <sup>nd</sup> POH (i.e after 36 months)	Complete exterior painting is done at every POH done after 36 months (POH duration of LHB Coaches – 36 months)

From above table, it is clear that the workload of exterior painting of PU painted coaches is 50% of the workload of exterior painting of Alkyd painted coaches (Mfd. before 2010).

Day by day, the nos. of PU painted coaches (both conventional & LHB) is increasing gradually in Indian Railways replacing the Alkyd painted coaches. This results in considerable reduction of exterior painting workload.

- 3.2.3 A considerable workload of Paint Shop has been outsourced to external agencies (mentioned in para 2.7) consequent upon which the workload of departmental staff of paint shop is reduced.
- 3.2.4 The introduction of various modern scrubbing machines, grinding machines and other machines, lead to increase in productivity which would result in lesser requirement of manpower.

Consequent upon the collective effect of above mentioned points, a reasonable amount of workload in regards to POH as well as painting activities has been reduced which is also evident from table under para 2.8 wherein it can be seen that 'average outturn of coaches/month' decreases in recent years i.e 2017-18 and 2018-19 as compared to year 2016-17, shown in graph below.



3.3 It is also pertinent to mention that, 60 nos. of Paint Shop's Artisan staff are not utilized in Paint Shop and deployed in other shops to cater other shop's workload [shown in table under para 2.4.2. 1]. There is no contribution of these 60 Artisan staff towards the day to day outturn of Paint shop.

3.4 Therefore, from the discussion done in above paras, it may be concluded that due to the reduction in workload of departmental staff, the requirement of staff for Paint shop also gets reduced which is also implied from the fact that out of the total On-roll strength of 486 Artisan staff, only 426 staff are utilized in Paint shop and 60 staff are sent to other shops for catering other shop's workload.

In consideration with these facts, a scope of review of manpower of Paint shop consequent upon the present scenario is felt necessitated by the Eastern Railway's Planning Cell.

3.5 The revised requirement for Paint shop is being assessed in ongoing paragraphs through analysis of various datas in regards to shop's workload and outturn mentioned in details in Chapter II.

For assessment, study team takes reference from Chapter IV of 'Indian Railway Mechanical Code' regarding various aspects of "**Production Control Organization**" keeping the infrastructural setup of concerned shop of Liluah Workshop in view. The related aspects considered in the present work study are:

*Originally this scheme was introduced in the Railway Repair Workshops of the Mechanical Department and the same is extended to Signal & Telecommunication workshops, Civil Engineering Workshops and the Electrical Sections attached to the Mechanical Workshops. This incentive scheme is also known as "the system of payment by results." The incentive workers are classified as Direct, Essential Indirect and Indirect Workers:*

- (a) **Direct workers (DW)** are those engaged in work which can be assessed through time studies.
- (b) **Essential Indirect workers (EIW)** are those who contributed to the continuity of the work and whose services are essential but whose work cannot be assessed through time studies.
- (c) **Indirect Workers (IW)** are those who are provided for cleaning etc. do not contribute directly or indirectly to production and do not earn any incentive bonus.

**Allowed Time:** The total of the normalized time arrived from time study and all the allowances stated is termed as "allowed time". The allowed time as issued by the Rate Fixing Department with the approval of Production Engineer, is the time within which a worker shall complete an operation and earn bonus. It is expected that the average worker will complete an operation in 75% of the allowed time when he will earn 33 ⅓ % bonus.

- 3.5.1 During analysis, study team also takes the reference of percentage of EIW staff for different activities as per IR Mechanical code as tabulated below, for calculating EIW staff:

<b>Name of the sub-shop</b>	<b>Strength of unskilled workers engaged as indirect workers including essential indirect worker</b>
<b>Erecting</b>	15% of the total strength of the erecting/shop.
<b>Boiler</b>	10% of the total strength of the Boiler shop.
<b>Tender</b>	15% of the total strength of the Tender shop.
<b>Fitting</b>	15% of the total strength of the Fitting shop.
<b>Copper &amp; Tin</b>	15% of the total strength of the Copper & Tin shop.
<b>Welding</b>	12% of the total strength of the Welding shop.
<b>Motion</b>	10% of the total strength of the Motion shop.
<b>Saw Mill</b>	30% of the total strength of the Saw Mill shop.
<b>Carriage Building</b>	10% of the total strength of the Carriage Building shop.
<b>Carriage Repair</b>	<b>10% of the total strength of the Carriage Repair/Shop.</b>
<b>Paint</b>	<b>10% of the total strength of the Paint shop.</b>
<b>Trimming</b>	10% of the total strength of the Trimming shop.
<b>Wagon building</b>	12% of the total strength of the Wagon Repair shop.
<b>Wagon repair</b>	15% of the total strength of the Wagon repair shop.
<b>General Iron Foundry</b>	20% of the total strength of the General Iron Foundry.
<b>Brass Foundry</b>	25% of the total strength of the Brass Foundry.
<b>Smith &amp; Forge</b>	10% of the total strength of the Smith & Forge shop.
<b>Machine</b>	10% of the total strength of the Machine shop.
<b>Wheel</b>	10% of the total strength of the Wheel shop.
<b>Tool Room</b>	10% of the total strength of the Tool Room.
<b>Mill Wright</b>	25% of the total strength of the Mill Wright.

- 3.6 For assessment of revised requirement of manpower for Paint shop, effective utilization of manpower is kept in consideration. The out-turn in terms of painting of coaches is also given attention by the study team for assessment.
- 3.7 The subject study is carried out to review the manpower of Paint Shop directly or indirectly involve with the workload of Paint Shop. The category-wise position of Supervisors, Artisan category and Erstwhile Group-D category staff are shown in paras 2.4.1, 2.4.2, 2.4.2.1 and 2.4.3. From the total position of Artisan and Erstwhile Group-D category staff, Peon and Safaiwala category staff are not directly related with shop's assigned workload and have no contribution towards shop's outturn. So, study team kept the category of Peon and Safaiwala out of the purview of the study. Also, Supervisory category is not considered during the assessment as this category is also not directly involved.



So, from paras 2.4.2, 2.4.2.1 and 2.4.3, the category-wise position of staff considered during the assessment is tabulated as under:

S. No.	Category	Sanctioned Strength	On-Roll Strength		Vacancy
			Working in Paint Shop	Working in other shop	
Artisan Category Staff					
1	Sr. Tech.	174	426	60	135
2	Technician I	342			
3	Technician II	54			
4	Technician III	51			
Total		621	486		135
Erstwhile Group 'D' Category Staff					
5	Helper	25	11		14
Total		25	11		14
Grand Total		646	497		149

- 3.8 The total work of Paint shop is executed by 11 sections with every section performing different set of activities (*mentioned in details in para 2.6*). The outturn of each section is different. The Allowed time earned by different sections reflects the actual out-turn of the corresponding section in terms of man-hours.  
The total Allowed time of Paint Shop for a month is the summation of Allowed time of all the sections of Paint Shop for the corresponding month.
- 3.9 It can be seen from the data collected from shop (*para 2.8 and 2.9*), the outturn varies every month, so study team considers outturn for the year 2016-17, 2017-18 and 2018-19 (*April'18 to June'18*) to get a more realistic and accurate assessment. The month-wise out-turn, Allowed time and Time Taken is depicted in the Chapter II.

- 3.10 From paras 2.8 , 2.9.1, 2.9.2 & 2.9.3, the month-wise Outturn and corresponding Allowed time, Time Taken and Efficiency Percentage of DW staff (*Direct worker*) of the Paint Shop for the year 2016-17, 2017-18 and 2018 (*April'18 to June'18*) are tabulated under:

3.10.1 **For the year 2016-17:**

S. No.	Month	Outturn of Coaches	No. of available hours in the month	Allowed Time (a)	Time Taken (b )	Time Saved (c=a-b)	Efficiency Percentage (d=c X 100/b)
1	Apr'16	219	167.5	106097	71367	34730	48.66
2	May'16	241	185	118424	79568	38856	48.83
3	Jun'16	238	185	117105	78957	38148	48.31
4	Jul'16	222	177.5	113887	76604	37283	48.67
5	Aug'16	238	187.5	120078	80964	39114	48.31
6	Sept'16	211	172.5	110120	74296	35824	48.22
7	Oct'16	191	152.5	96538	64915	31623	48.71
8	Nov'16	221	175	109526	73758	35768	48.49
9	Dec'16	234	190	117123	78682	38441	48.86
10	Jan'17	215	172.5	107136	72053	35083	48.69
11	Feb'17	211	165	101324	68103	33221	48.78
12	Mar'17	230	185	111956	75259	36697	48.76
<b>Average</b>		<b>222.58</b>	<b>176.25</b>	<b>110776.17</b>	<b>74543.83</b>	<b>36232.33</b>	<b>48.61</b>

3.10.2 **For the year 2017-18:**

S. No.	Month	Outturn of Coaches	No. of available hours in the month	Allowed Time Earned (a)	Time Taken (b )	Time Saved (c=a-b)	Efficiency Percentage (d=c X 100/b)
1	Apr'17	212	162.5	99248	66687	32561	48.83
2	<b>May'17</b>	<b>233</b>	<b>187.5</b>	<b>109708</b>	<b>73695</b>	<b>36013</b>	<b>48.87</b>
3	Jun'17	208	177.5	102447	69709	32738	46.96
4	Jul'17	217	182.5	107479	72471	35008	48.31
5	Aug'17	223	187.5	110766	74774	35992	48.13
6	Sept'17	182	155	92359	62768	29591	47.14
7	Oct'17	187	160	92288	62203	30085	48.37
8	Nov'17	199	180	103994	71186	32808	46.09
9	Dec'17	206	177.5	99662	66956	32706	48.85
10	Jan'18	206	172.5	98721	66413	32308	48.65
11	Feb'18	184	170	95566	65609	29957	45.66
12	Mar'18	209	185	102768	69148	33620	48.62
<b>Average</b>		<b>205.50</b>	<b>174.79</b>	<b>101250.5</b>	<b>68468.25</b>	<b>32782.25</b>	<b>47.87</b>

3.10.3 **For the year 2018-19 (April'18 to June'18) :**

S. No.	Month	Outturn of Coaches	No. of available hours in the month	Allowed Time Earned (a)	Time Taken (b )	Time Saved (c=a-b)	Efficiency Percentage (d=c X 100/b)
1	Apr'18	200	165	95633	64303	31330	48.72
2	May'18	208	187.5	102684	69190	33494	48.41
3	Jun'18	218	177.5	94183	65079	29104	44.72
<b>Average</b>		<b>208.67</b>	<b>176.67</b>	<b>97500</b>	<b>66190.67</b>	<b>31309.93</b>	<b>47.28</b>

- 3.11 It is already stated earlier that, revised requirement of staff are being assessed by considering the outturn data for the year 2016-17, 2017-18, 2018-19 (*upto June'18*). So, from the outturn figure for the year 2016-17, 2017-18, 2018-19 [*upto June'18*] (*from table under para, 3.10.1, 3.10.2 and 3.10.3*), the average value of Outturn of coaches/month, available working hours/month, Allowed time/month, Time taken/month is shown below:

Average Outturn of Coaches/ month	Average No. of available hours/ month	Average value of Allowed Time per Month (a)	Average value of Time Taken per Month (b )	Average value of Time Saved per month (c=a-b)	Average value of Efficiency Percentage (d=c X 100/b)
213.44	175.65	105067.41	70915.44	34151.96	48.16

In table above, the average value of Allowed time (AT) reflects the timing for average outturn of 213.44 coaches in terms of man-hours.

Average Time Taken denotes the utilized man-hours to get the corresponding outturn. It actually resembles the input factor of manpower and time i.e duty hours to get the outturn.

Therefore, the bare requirement of DW (*Direct Worker*) staff to achieve the outturn of 213.44 coaches (*i.e average out turn with AT 105067.41 manhours*) is calculated below.

<b>From table under para 3.11, Utilised Man-hours (i.e Time Taken) for average Outturn of AT 105067.41 manhours</b>	<b>70915.44</b>
<b>Average no. of available hours</b>	<b>175.65</b>
<b>Bare Requirement of DW staff on the basis of assessment based on Average Outturn</b>	<b>70915.44 / 175.65 = 403.73</b>

- 3.11.1 The requirement of EIW staff of Paint Shop as per percentage of EIW staff for different activities as per IR Mechanical code tabulated in para 3.5.1 is assessed underneath:

$$\begin{aligned}
 &\text{Bare Requirement of EIW staff on the basis of assessment based on average outturn} &&= 10 \% \text{ of DW staff of Paint Shop} \\
 & &&= 10\% \times 403.73 \\
 & &&= 40.37
 \end{aligned}$$

3.11.2 So, the Revised Requirement of staff based on assessment on the basis of Average Outturn:

<b>Bare Requirement of DW staff (para 3.11)</b>	<b>403.73</b>
<b>Bare Requirement of EIW staff (para 3.11.1)</b>	<b>40.37</b>
<b>Leave Reserve (LR) @12.5%</b>	<b>(403.73 + 40.37) X 12.5% = 55.51</b>
<b>Total</b>	<b>499.61</b>

From above table the Revised requirement of staff on the basis of assessment based on Average outturn is **499.61** say **500**.

3.12 In above paragraphs, the assessment is done considering the Average outturn of the year 2016-17, 2017-18 and 2018-19 (*upto June'18*). It can be seen in table under para 3.11 that the corresponding Efficiency Percentage is 48.16. The effective utilization of staff for the corresponding outturn for which the assessment was made (*on the basis of Average outturn*) is not among the best.

Now, in the paragraphs below, study team assess the Revised Requirement of manpower considering the outturn figure for the month at which highest effective utilization of manpower was achieved i.e the month when the staff of Paint shop worked with highest efficiency within the specified period.

From table under paras 3.10.1, 3.10.2 and 3.10.3, it can be seen that, the highest Efficiency percentage was accomplished in the month of May'17 (*i.e 48.87%*) which implies that effective utilization of manpower for this month is highest.

Therefore, the bare requirement of DW staff on the basis of outturn figure for the month, when highest Efficiency percentage was achieved (*i.e May'17*) is calculated as under.

<b>From table 3.10.2, Utilised Man-hours (i.e Time Taken) in the month of May'17 for outturn of 233 coaches ( AT 109708 manhours)</b>	<b>73695 manhours</b>
<b>Available hours in the month of May'17</b>	<b>187.5</b>
<b>Bare Requirement of DW staff on the basis of assessment based on highest Efficiency percentage i.e effective utilization of staff</b>	<b>73695 / 187.5 = 393.04</b>

3.12.1 The requirement of EIW staff on the basis of outturn figure for the month with highest Efficiency percentage as per percentage of EIW staff for different activities as per IR Mechanical code tabulated in para 3.5.1 is assessed underneath:

$$\begin{aligned}
 &\text{Bare Requirement of EIW staff on the basis} \\
 &\text{of assessment based on highest Efficiency} = 10 \% \text{ of DW staff} \\
 &\text{percentage} \\
 &= 10\% \times 393.04 \\
 &= \mathbf{39.3}
 \end{aligned}$$

3.12.2 So, the revised requirement of staff on the basis of **assessment based on highest Efficiency Percentage**:

<b>Bare Requirement of DW staff (para 3.12)</b>	<b>393.04</b>
<b>Bare Requirement of EIW staff (para 3.12.1)</b>	<b>39.3</b>
<b>Leave Reserve (LR) @12.5%</b>	<b>(393.04 + 39.3) X 12.5% = 54.04</b>
<b>Total</b>	<b>486.38</b>

From above table, the revised requirement of staff on the basis of assessment based on highest Efficiency Percentage is **486.38** say **487**

- 3.13 In paragraphs 3.11 and 3.12, two different types of assessments were done on the basis of two separate criteria. The Revised requirement of staff resulted during different assessments is tabulated as under:

	<b><i>Revised requirement of manpower</i></b>	<b><i>Reference para</i></b>
Assessment done based on <b>average Outturn</b>	<b>500</b>	3.11.3
Assessment done based on <b>highest Efficiency percentage</b>	<b>487</b>	3.12.3

- 3.14 It can be seen from para 3.10.1, 3.10.2 and 3.10.3 that the average Allowed time and Time Taken decreases gradually over the period of 2016-17, 2017-18 & 2018-19 (*upto July'2018*). It implies that the workload is in decreasing trend. The outsourcing of painting activities will increase in future in view of cost effectiveness which will also result in further reduction of departmental workload. Moreover, day by day, numbers of Alkyd painted coaches are being replaced by PU Painted coaches. Due to which the painting workload is gradually decreasing. Keeping the above points in view, study team considers the lowest Revised requirement of **487 staff**.
- 3.15 Summarizing the revised requirement of staff as discussed in above para, the posts to be rendered as surplus against the total existing sanctioned strength with the consideration of assessment made in the above paragraphs, may be seen from the following table.

<b><i>Sanctioned Strength</i></b> <i>(from para 3.7)</i>	<b><i>Men-On- roll</i></b> <i>(from para 3.7)</i>	<b><i>Total requirement of staff duly revised</i></b> <i>(from para 3.14)</i>	<b><i>Surplus posts</i></b>
<b>646</b>	<b>497</b>	<b>487</b>	<b>159</b>

- 3.16 **Recommendation:** -

It is recommended that the revised total requirement of manpower to carry out the entire existing departmental workload of the Paint shop will be 487 posts (*para 3.14*) which would result in surrender of **159 posts** as against the present total sanctioned strength of 646 posts (*para 3.7*). The revised total requirement of manpower has been revised by the study team on the basis of assessment & analysis made in the foregoing paragraphs.

**CHAPTER-IV****4.0 FINANCIAL APPRAISAL:**

- 4.1 As per recommendation made in Para 3.16, the total surplus posts works out to **159 posts**. For an easy and smooth means of calculation of financial appraisal, the study team considered the posts from lowest grades with lowest Pay scale and Grade Pay. A statement showing the minimum annual financial savings on account of surrender of total **159 posts** is furnished below.

<b>Lowest Scale of Pay (Rs.)</b>	<b>Lowest Grade Pay (Rs.)</b>	<b>Mean pay (in Rs)</b>	<b>Mean Pay (as per 7th PC) = 2.57 X Mean Pay (as per 6th PC)</b>	<b>D.A (7%) (in Rs)</b>	<b>Total (in Rs)</b>	<b>No. of posts Recommended for Surrender</b>	<b>Monthly savings of total staff (in Rs)</b>	<b>Minimum Annual savings. (in lakhs Rs)</b>
<b>(as per 6th Pay Commission)</b>			<b>(as per 7th Pay Commission )</b>					
5200-20200/-	1800/-	14500/-	37265/-	2609/-	39874/-	<b>159</b>	63,39,966/-	<b>760.79</b>
<b>TOTAL</b>						<b>159</b>		<b>760.79</b>

Thus, the minimum annual financial savings works out to **Rs. 760.79 lakhs.**