EASTERN RAILWAY

WORK STUDY REPORT

ON

REVIEW OF STAFF STRENGTH VIS-À-VIS WORKLOAD OF BLACK SMITH SHOP AT LILUAH WORKSHOP

(STUDY NO. WSER -11-20-21)

(Submitted on: 30.12.20)

Study guided by: - Sri S.Chandra, AEO

Study conducted by: - Sri S.K. Mandal, CPLI

BY

GM'S EFFICIENCY CELL

EASTERN RAILWAY

KOLKATA

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The study team is also very thankful to Senior Section Engineer, Junior Engineer and other staff of Blacksmith Shop and PCO 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 Supervisors of Blacksmith Shop
- Study of existing workload
- Critical analysis of workload and manpower

TERMS OF REFERENCE

The subject work study has been undertaken by the GM's Efficiency Cell during the current financial year 2020-2021 as per recommendation done vide CWE's L.No. MG/791/MPP (WS) dated. 10/07/20 with the following terms of references:

(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

Sl. No.	***Recommendations***	***Para reference***
1	It is recommended that the Revised total requirement of Artisan & Helper to carry out the entire departmental workload presently catered Black smith shop will be 146 posts which would result in surrender of 48 posts as against the present total sanctioned strength of 194 posts.	*3.10*

EXECUTIVE SUMMARY

Study Name & No.:	"REVIEW OF STAFF STRENGTH VIS-A-VIS WORKLOAD OF BLACKSMITH SHOP AT LILUAH WORKSHOP" ***(STUDY NO.WSER 11-20-21)***
Year of conducting the study:	**2020-21**
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.
Methodology:	• Collection of data • Discussion with concerned officers and Supervisors of Blacksmith Shop • Study of existing workload • Critical analysis of workload and manpower.
Existing Sanctioned Strength *(Artisan staff & Helper category staff only)*	***194***
Existing Men on Roll *(Artisan staff Helper category staff only)*	***122***
Vacant post	***72***
Revised Requirement	***146***
Proposed Surrender	**48**

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 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 organization like Indian Railways may also provide a good financial support for its development, if good financial discipline can be practiced 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', 'Rationalizing of Man-Power', etc.

1.7 Indian Railway is facing tremendous financial crunch after implementation of 6th 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 100. Performance Efficiency Index shown in the corporate plan booklet published by the Eastern Railway is given below.

Year	Operating Ratio
2016-2017	165.25
2017-2018	181.15
2018-2019	185.98
2019-2020	169.75
2020-2021	101.14 (Proposed)

1.8 In view of the above, Eastern Railway has taken serious consideration to make the operating ratio within the limit (below 100%) by decreasing the Working Expense and increasing the Earnings. For this purpose, Rly Board issued nos. of circulars, orders etc to minimize Expenses and increase Earnings. The Zonal Railway also implements various measures for financial discipline.

1.9 Considering the above, the railway authority has suggested for conducting the subject study in order to provide **need based requirement of artisan staff at Blacksmith Shop in LLH workshop** consequent upon the changed scenario. The subject work-study has been undertaken by GM's Efficiency Cell/E.Rly during the current financial year 2020-21 to improve the productivity index of the railway. As per terms of reference, the study team has thoroughly observed the activities and deployment of Artisan staff at Blacksmith Shop and critically analyzed the involvement of staff to ascertain their optimum utilization and to find out the need based requirement. In the analysis, the effective utilization of human resource is considered keeping in mind of the present working pattern. The main objective of the study team is to increase the efficiency of the Railways by maximum utilization of its resources.

CHAPTER-II

2.0 Existing Scenario:

In Eastern Railway, there are three major Workshops for POH/ROH/IOH/NPOH of 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 Organization)* is one of the IR's oldest & biggest Railway Carriage & repair Workshop in 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 coach & wagon components. The above mentioned activities are performed in different shops.

2.2.1 Different shops or work points along with their respective activities of LLH Workshop are as under:

No.	Shops	Activities catered by the shops
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 & Heat Treatment
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 subject study of Blacksmith Shop under "A" Shop is conducted to ascertain the optimum utilization of Technician by observing their outturn in last 3 years.

2.3.1 The regular vital items and their activities including sequence of operation performed by Blacksmith shop is tabulated below.

Item wise activities at Black Smith Shop		
ITEM	OP No	ACTIVITIES
Buffer Casing	1	Heat in open hearth and straighten (Barrel portion)
	2	Heat in open hearth and straighten (Face portion)
Traction Lever Drg no. 1267506	1	Dismantling Silent Block from both sides
	2	Force fit new Silent Block
	3	Clean and two coats paints
Control Arm Top Drg. No. LW 01105	1	Dismantling Silent Block from both sides
	2	Force fit new Silent Block
	3	Clean and two coats paints
Roll Link Drg. No. 1267511	1	Dismantling Silent Block from Roll Link
	2	Force fit new Silent Block
	3	Clean and two coats paints
Anchor Link Drg. No. S-T- 07-603	1	Dismantling Silent Block from Roll Link
	2	Force fit new Silent Block
	3	Clean and two coats paints
Traction Center Drg. No. 1267507	1	Dismantling Silent Block from both sides
	2	Force fit new Silent Block
	3	Clean and two coats paints
Minor Rubber Pad	1	Press at 20 T for 3 minutes
Buffer Plunger Drg. No. RDSO 98145	1	Dismantling Face Plate, Spindle & Buffer Plug By Oxy-Cutting & Hammering
	2	Heat in open hearth and straighten Face Plate of Buffer Plunger
	3	Matching & Riveting The Face Plate & Dress Up of gap

Screw Coupling	1	Cut Rivets, dismantle Straight Link, Bent Link, Wt Lever
	2	Inspect components for distortion cracks etc
	3	Dress up straight Link, Bent Link, Wt Lever
	4	Remove Ridges, Rusts and Notches etc
	5	Assemble Screw Coupling as per Drawing
	6	Ease Screw Coupling
Basin Pipe	1	Fill the pipe with sand heat in hearth bend as per sample
End Pillar SK no. LLH 55/2000 alt 01	1	Heat press to shape and dress up
Centre Stiffner (Full) T-1-2-513, Alt-6	1	Heat and bend to shape and dress up
Centre Stiffner (Half) LLH-20/89-IT-4	1	Heat & Press to Shape
	2	Dress Up
Pillar Part bottom (LH & RH) XC/M 218/A/1 alt 3	1	Heat and press to shape to Drg. (Del to SSE/C)
	2	Press to shape
Seat for Lower Side Wall LH & RH	1	Heat and press to shape as per Drg
	2	Heat and dress up
Side Wall Panel at window location Drg-LLH 25/2015	1	Heat and bend to make profile to Drg. Manually
Part side Wall sheet Drg. No. LLH/70/93 alt 2	1	Heat and bend to shape and dress up
Door Hinge (Swing Door) LLH 11/2012	1	Mark off and oxy cut round to size
	2	Heat and forge to make Billet to Drg
LHB Loco side Buffer MI - 004277 Ref LTO No. 69 dtd 14.09.2017	1	Dismantle of all parts
	2	Clean all parts and check visually cracks, distortion and wear for acceptable condition as per LTO 69
	3	Collect all the checked and load tested parts and assemblies as per LTO 69

2.4 The category-wise Sanctioned strength vis-à-vis On-roll position of Artisan and Erstwhile Gr. D staff of Blacksmith shop /LLH Workshop is tabulated underneath:

Staff position of Black Smith Shop as on Oct'20				
Section	Category	S/S	MOR	Vacancy
Supervisor	SSE	11	8	3
	JEE	3	1	2
Sub Total		**14**	**9**	**5**
Artisan	Sr. Tech	53	32	21
	Tech-I	105	20	85
	Tech-II	16	2	14
	Tech-III	18	9	9
Sub Total		**192**	**63**	**129**
	Helper	2	0	2
	Peon	1	1	0
	Safaiwala	1	1	0
Subtotal		**4**	**2**	**2**
Staff deployed at different shops (Tech-I = 11 & Tech-II = 48)			**59**	
Total (Ex. Supervisor)		**196**	**124**	**72**

2.5 The subject study is carried out to review the manpower of Blacksmith shop directly or indirectly involve with the workload of the shop. The category-wise position of Supervisors, Artisan and Erstwhile Group-D staff are shown in para 2.4.

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 in the assessment as their work is to supervise the sectional staff and they did not directly carry out the sectional work.

2.5.1 So, from above discussion, the category-wise position of staff considered during the assessment is tabulated as under:

S. No.	Category	Sanctioned Strength	On-Roll Strength	Vacancy
Artisan Category Staff				
1	Sr. Tech.	53	32	0
2	Technician I	105	19	21
3	Technician II	16	3	-5
4	Technician III	18	9	13
Erstwhile Group 'D' Category Staff				
5	Helper	2	*0*	***11***
Total		***194***	***63***	***131***

2.6 During conducting the study, it has been noticed that 59 Artisan category staff consisting 11 Sr Tech & 48 Tech-I are deployed at other shops and are utilized to cater other shop's workload. **Therefore, for assessment, study team considers Sanctioned Strength of 194 posts [para 2.7 (supplied by Personnel Dept.)] and Men-On-Roll of 122 (63+59) staff (supplied by Blacksmith shop).**

The summarized position of deployment of staff of Blacksmith shop is shown below.

Category	Sanctioned Strength	On-Roll Strength		Vacancy
		Working for contributing for Outturn at Blacksmith shop	*Working for contributing of outturn for other shop's*	
Artisan staff & Helper	194	63	59	**72**
Total	**194**	**122**		

2.7 The Machinery and Plants in working condition present in Blacksmith Shop are as under:

Machineries and Plants pertaining to Blacksmith Shop		
Sl No.	**M/C No.**	**Description**
1	A-66	7 cwt Air Steam Hammer Over Hanging Form
2	A-77	7 cwt Steam Hammer
3	A-123	200 Ton Vertical Down Stroke Hydraulic Press

4	A-134	200 Ton 4 Column Hydraulic Press
5	A-135	300 Ton 4 column semi-automatic Hydraulic Press
6	A-136	200 Ton 'C' frame Vertical type Hydraulic Press
7	AP-1	Oil Fired Furnace
8	AP- 83	Coal Fired Hearth
9	AP- 85	Coal Fired Hearth
10	AP-698	Electric oil Pump Rotary Gear
11	AP-699	Electric oil Pump Rotary Gear
12	AP-721	Welding Machine
13	Ap-722	Welding Machine
14	AP-723	Welding Machine
15	AP-724	Welding Machine
16	AP-725	50 Ton semi-automatic 'C' frame type Hydraulic Power Press

2.8 The study team has collected the item wise outturn of Black smith shop from 2017-18 to 2019-20. Month-wise vis-à-vis item wise outturn from Annexures-A, B, and C is tabulated below.

OUTTURN OF REGULAR VITAL ITEMS OF BLACKSMITH SHOP DURING 2017-18 (Annexure-A)

SL NO	ITEM	APR 2017	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	JAN 2018	FEB	MAR	TOTAL
1	Anchor Link	1132	1234	1057	920	1104	892	935	1046	1006	1045	1025	1123	**12519**
2	Roll Link	34	20	48	66	80	52	36	94	96	118	102	106	**852**
3	Control Arm upper	49	78	72	93	88	77	77	169	115	160	136	161	**1275**
4	Traction Lever	113	88	142	124	134	109	84	119	103	122	108	132	**1378**
5	Traction Centre	21	63	66	45	48	42	27	54	70	56	55	51	**598**
6	Minor Rubber Pad	0	16	38	0	0	32	0	16	24	8	27	9	**170**
7	Buffer Casing	245	273	233	264	249	243	252	266	238	250	245	240	**2998**

8	Buffer Plunger	494	460	524	479	518	458	349	539	602	533	463	407	**5826**
9	Screw Coupling	274	322	309	305	356	272	237	302	281	261	244	291	**3454**
10	Basin Pipe	372	503	403	409	437	370	382	526	423	404	476	558	**5263**
11	Part side Wall sheet	306	154	274	309	424	313	259	213	290	286	287	488	**3603**
12	Side Wall Panel at window location	0	0	0	0	0	0	0	0	0	0	0	0	**0**
13	End Pillar	55	90	141	60	260	180	0	0	0	25	200	210	**1221**
14	Centre Stiffener Full (Pair)	20	10	55	60	18	50	30	72	94	0	46	20	**475**
15	Centre Stiffener Half	70	80	92	163	122	20	20	114	143	0	50	75	**949**
16	Pillar Part bottom	580	380	1630	1716	2392	1222	2680	1325	2260	1860	2050	1970	**20065**
17	Seat for Lower Side Wall	120	137	141	127	243	69	78	239	126	145	196	250	**1871**
18	Door Hinge (Swing Door)	140	120	140	120	110	100	140	120	140	110	120	140	**1500**
19	LHB Loco side Buffer	0	0	0	0	0	0	4	8	6	0	4	0	**22**

OUTTURN OF REGULAR VITAL ITEMS OF BLACKSMITH SHOP DURING 2018-19 (Annexure-B)

SL NO	ITEM	APR 2018	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	JAN 2019	FEB	MAR	TOTAL
1	Anchor Link	937	993	1035	1026	1019	799	866	957	1061	878	853	805	**11229**
2	Roll Link	100	84	87	116	104	112	104	120	180	104	145	90	**1346**
3	Control Arm upper	76	156	48	94	61	0	80	224	256	200	289	304	**1788**
4	Traction Lever	116	115	116	145	140	121	96	168	176	152	149	189	**1683**
5	Traction Centre	44	32	64	72	58	74	60	72	77	52	88	89	**782**
6	Minor Rubber Pad	16	0	0	0	20	8	0	0	9	64	178	142	**437**
7	Buffer Casing	149	107	93	218	268	250	138	203	252	243	259	209	**2389**
8	Buffer Plunger	459	304	464	525	729	445	499	586	537	593	529	611	**6281**
9	Screw Coupling	286	269	257	260	340	290	247	295	295	279	262	288	**3368**
10	Basin Pipe	450	491	397	405	498	342	304	367	333	348	291	312	**4538**
11	Part side Wall sheet	491	213	258	253	0	62	250	166	434	240	156	124	**2647**
12	Side Wall Panel at window location	0	0	0	54	146	0	108	72	20	0	24	35	**459**

13	End Pillar	295	445	0	250	215	25	100	102	110	105	80	0	**1727**
14	Centre Stiffener Full (Pair)	10	20	10	30	20	30	28	22	30	32	21	22	**275**
15	Centre Stiffener Half	90	65	45	50	85	50	95	100	30	116	54	60	**840**
16	Pillar Part bottom	1000	2184	920	1659	362	790	960	543	0	527	620	510	**10075**
17	Seat for Lower Side Wall	146	71	152	285	236	135	183	142	210	0	190	240	**1990**
18	Door Hinge (Swing Door)	110	120	140	100	120	140	100	120	120	140	110	120	**1440**
19	LHB Loco side Buffer	0	2	4	0	0	0	4	0	0	0	0	0	**10**

OUTTURN OF REGULAR VITAL ITEMS OF BLACKSMITH SHOP DURING 2019-20 (Annexure-C)

SL NO	ITEM	APR 2019	MAY	JUN	JULY	AUG	SEPT	OCT	NOV	DEC	JAN 2020	FEB	MAR	TOTAL
1	Anchor Link	765	790	768	919	811	730	595	759	791	776	738	454	**8896**
2	Roll Link	136	142	112	196	136	171	96	192	161	140	152	80	**1714**
3	Control Arm upper	269	165	241	328	247	292	164	217	249	285	262	158	**2877**
4	Traction Lever	143	128	184	200	192	184	164	184	192	184	188	112	**2055**
5	Traction Centre	0	75	80	88	84	91	80	84	100	78	80	52	**892**
6	Minor Rubber Pad	145	164	188	256	341	358	200	336	402	399	351	242	**3382**
7	Buffer Casing	239	224	272	419	401	170	85	251	245	63	98	46	**2513**
8	Buffer Plunger	640	701	623	642	683	548	442	560	490	570	518	304	**6721**
9	Screw Coupling	276	294	353	296	284	266	235	171	322	257	253	159	**3166**
10	Basin Pipe	317	300	279	311	341	219	288	255	266	300	235	183	**3294**
11	Part side Wall sheet	188	257	218	225	275	215	99	138	85	311	202	236	**2449**
12	Side Wall Panel at window location	35	0	0	0	0	0	15	34	51	43	57	0	**235**
13	End Pillar	120	140	110	150	141	291	180	190	291	140	150	120	**2023**
14	Centre Stiffener Full (Pair)	10	17	44	127	255	20	58	30	28	30	71	56	**746**
15	Centre Stiffener Half	121	240	120	120	120	110	154	124	0	74	16	0	**1199**
16	Pillar Part bottom	490	680	500	682	720	540	720	810	920	800	1530	885	**9277**
17	Seat for Lower Side Wall	110	140	130	150	80	90	110	125	78	90	96	80	**1279**
18	Door Hinge (Swing Door)	120	110	140	120	140	120	100	140	100	120	120	100	**1430**
19	LHB Loco side Buffer	0	2	4	4	4	4	4	4	4	2	4	4	**40**

2.8.1 Summarizing the monthly outturn, the following table indicates the yearly total outturn of regular vital items performed by Black smith shop in 2017-18, 2018-19 & 2019-20.

TOTAL OUTTURN OF REGULAR VITAL ITEMS OF 'A' SHOP (Black Smith Shop) in financial year 2017-18, 2018-19 & 2019-20					
SL NO	**ITEM**	**2017-18**	**2018-19**	**2019-20**	**Components of**
1	Anchor link	12519	11229	8896	ICF coaches
2	Buffer Casing	2998	2389	2513	
3	Buffer Plunger	5826	6281	6721	
4	Screw Coupling	3454	3368	3166	
5	Part side Wall sheet	3603	2647	2449	
6	Side Wall Panel at window location	0	459	235	
7	End Pillar	1221	1727	2023	
8	Centre Stiffener Full (Pair)	475	275	746	
9	Centre Stiffener Half	949	840	1199	
10	Pillar Part bottom	20065	10075	9277	
11	Seat for Lower Side Wall	1871	1990	1279	
12	Basin Pipe	5263	4538	3294	ICF & LHB
13	Traction Lever	1378	1683	2055	LHB coaches
14	Control Arm Upper	1275	1788	2877	
15	Roll Link	852	1346	1714	
16	Traction Centre	598	782	892	
17	Minor Rubber Pad	170	437	3382	
18	LHB Loco side Buffer	22	10	40	
19	Door Hinge (Swing Door)	1500	1440	1430	Wagon

2.9 The month-wise Allowed Time (AT) and Time Taken of Black smith shop for the Year 2017-18, 2018-19, and 2019-20 are shown in tables below. The following data has been taken from Annexures-D, E, F.

2.9.1 **For the Year 2017-18: From Annexure-A**

Shop	Sec. Name	WH=162.5		WH=187.5		WH=177.5		WH=182.5		WH=187.5		WH=155.0		WH=160.0		WH=180.0		WH=177.5		WH=177.5		WH=170.0		WH=170.0	
		Apr.2017		May.2017		June.2017		July.2017		Aug.2017		Sept.2017		Oct.2017		Nov.2017		Dec.2017		Jan.2018		Feb.2018		Mar.2018	
		DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken
Black Smith Shop	Draw Bar	1396	1006	1644	1184	1691	1218	1857	1338	1661	1151	1431	989	1415	972	2026	1401	1831	1261	1661	1144	1955	1349	2291	1582
	Smith Mfg	1479	1066	1670	1204	1583	1142	1506	1086	1545	1076	1285	886	1338	921	1032	711	1109	760	1117	769	1124	769	1035	709
	Axle Guard	1186	854	1448	1042	1333	958	1383	994	1489	1027	1111	764	1036	714	1095	755	1173	809	1210	834	1050	727	1081	745
	Bolt Forging	1045	756	1133	815	1138	818	1107	796	1286	890	1015	700	993	684	1158	798	1049	724	1137	782	1178	812	1230	848
	Screw Coupling	1060	765	1062	763	1163	834	1150	826	1127	784	962	663	1097	756	1153	795	1139	785	1071	737	1162	801	1606	1105
	Buffer Rep	3440	2489	3682	2673	3728	2694	3981	2843	4176	2927	3430	2348	3304	2272	3972	2754	3389	2337	3273	2254	3002	2070	3578	2471
	Rough Forging & Drop	2035	1473	1917	1378	2325	1671	2414	1734	2435	1681	1986	1368	1730	1192	2463	1697	2285	1575	2077	1430	2108	1454	2215	1527
	Hyd. Press	2445	1786	2799	2036	2499	1822	2772	2015	2896	2054	2559	1765	2516	1734	2985	2060	2583	1781	2380	1641	2610	1801	2591	1786
	Misc. Rep	3058	2211	3406	2465	3198	2312	3477	2508	3567	2509	3340	2297	3004	2064	3659	2508	3186	2181	3289	2251	2583	1776	3137	2157
	Fab & Recl	1379	997	1392	1005	1310	944	1418	1024	1438	999	1249	861	1256	869	1129	778	944	648	1152	792	998	687	1281	882
TOTAL		18523	13403	20153	14565	19968	14413	21065	15164	21620	15098	18368	12641	17689	12178	20672	14257	18688	12861	18367	12634	17770	12246	20045	13812

2.9.2 **For the Year 2018-19: From annexure-B**

Shop	Sec. Name	WH=165.0		WH=187.5		WH=177.5		WH=185.0		WH=185.0		WH=170.0		WH=152.5		WH=167.5		WH=177.5		WH=180.0		WH=170.0		WH=170.0	
		Apr.2018		May.2018		June.2018		July.2018		Aug.2018		Sept.2018		Oct.2018		Nov.2018		Dec.2018		Jan.2019		Feb.2019		Mar.2019	
		DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken
Black Smith Shop	Draw Bar	2373	1635	2116	1460	2031	1408	2002	1392	2071	1438	1871	1300	1879	1301	1876	1305	1967	1363	1628	1164	1377	955	964	669
	Smith Mfg	971	663	1520	1041	1252	869	1296	900	1254	871	837	582	820	568	857	594	991	688	993	711	826	573	875	606
	Axle Guard	1241	854	1025	706	864	604	1529	1066	1559	1081	1378	956	1111	771	1243	862	1357	940	1366	960	1258	884	1277	902
	Bolt Forging	1164	803	1238	852	1164	813	956	668	1133	785	1133	786	926	642	1011	701	1113	769	1150	816	1065	749	1210	852
	Screw Coupling	1677	1155	1707	1176	1569	1096	1713	1192	1691	1172	1638	1135	1439	996	1097	759	1288	891	1346	963	1331	942	1282	903
	Buffer Rep	3338	2303	3295	2275	3098	2150	3513	2439	3529	2453	3503	2433	2789	1932	2931	2031	2577	1788	2583	1848	2601	1803	2340	1621
	Rough Forging & Drop	1903	1313	2054	1415	2036	1422	2399	1664	2270	1576	2169	1499	1900	1319	1827	1268	2096	1448	1909	1351	1871	1315	1690	1190
	Hyd. Press	2622	1809	2848	1963	2458	1706	1809	1247	1694	1174	1262	873	1249	865	1398	970	1328	920	1356	966	1292	909	1288	906
	Misc. Rep	3128	2150	3040	2090	3167	2198	3194	2218	3250	2257	2525	1753	2404	1670	2260	1579	2375	1649	2452	1754	2383	1666	2562	1792
	Fab & Recl	1150	792	1348	931	1114	778	1098	762	994	690	1016	705	947	655	1113	772	1077	743	1128	799	1071	758	1037	729
TOTAL		19567	13477	20191	13909	18753	13044	19509	13548	19445	13497	17332	12022	15464	10719	15613	10841	16169	11199	15911	11332	15075	10554	14525	10170

2.9.3 **For the Year 2019-20: from Annexure-C**

Shop	Sec. Name	WH=180.0		WH=180.0		WH=167.5		WH=192.5		WH=182.5		WH=170.0		WH=155.0		WH=172.5		WH=180.0		WH=177.5		WH=177.5		WH=115.0	
		Apr.2019		May.2019		June.2019		July.2019		Aug.2019		Sept.2019		Oct.2019		Nov.2019		Dec.2019		Jan.2020		Feb.2020		Mar.2020	
		DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken	DW-Allowed Time	DW-Time Taken
Black Smith Shop	Draw Bar	998	691	1121	776	956	662	1159	802	1209	834	1065	736	990	684	1104	762	987	682	855	621	942	693	855	621
	Smith Mfg	989	687	947	658	935	647	1105	765	798	551	577	399	650	450	918	635	953	658	1120	821	1190	877	1120	821
	Axle Guard	1279	899	1414	984	1350	936	1583	1103	1394	966	1380	957	1145	794	1535	1065	1453	1009	1533	1118	1565	1133	1533	1118
	Bolt Forging	1162	816	1219	846	1133	786	1289	894	1217	844	1096	770	954	662	1112	772	1316	912	1368	1000	1088	793	1368	1000
	Screw Coupling	1397	982	1407	976	1305	905	1501	1040	1470	1018	1233	857	1203	833	1350	935	1454	1006	1330	972	1274	972	1330	972
	Buffer Rep	2513	1742	2323	1602	2392	1655	3098	2144	3027	2088	2700	1866	2266	1566	2936	2027	2429	1684	2594	1904	2392	1759	2594	1904
	Rough Forging & Drop	1779	1251	1909	1324	1775	1234	2147	1488	2133	1480	1982	1374	1773	1230	1996	1384	2000	1387	1569	1140	1641	1205	1569	1140
	Hyd. Press	1469	1033	1324	919	1082	752	1248	870	1270	882	1270	781	1085	754	1382	957	1453	1008	1241	894	1026	747	1241	894
	Misc. Rep	2508	1754	2275	1590	2082	1455	2314	1606	2230	1547	2115	1467	1841	1276	2025	1403	2025	1484	2102	1533	2022	1486	2102	1533
	Fab & Recl	1124	790	1229	853	1060	736	1152	798	1272	882	1186	827	883	610	1178	815	1199	832	1199	854	1175	851	1199	854
TOTAL		15218	10645	15168	10528	14070	9768	16596	11510	16020	11092	14604	10034	12790	8859	15536	10755	15269	10662	14911	10857	14315	10516	14911	10857

CHAPTER-III

3.0 CRITICAL ANALYSIS

The subject work study has been conducted to review the manpower deployed in Black smith Shop of Liluah Workshop against the existing workload i.e. outturn performed.

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 by right sizing human resources along with the motive to improve the effective utilization of staff.

3.2 It has been mentioned in para 2.5.1, that study team is considering only Artisan and Helper Category staff for assessment. So, from para 2.5.1, the category-wise position of Artisan and Helper category staff under the purview of study is tabulated underneath.

S. No.	Category	Sanctioned Strength	On-Roll Strength		Vacancy
			Working in Black smith Shop	Working in other shop	
Artisan Category Staff					
1	Sr. Tech.	53	63	59	72
2	Technician I	105			
3	Technician II	16			
4	Technician III	18			
Erstwhile Group 'D' Category Staff					
5	Helper	2			
Total		***194***	***122***		***72***

3.3 The revised requirement of staff for Black smith Shop has been assessed in ongoing paragraphs through analysis of various data 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.*

3.3.1 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:

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

3.4 For assessment of revised requirement of manpower (i.e *Artisan and Helpers*) for Black smith shop, effective utilization of manpower is kept in consideration. The out-turn of the Black smith shop is mainly given attention by the study team for assessment.

3.5 The total Allowed time of Black smith shop for a month is the summation of Allowed time of all the sections of Black smith shop for the corresponding month.

3.5.1 It can be seen from the data collected from Black smith shop (*para 2.10.1 and 2.10.2*), the outturn varies every month, so study team considers outturn for the year 2017-18, 2018-19 2019-20 to get a more realistic and accurate assessment. The month-wise out-turn, Allowed time and Time Taken is depicted in the Chapter II.

3.5.2 From paras 2.10.1 and 2.10.2, the month-wise Outturn and corresponding Allowed time, Time Taken and Efficiency Percentage of DW staff *(Direct worker)* of Black smith shop for the year 2017-18, 2018-19 and 2019-20 are tabulated under:

3.6 **For the Year 2017-18:**

Month	Available Hrs	Allowed Time (a)	Time Taken (b)	Time saved c=(a-b)
April	162.5	18523	13403	5120
May	187.5	20153	14565	5588
June	177.5	19968	14413	5555
July	182.5	21065	15164	5901
August	187.5	21620	15098	6522
September	155.0	18368	12641	5727
October	160.0	17689	12178	5511
November	180.0	20672	14257	6415
December	177.5	18688	12861	5827
January	177.5	18367	12634	5733
February	170.0	17770	12246	5524
March	170.0	20045	13812	6233
Total	**2087.5**	**232928**	**163272**	**69656**

For the Year 2018-19:

Month	Available Hrs	Allowed Time (a)	Time Taken (b)	Time saved c=(a-b)
April	165.0	19567	13477	6090
May	187.5	20191	13909	6282
June	177.5	18753	13044	5709
July	185.0	19509	13548	5961
August	185.0	19445	13497	5948
September	170.0	17332	12022	5310
October	152.5	15464	10719	4745
November	167.5	15613	10841	4772
December	177.5	16169	11199	4970
January	180.0	15911	11332	4579
February	170.0	15075	10554	4521
March	170.0	14525	10170	4355
Total	**2087.5**	**207554.0**	**144312.0**	**63242.0**

For the Year 2019-20:

Month	Available Hrs	Allowed Time (a)	Time Taken (b)	Time saved c=(a-b)
April	180.0	15218	10645	4573
May	180.0	15168	10528	4640
June	167.5	14070	9768	4302
July	192.5	16596	11510	5086
August	182.5	16020	11092	4928
September	170.0	14604	10034	4570
October	155.0	12790	8859	3931
November	172.5	15536	10755	4781
December	180.0	15269	10662	4607
January	177.5	14911	10857	4054
February	177.5	14315	10516	3799
March	115.0	14911	10857	4054
Total	**2050.0**	**179408.0**	**126083.0**	**53325.0**

3.7 It can be seen that the outturn in terms of Allowed Time varies in every month. Therefore, for assessment, study team considers the Average value.

So, from the outturn figure for the year 2017-18, 2018-19 and 2019-20, the average value of available working hours/month, Allowed time/month, Time taken/month is shown below:

Man power req. at Black smith shop			
Year	Total Available Hrs	Total Allowed time (AT)	Total Time taken
2017-18	2087.5	232928.0	163272
2018-19	2087.5	207554.0	144312
2019-20	2050.0	179408.0	126083.0
Grand Total	6225.0	619890.0	433667.0
Avg.	**2075**	**206630.00**	**144555.67**

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

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

Therefore, the requirement of DW *(Direct Worker)* staff to achieve the average outturn (*i.e average AT 206630 man-hours*) is calculated below.

From above table, Utilized Man-hours (i.e Time Taken) for average Outturn of AT 206630 man-hours	*144555.67*
Average available hours	*2075*
Requirement of DW staff on the basis of assessment based on Average Outturn	*144555.67* / 2075 = *69.66*

So, the requirement of DW staff at Black smith shop with incentive scheme based on assessment on the basis of Average Outturn is calculated as 69.66 ≈ 70

The requirement of EIW staff at Black smith shop as per *percentage of EIW staff* for different activities as per *IR Mechanical code* tabulated in para 3.3.1 is assessed underneath:

Requirement of EIW staff on the basis of assessment based on average outturn	*= 10 % of DW staff of Black smith shop* *= 10% X 70* *= 7*

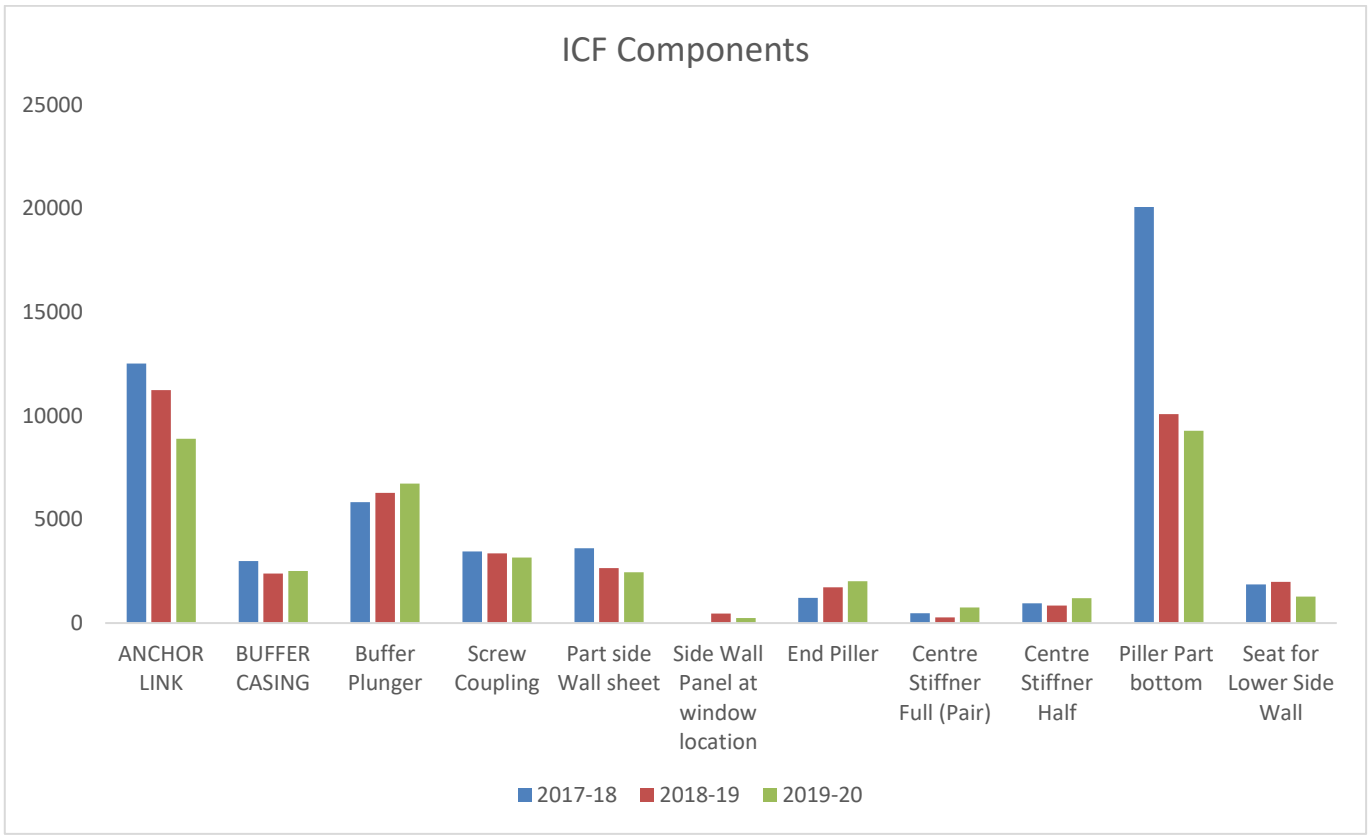
So, the requirement of staff at EIW section based on assessment on the basis of Average Outturn is calculated as 7.

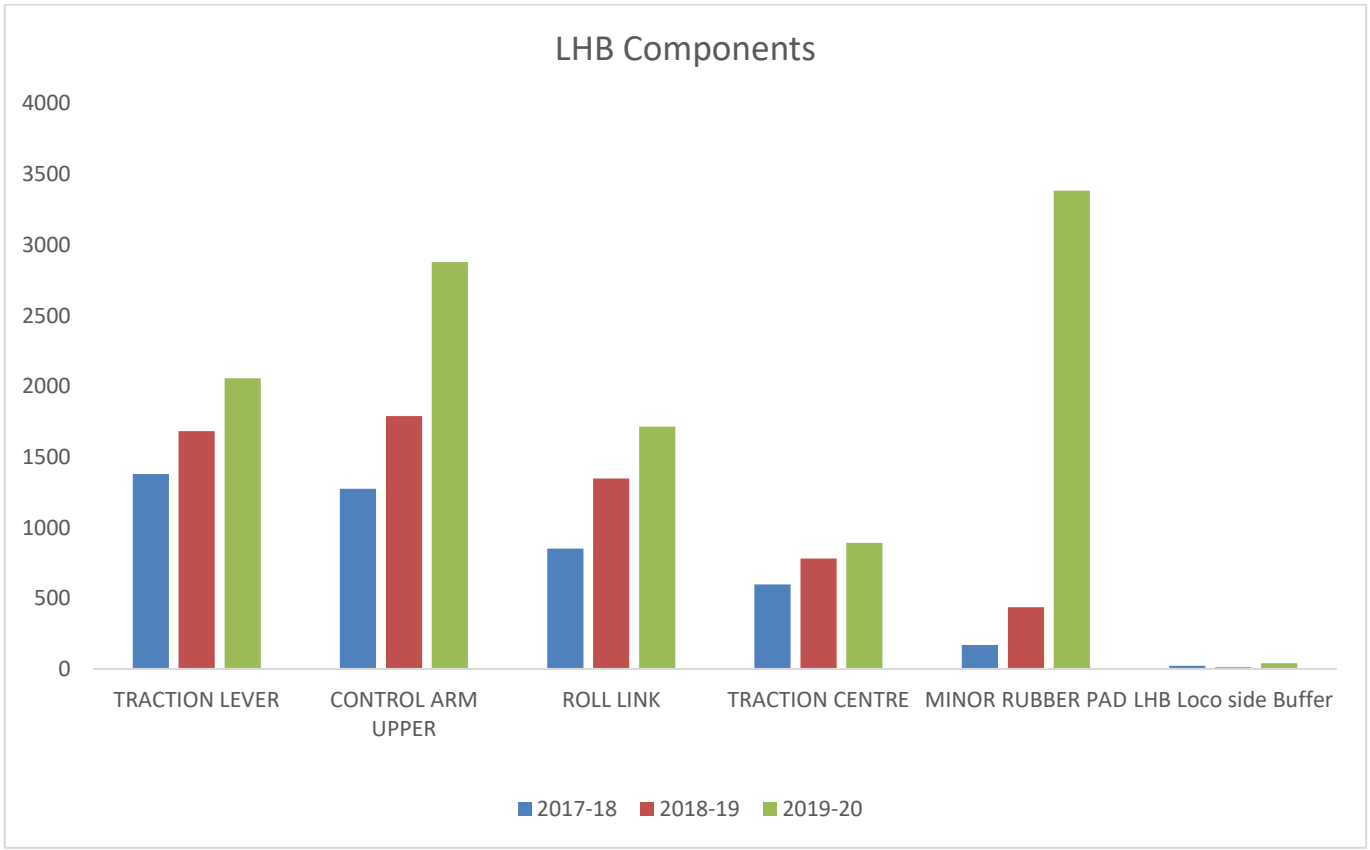
Hence, Bare requirement of Artisan & Helper at Black smith shop = 70+7 = 77

3.8 The study team also compared the trend of outturn (Items/Components) performed in the year 2017-18, 2018-19 7 2019-20. Year wise vis-à-vis item wise total outturn for ICF coaches & LHB coaches is tabulated below.

SL NO	ITEM	2017-18	2018-19	2019-20	Components of
1	ANCHOR LINK	12519	11229	8896	
2	BUFFER CASING	2998	2389	2513	
3	Buffer Plunger	5826	6281	6721	
4	Screw Coupling	3454	3368	3166	
5	Part side Wall sheet	3603	2647	2449	
6	Side Wall Panel at window location	0	459	235	ICF coaches
7	End Piller	1221	1727	2023	
8	Centre Stiffner Full (Pair)	475	275	746	
9	Centre Stiffner Half	949	840	1199	
10	Piller Part bottom	20065	10075	9277	
11	Seat for Lower Side Wall	1871	1990	1279	
12	Basin Pipe	5263	4538	3294	ICF & LHB
13	TRACTION LEVER	1378	1683	2055	
14	CONTROL ARM UPPER	1275	1788	2877	
15	ROLL LINK	852	1346	1714	
16	TRACTION CENTRE	598	782	892	LHB coaches
17	MINOR RUBBER PAD	170	437	3382	
18	LHB Loco side Buffer	22	10	40	
19	Door Hinge (Swing Door)	1500	1440	1430	Wagon

3.8.1 Outturn trends of ICF components and LHB components in 2017-18, 2018-19 & 2019-20 is depicted below in graphically.





3.8.2 The above figure indicates that the outturn for LHB coaches is gradually increasing whereas, the outturn for ICF coaches is decreasing. Hence, man-hrs saved for ICF components are utilized against workload of LHB coaches.

3.9 From para 3.7, the Revised requirement of staff is tabulated underneath:

The Bare requirement of DW staff = 70
Giving LR as 12.5% of 70 (i.e. 9), actual requirement will be = 79

Similarly, giving 12.5% of 7 as LR to Helper, the actual requirement will be = 8

Hence, total requirement at Blacksmith shop at LLH against the existing workload will be as under:

Sections	*Sanctioned Strength* (Artisan & Helper Category staff)	*Existing* Deployment	*Proposed Requirement*
Requirement of staff for catering existing workload of Black smith shop including Leave Reserve	194	*63*	*87*
The staff deployed at different shop other than Black smith shop		*59*	*59*
Total	**194**	**122**	**146**

3.9.1 Summarizing the Revised requirement *(including Leave Reserve)* 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.

Category	Sanctioned Strength	Men-On- Roll	Revised Requirement	Surplus
Artisan & Erstwhile Gr. D *(only Helper category)*	**194**	**122**	**146**	**48**

3.10 **Recommendations**:

It is recommended that the Revised total requirement of Artisan & Helper to carry out the entire departmental workload presently catered Black smith shop will be 146 posts which would result in surrender of 48 posts as against the present total sanctioned strength of 194 posts.

CHAPTER-IV

4.0 FINANCIAL APPRAISAL:

4.1 As per recommendation made in para 3.10, the total surplus posts works out to ***48 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 **48 posts** is furnished below.

Pay Level	*Lowest Grade Pay (Rs.)*	*Mean pay (in Rs)*	*D.A (17%) (in Rs)*	*Total (in Rs)*	*No. of posts Recommended for Surrender*	*Monthly savings of total staff (in Rs)*	*Minimum Annual savings. (in Rs)*
1	1800/-	20750/-	3528/-	24278/-	***48***	1165344/-	***13984128/-***

Hence, total annual financial savings works out to ***Rs. 139.84 lakhs***.