Report of the
Comptroller and Auditor General of India

On

Assessment and Utilisation of Locomotives
&
Production and Maintenance of LHB Coaches in Indian Railways

for the year ended March 2018

Laid in Lok Sabha/Rajya Sabha on _____

Union Government (Railways)
No. 2 of 2020
(Performance Audit)

Preface

The Report for the year ended March 2018 has been prepared for submission to the President under Article 151 of the Constitution of India.

The Report contains results of audit of the Ministry of Railways of the Union Government, on the following topics

1. Assessment, Procurement and Utilization of Locos in Indian Railways; and
2. Production and Maintenance of LHB Coaches in Indian Railways.

The instances mentioned in this Report are those which came to notice in the course of test audit for the period April 2012 to March 2018 as well as those which came to notice in earlier years, but could not be reported in the previous Audit Reports. Instances relating to the period subsequent to 2017-18 have also been included, wherever necessary.

The audit has been conducted in conformity with the Auditing Standards issued by the Comptroller and Auditor General of India.

Contents

Abbreviations

Abbreviation	Full form
AOH	Annual Overhauling
ASS	Annual Statistical Statements
AW	Actual Working
BEML	Bharat Earth Movers Limited
BG	Broad Gauge
BHEL	Bharat Heavy Electricals Limited
CLW	Chittaranjan Locomotive Works
CME	Chief Mechanical Engineer
COFMOW	Central Organization for Modernization of Workshops
CR	Central Railway
CRB	Chairman Railway Board
CRS	Commissioner of Railway Safety
CWE	Chief Workshop Engineer
DLF	Diesel Loco Factory
DLS	Diesel Loco Shed
DLW	Diesel Locomotive Works
DLWS	Diesel Loco Workshop
DRF	Depreciation Reserve Fund
DRM	Divisional Railway Manager
ECOR	East Coast Railway
ECR	East Central Railway
ELAAU	Electric Loco Assembly and Ancillary Unit
ELS	Electric Loco Shed
ELWS	Electric Loco Workshop
ER	Eastern Railway
FA&CAO	Financial Advisor and Chief Accounts Officer
FYP	Five Year Plan
GDP	Gross Domestic Product
GELF	Greenfield Electric Loco Factory
GM	General Manager
GMT	Gross Million Tonne
HHP	High Horse Power
HLSRC	High Level Safety Review Committee

Abbreviation	Full form
ICF	Integral Coach Factory
ICMS	Integrated Coaching Management System
IOH	Intermediate Overhauling
IR	Indian Railways
IROM	Indian Railway Operating Manual
IRPWM	Indian Railway Permanent Way Manual
LC	Level Crossings
LHB coaches	Linke Hoffman Busch coaches
MoR	Ministry of Railways
NCR	North Central Railway
NEFR/NFR	Northeast Frontier Railway
NER	North Eastern Railway
NR	Northern Railway
NTKM	Net Tonne Kilometer
NWR	North Western Railway
OHE	Over Head Electric Equipment
PAC	Public Accounts Committee
PCEE	Principal Chief Electrical Engineer
POH	Periodic Overhaul
RDSO	Research, Designs and Standards Organization
ROB	Road Over Bridge
RUB	Road Under Bridge
RVNL	Rail Vikas Nigam limited
RWF	Rail Wheel Factory
RWP	Rail Wheel Plant
S&T	Signal and Telecommunication
SAIL	Steel Authority of India Limited
SCR	South Central Railway
SR	Southern Railway
SS	Sanctioned Strength
SWR	South Western Railway
WCL	Western Coalfields Limited
WCR	West Central Railway
WR	Western Railway

EXECUTIVE SUMMARY

Chapter 1 Assessment, Procurement and Utilization of Locomotives in Indian Railways

Using the fleet of 11,764 locomotives (locos), Indian Railways operated 13,452 passengers and 9,141 goods trains daily throughout its network of 68,442 Route Kilometers (RKM) as on 31 March 2018. Indian Railways has four loco production units, viz. Diesel Locomotive Works (DLW) at Varanasi, Chittaranjan Locomotive Works (CLW) at Chittaranjan, Diesel Modernization Works (DMW) at Patiala and Electric Loco Assembly and Ancillary Unit (ELAAU) at Dankuni. DLW and DMW were diesel loco production units. However, DLW and DMW started manufacturing electric locos from 2016-17 and 2018-19 respectively.

The main focus of the Performance Audit was (i) Production planning of locos *vis-à-vis* assessed requirement; (ii) Allotment of locos to Zonal Railways and adequacy of infrastructure to handle the available locos; and (iii) Efficiency of loco utilization.

Major Audit Findings

- Loco requirement was decided not on the basis of actual requirement, but for utilising the production capacity. Further, the main criteria adopted by Railway Board for the assessment of requirement of locos and production planning were actual production of locos in previous years. Factors, which should be an integral part of finalising loco requirements, were not wholly considered. More so, there was no structured methodology for assessing the requirements of locos based on specifically laid down parameters. This has led to more numbers of diesel locos in the system than required, as evident from the various efficiency indices of loco utilisation. ***Para 1.8***

- Huge expenditure was incurred for capacity augmentation of DLW for production of diesel locos and the work was completed within five months from the targeted date of completion. On the other hand, works for augmentation of capacity of CLW and ELAAU for production of electric locos were running way behind schedule. ***Para 1.11***

- Locos were allotted to Zonal Railways without keeping in mind their requirements and infrastructure available for maintenance, which led to underutilisation of locos by Zonal Railways. Further, newly allotted locos were commissioned after delays and could not be put in use after its receipt.

Para 1.12

- On account of defective material in manufacturing *etc.*, 46 *per cent* new locos failed within 100 days of their commissioning. ***Para 1.13 a***

- There were wide variations in sanctioned strengths of loco pilots per loco among Zonal Railways. There was no uniformity in loco pilots sanctioned and actual working requirements among Zonal Railways. No norms were fixed for number of loco pilots per loco. ***Para 1.15***

- Total 2,070 locos were added in Indian Railway's loco fleet during 2012-18. As compared to 2012-13, NTKMs[1] per goods engine per day 'on line' and 'in use' decreased by 11.6 *per cent* and 22.4 *per cent* respectively for diesel locos in 2017-18. Similarly, for electric locos, NTKMs per goods engine per day 'on line' and 'in use' decreased by 17 *per cent* and 27.2 *per cent respectively.*

Para 1.16

- Excess days were taken in periodical overhauling (POH) of diesel and electric locos in workshops, and completing their maintenance schedules in locos sheds. Locos were detained in exchange yards before and after their POH.

Para 1.17

- Lack of quality control, use of inferior material, poor supervision and inadequate internal control occurred during scheduled maintenance of locos in loco sheds. This led to unscheduled/ out of course repairs of 17,530 diesel and 22,078 electric locos. ***Para 1.18 a***

- On account of defective material, poor inspection *etc.*, 37 and 18 *per cent* diesel and electric locos failed within 180 days of their POH. Almost half of

[1]NTKM - Net Tonne Kilometer – Unit of measure of freight traffic which represent the transport of one tonne goods (including the weight of any packing but excluding the weight of the vehicle used for transport) over a distance of one kilometer.

diesel and electric locos failed after their scheduled maintenance by loco sheds. ***Para 1.18 b***

Recommendations

1. ***Railways may evolve a suitable methodology for assessing the electric loco requirements, with due considerations to the end user requirements.***
2. ***Railways need to examine the referred augmentation works in the electric loco sheds to avoid the delays/ detention in maintenance of locos.***
3. ***Railways need to revisit upgradation of the infrastructure of existing diesel loco sheds judiciously taking into account the ongoing growth of electric loco fleet.***
4. ***Railways should improve infrastructure facilities, quality of maintenance and promote good management practices in loco sheds to minimize unscheduled repairs in future.***

Chapter 2: Production and Maintenance of LHB Coaches in Indian Railways

In 2002, Indian Railways entered into Transfer of Technology (ToT) contract with M/s ALSTOM LHB/Germany for production of LHB design stainless steel coaches. LHB design coaches are far superior with respect to passenger comfort, safety, speed, corrosion, maintenance and aesthetics than ICF design coaches (conventional coaches). These coaches are also longer as compared to ICF design and have more carrying capacity. Further, LHB coach has vertically interlocked Centre Buffer Couplers with anti-climbing features. This prevents the coaches to capsize in case of a derailment. The first LHB coach was introduced in Indian Railways network in December 2003. Audit analyzed the pace of production of LHB coaches, running of passenger trains with LHB coaches and extent of availability of maintenance facility for LHB coaches in IR.

Major Audit Findings

- In February 2012, High Level Safety Review Committee recommended complete switching over to the manufacture of LHB design coaches and

immediate stopping of the manufacture of ICF design coaches. However, the decision to switch over to LHB coaches was taken only with effect from 1 April 2018. During the last five years, out of 19,327 coaches produced by Indian Railways' production units, only 5,847 coaches were of LHB type i.e. only 30 *per cent*. ***Para 2.2***

- Indian Railways has three coach production units viz., Integral Coach Factory Perambur (ICF), Rail Coach Factory Kapurthala (RCF), Modern Coach Factory Raebareli (MCF). ICF and RCF manufacture both conventional and LHB coaches and MCF was set up in April 2011 to produce LHB coaches only. Railways also planned to set up new production units of LHB coaches at Kanchrapara and Singur. But, these were not yet functional.

  MCF was set up only for production of LHB coaches. However, it was yet to fully contribute towards production of LHB coaches. During 2013-18, only 37 *per cent* of the installed capacity was utilized. Audit noted non-commissioning/ rejection/ breakdown of machines as one of the main reasons for shortfall in production by MCF. Railways need to enhance the installed capacity of ICF, RCF and MCF for production of LHB coaches and phase out production of ICF Coaches. ***Para 2.3 and Para 2.3.1***

- Audit examined planning and pace of conversion of ICF rakes into LHB rakes. During the last three years (2015-16 to 2017-18), 195 rakes were planned for conversion into LHB rakes. However, only 108 rakes could be converted into LHB rakes. Audit noted that Railway Board did not allot required number of LHB coaches to Zonal Railways and allotted coaches in piecemeal. Coaches received in the Zonal Railways were found lying unused till appropriate number of coaches were allotted to form a rake.

  Audit also carried out age analysis of existing conventional coaches across Indian Railways. Out of 49,033 ICF design coaches, 609 coaches have already attained their codal life of 25 years as on 31 March 2018. Further, about 13 *per cent* (6,259 coaches) were between the age of 20 and 25 years and would need to be replaced in the next five years. As such, Indian Railways need to replace at least 6,868 coaches (14 *per cent*) over a period of next five years. In addition, Indian Railways would also need to manufacture additional new

coaches to cater to anticipated increase in passenger traffic. The present production programme was not able to meet the requirement of coach production. ***Para 2.3.2***

- Audit examined records of 53 major coaching depots to analyse the adequacy of maintenance of LHB coaches. Audit noticed lack of adequate infrastructure required for maintenance of LHB coaches in 14 depots. Spare items for maintenance of LHB coaches were not being properly maintained in 12 depots.

  Audit also reviewed the status of availability of infrastructure in workshops to analyse whether these were adequately equipped for POH/IOH and other maintenance activities of LHB coaches. Indian Railways did not have adequate facilities in their workshops for POH/IOH of LHB coaches. In some workshops, the POH/IOH of LHB coaches was carried out, but the same needed to be augmented to handle the increase in number of LHB coaches. As a result, the LHB coaches were to be sent to other workshops which results in extra time as well as empty haulage of coaches. ***Para 2.4***

Recommendations

1. ***Indian Railways need to examine the need to speed up the production of LHB coaches, and ancillary facilities required, if they plan to achieve complete switch over to LHB variant coaches.***
2. ***Availability of adequate infrastructure and other maintenance facilities need to be ensured in the coaching depots and workshops for timely and effective maintenance and POH/IOH of LHB coaches.***

Chapter 1 Assessment, Procurement and Utilization of Locos in Indian Railways

1.1 Introduction

Locomotives (locos) provide motive power for both passenger and freight train services. Timely availability of locos is critical to the operation of train services. As on 31 March 2018, Indian Railway had a fleet of 11,764 locos[2].Using this fleet of locos, Indian Railways runs 13,452 passenger and 9,141 goods trains daily over 68,442 Route Kilometres (RKM)[3]. The codal life[4] of diesel and electric loco is 36 years and 35 years respectively.

Indian Railways has four loco production units (PUs), viz. Diesel Locomotive Works (DLW) at Varanasi, Chittaranjan Locomotive Works (CLW) at Chittaranjan, Diesel Modernisation Works (DMW) at Patiala and Electric Loco Assembly and Ancillary Unit (ELAAU) at Dankuni. DLW and DMW were diesel loco production units. However, DLW and DMW started manufacturing electric locos from 2016-17 and 2018-19 onwards respectively. Other two production units, CLW and ELAAU are manufacturing only electric locos. Two more PUs[5] in PPP mode are supplying diesel and electric locos. Indian Railways are also procuring electric locos from Bharat Heavy Electricals Limited (BHEL).

Indian Railways spent ₹52,198.21 crore on production of locos during the past six years (2012-18) through its Production Units. Out of this, ₹ 44,254.92 crore (85 *per cent*) was met from Extra Budgetary Resources.

There are different types and versions of locos with reference to the kind of horsepower and utilisation for passenger and goods traffic in terms of capacity and other advantages. Prescribed periodical maintenances of locos are carried out in their designated workshops and loco sheds over Zonal Railways. There are six diesel loco workshops, six electrical loco workshops and 43 diesel loco sheds and 31 electric loco sheds over Indian Railways.

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2 Steam: 39 (26 MG & 13 NG); Diesel: 5,881 BG, 74 MG & 131 NG; Electric 5,639 BG
3 63,558 RKM for BG; 3,200 RKM for MG and 1,684 RKM for NG
4 RB's letter no. 2002/ACII/1/10 dated 24.05.06 (RBA No. 25/2006)
5 One Diesel Loco Factory, (DLF) at Marhowra, Bihar and another Greenfield Electric Loco Factory (GELF) at Madhepura, Bihar

1.2 Organization Structure

At Railway Board level, Member Traction is responsible for loco procurement and Member Rolling Stock is responsible for loco maintenance. Production Units for production of locos are managed independently by General Managers reporting to the Railway Board.

At Zonal Railway level, the Principal Chief Electrical Engineer (PCEE) co-ordinates the assessment and procurement of locos required for the Zonal Railways and send indents to Railway Board. PCEE also looks after the maintenance of diesel and electric locos.

1.3 Audit Objectives

The Audit was undertaken with a view to assess:

- Whether assessment of requirement of locos over Zonal Railways was adequate;
- Whether acquisition of locos and allotment to Zonal Railways was commensurate with the assessed requirement;
- Whether the locos were utilized efficiently and optimally by Zonal Railways.

1.4 Audit Criteria

The following were the sources of Audit Criteria:

(i) Indian Railway Code for the Mechanical Department (Workshop).
(ii) Indian Railway Operating Manual.
(iii) Indian Railway Maintenance Manuals of Diesel and Electric Locos.
(iv) Instructions/ circulars issued by Railway Board/ Zonal Railway on assessment, procurement, utilization and maintenance of locos from time to time.
(v) Annual Statistical Statements (ASS) of 2012-18.

1.5 Audit Scope, Methodology and Sample

Audit reviewed the assessment of requirement of locos, their procurement, and infrastructure for production of locos for 2012-19. Utilization of locos was reviewed for 2012-18. Maintenance of locos in workshops and loco sheds, and adequacy of infrastructure in loco sheds was reviewed for 2012-17. Uniformity in loco pilots sanctioned and their actual working among Zonal Railways as on 31 March 2017

was also reviewed. Records of Railway Board, Production Units, Zonal Railways in respect of assessment of requirement, production, procurement and utilization were examined. Records of 42 diesel and 30 electric loco sheds were examined for the adequacy of infrastructure therein. Audit also studied maintenance and utilization of locos in selected 32 Divisions, 6 diesel and 6 electric loco workshops and 16 diesel and 12 electric loco sheds. Details thereof are shown in **Annexure 1.1.**

Audit findings in this report are based on the observations noticed in all the production units, selected divisions, workshops and loco sheds. Similar deficiencies may be prevailing in other units of Indian Railways, which the Ministry of Railways may look into and take necessary measures.

Entry and Exit conferences were held in all Zonal Railways. Exit conference with Railway Board was held on 6 May 2019. Responses of Railway Board during exit conference and their reply to audit findings were included appropriately in the report.

1.6 Scope Limitation

Some of the Railway formations did not make available records/documents/ information, as mentioned in the respective Annexure[6]. Audit observations have been framed assuming that they did not maintain records, though required to do so.

1.7 Acknowledgement

Audit acknowledges the co-operation extended by the Railway Board, Zonal Railways and Production Units during the conduct of this Audit.

Audit Findings

1.8 Assessment of requirement of locos and production planning

The assessment of requirement and planning for production of locos was centralised at Railway Board. Zonal Railways and Production Units were not involved in assessing the requirement. Railway Board prepared the production plan for a period of three year[7] in advance. Various functional Directorates in Railway Board including Finance were involved in the assessment of requirement and production planning

[6](i) New locos failed within 50 and 100 days of their commissioning by SECR &SER (Para 1.13); (ii) Detention of locos in exchange yard by ER, NWR & SR {Annexure 1.6 B (Para 1.17)}; (iii) Unscheduled repairs of Diesel Locos by CR, ECR, NR & NER {Annexure 1.7 A & B (Para 1.18 a)}; (iv) Loco failures within 180 days of POH by NWR & SR {Annexure 1.8 (Para 1.18 b)}.

[7]Indian Railway Code for the Mechanical Department (Workshops),1991

process. The time taken for finalisation of production plan during 2012-19 at Railway Board was as follows:

Table 1.1 Details of locos initially proposed for production and locos approved for production, and delay in finalisation of production programme.

Year	Number of locos proposed initially		Number of locos approved for production programme		Date of finalisation of three year plan	Delay in months[8]
	Diesel	*Electric*	*Diesel*	*Electric*		
2012-13	290	250	300	250	28.01.2011	00
2013-14	330	250	340	250	19.12.2014	24
2014-15	360	280	352	264	19.12.2014	12
2015-16	360	280	300	280	25.03.2015	03
2016-17	300	280	300	300	08.09.2016	08
2017-18	300	280	254	352*	27.01.2017	*Revised on 26.10.17
2018-19	350	375	107	1000*	25.10.2017	*Revised on 26.10.18

Audit observed that there were delays in finalization of plans for most of the years. The main reason for delay was absence of consensus regarding parameters/specific methodology amongst the various Directorates. Besides, lack of prescribed guidelines for assessing the requirement of locos has also added to the delays. Different Directorates adopted their own criteria, which were put forth on the basis of different data and parameters[9]. As such, the planning process was not a scientific and structured assessment. Railways did not make efforts to validate assumptions made by different members with actual empirical data collected from users of the locos (Zonal Railways).

Audit also noticed that production plan was not finalised in advance. As a result, Production Units continued production at their own pace during 2013-14, 2014-15 and 2016-17. It was seen that at the time of communication of finalised plan, significant/most part of the production was completed by the Production Units. Delayed production plan thus, could not realign production as per requirement.

Audit also noticed that Finance Directorate emphasized (March and June 2013) need to conduct a zero base review of requirement to arrive at a realistic projection on

[8] Approved Production Programme should be issued by 15th December.
[9] Growth of Traffic, Rake-Loco Ratio, Electrification of Routes *etc*.

rational basis. The same was to be supported by factual data linked to traffic requirements. No concerted efforts were taken by the Railway Board in this regard.

However, in planning the manufacturing of locos, Chairman Railway Board took a view (December 2014) on the issue. He opined that if enough locos were not produced, the staff in Production Units would have to be paid salary without any work and there would be industrial relations issues.

Thus, it was seen that loco requirement was decided not on the basis of actual requirement, but for utilising the production capacity. Further, the main criteria adopted by Railway Board for the assessment of requirement of locos and production planning were actual production of locos in previous years. Factors[10], which should be an integral part of finalising loco requirements, were not wholly considered (**see Para 1.9**). More so, there is no structured methodology for assessing the requirement of locos based on specifically laid down parameters. This has led to more number of diesel locos in the system than required, as evident from the various efficiency indices of loco utilisation (**see Para 1.16**).

Railway Board decided to stop production of diesel locos in their manufacturing units from the year 2019-20 onwards. Review of the planning process showed that some of the parameters such as accelerated pace of railway electrification and requirement of right powering of passenger trains were considered for planning the production plan for the next three years. However, certain parameters such as traffic growth in the coming years, loco utilisation norms, rake-loco ratio as well as production by new units at Madhepura and Marhowra (diesel), (which was also flagged by Member (Traffic) while finalising the production plan for 2019-22) have not been taken into consideration.

It is, therefore, necessary that all factors are considered in the planning process for production of electric locos. There is a need to ensure that the deficiencies plaguing the planning process of diesel locos do not recur in planning process for electric locos in the coming years.

[10] Expansion of infrastructural facilities, line capacity constraints (As per White Paper on IR, 2015, almost 40 *per cent* of the routes in IR are being operated beyond 100 *per cent* line capacity), pace of electrification, availability of manpower, ideal rake-loco ratio, actual growth of traffic etc.

1.9 Parameters for assessment of requirements

For assessment of requirement of locos, different parameters were considered. The various parameters required for assessment of requirement of locos are discussed below:

1.9.1 Projections made in XII Five Year Plan

While assessing the requirement of locos, Railway Board prioritised its loco production program with XII Five Year Plan (FYP) (2012-17) as benchmark. The assessed requirement for the period of 2012-17 was 400 per annum each for diesel and electric locos. This projection was based on the anticipated Gross Domestic Product (GDP) growth rate of nine *per cent*.

Audit observed that the actual growth rate in goods and passenger traffic was not factored into production plans of locomotives. It was seen that the projected growth rate was 10.8 *per cent* for passenger kilometres and 7.77 to 8.08 *per cent* for Million Tonne Load of freight. Against this, the actual growth rate was only 0.24 to 3.96 *per cent* for passenger kilometres and 0.36 to 4.37 *per cent* for freight load. Similarly, actual growth rate of NTKM over the previous year which was projected as 6.81 to 8.17 *per cent* was always less than 2.49 *per cent* and even negative in 2015-16 and 2016-17.

Thus, the actual growth rates were much lower than the projected rates and led to projection of requirement of locos higher than what was actually required. Details are shown in Annexure 1.2.

1.9.2 Loco Utilization Norms

Requirement of locomotives can also be assessed on the basis of Loco Utilisation Norms. For passenger traffic, loco requirement was assessed by dividing the total passenger engine kilometres by engine kilometre per day per passenger engine in use multiplied by number of days in the year. For goods traffic, loco requirement was assessed by dividing the NTKM (total goods traffic moved) by NTKM per goods engine per day in use multiplied by number of days in the year. Audit assessed the requirement of locos as per this norm and noticed that there was excess holding of locos during 2012-17 as shown in the Table 1.2.

Table 1.2 - Requirement of Locos on the basis of Loco Utilisation Norms in terms of NTKM per loco per day for goods and Engine KM per loco per day for passenger										
Particulars	Diesel locos					Electric locos				
Year	*2012-13*	*2013-14*	*2014-15*	*2015-16*	*2016-17*	*2012-13*	*2013-14*	*2014-15*	*2015-16*	*2016-17*
Passenger Traffic										
Loco required for passenger traffic	1374	1492	1568	1590	1615	1048	1085	1113	1232	1235
Loco available for passenger traffic[11]	1840	1959	1974	2056	2039	1169	1242	1279	1329	1418
Excess pass. loco	466	467	406	466	424	121	157	166	97	183
Excess Passenger Loco	**34%**	**31%**	**26%**	**29%**	**26%**	**12%**	**14%**	**15%**	**8%**	**15%**
Goods Traffic										
Loco required for goods traffic	1720	1965	2063	2201	2090	2368	2650	3272	3292	2985
Loco available for goods traffic	1986	2128	2255	2431	2538	2824	2973	3127	3266	3326
Excess Goods loco	266	163	192	230	448	456	323	-145	-26	341
Excess Goods Loco	**15%**	**8%**	**9%**	**10%**	**21%**	**19%**	**12%**	**-4%**	**-1%**	**11%**

Thus, at the time of assessing the requirement of locos, above parameters, which provided the basis for actual requirement of locos, were not kept in view. This resulted in excess projection of requirement of locos especially diesel locos.

1.9.3 Rake-Loco ratio

Rake-loco ratio is the number of locos required per rake. In the General Managers' conference (April 2013), the Rake-loco ratio of 1:0.8 was quoted as ideal for passenger and goods rakes.

Audit assessed the requirement of locos on the basis of rake-loco ratio. Audit observed that the actual holding of locos, which was already in excess by 45 *per cent* in 2012-13, further increased by 12 *per cent* over the next five years to reach 57 *per cent* in 2017-18. Details are shown in **Annexure 1.3.**

As such, it can be concluded that the rake-loco ratio was not considered while assessing the requirement of locos and locos manufactured were more than the actual requirements.

[11] After deducting locos unavailable for operation i.e. ineffective

In the exit conference, Railway Board stated (May 2019) that ideal rake-loco ratio is a ballpark figure. The rake-loco ratio was changed with the advent of new high horse power (HHP) locos, implementation of right powering of freight trains to achieve higher mobility etc. Audit however, did not find any records of change in rake-loco ratio.

1.9.4 Electrification in Indian Railways

Audit observed that while assessing loco requirements for the period 2012-17, Railway Board did not properly review the increasing rate of electrification. Increase in the requirement of electric locos and the simultaneous reduction in utilisation of diesel locos was not adequately considered while assessing the loco requirements.

In the Mission Electrification and De-carbonization, Hon'ble Minister of Railways had given directives (September 2017) for 100 *per cent* Electrification in Indian Railways. Audit noted that Railway Board considered the increasing rate of electrification and increased the production target of electric locos in the middle of the year during 2017-18 and 2018-19. However, they continued to plan production of diesel locos including from Diesel Loco Factory (DLF), Marhowra. They did not revise the production plan of diesel locos in 2017-18 (manufactured 260 against the target of 254). Moreover, a production plan of 107 diesel locos was also made for 2018-19. Further, requirement of only electric locos in Dedicated Freight Corridors (which is targeted to be completed by 2021 and would be completely electrified), was not considered for arriving at requirements of diesel locos.

In reply, Railway Board stated (April 2019) that three years' plan was reviewed annually for making modifications because of modernization, technical changes, Zonal Railways requirements etc. Therefore, it was a long-term process and underwent many changes till finalization and it always remained dynamic with moderation and fluctuation. They also stated that assessment of requirement was done by a Committee of Additional Members/Executive Directors. The Committee duly considered many factors and submitted their recommendations to Railway Board, where they finally decided the production planning. It was admitted that in some years, actual production in previous years was the basis of production.

Audit, however, observed that Committees of Additional Members/Executive Directors of 2006-16 neither prescribed any criteria, nor could arrive at any

unanimous decision on the number of locos required. Further, outcome of various parameters, which affected the loco requirements as discussed above, was not contemplated while assessing the loco requirements.

Railways may evolve a suitable methodology for assessing the requirements of electric loco, wherein due consideration is given to all related parameters. Inputs of the user field offices at the planning stage should be ensured for realistic assessment of requirements. There is also a need to ensure that the deficiencies plaguing the planning process of diesel locos do not recur in planning process for electric locos in the coming years.

1.10 Actual production of locos

Audit compared the actual production *vis-à-vis* the targets set in the production programme of 2012-19 and observed the following:

Table 1.3 - Targeted and actual production & procurement of locos during 2012-19

Year	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19
Diesel Locos							
Targets	300	340	352	300	300	254	107
Actual	293	331	330	319	316	260	102
Variation	-7	-9	-22	19	16	6	-5
Electric Locos							
Targets	250	250	264	280	300	352	1000
Actual	270	264	250	280	294	377	605
Variation	20	14	-14	0	-6	25	-395

After deciding to stop production of diesel locos from 2019-20, Railway Board enhanced the target of production of electric locos from 573 to 1,000 in the middle of the year (October 2018). Against this target, 605 electric locos were produced. During 2017-19, 86 diesel locos produced and supplied by DLF, Marhowra were also added to the fleet in addition to the 102 locos produced by Railways during 2018-19.

1.11 Infrastructure for loco procurement/ production in Indian Railways

Indian Railways has four loco production units, viz. DLW, CLW, DMW and ELAAU. The requirements of locos of Indian Railways are mainly met from these Production Units. Indian Railways also took measures to create new facilities for procurement of locos, as well as to augment the production capacity of the Production Units. These are discussed in succeeding paragraphs.

1.11 (i) *New Greenfield Electric Loco Factory (GELF) at Madhepura*

In the Works Programme of 2007-08, a project for setting up of GELF at Madhepura for annual manufacturing of 120 HHP (12,000 HP) electric locos was included for DFCs and pan India operations. Audit observed that the first loco was rolled out from GELF/ Madhepura as per timeline in February 2018. However, its validation trials by technical wings of Indian Railways were underway till 31 March 2019. As such, no electric loco could be inducted into service as of 31 March 2019.

1.11 (ii) *Capacity augmentation of DLW for production of diesel locos*

In November 2011, DLW submitted a proposal of ₹ 295.89 crore for augmentation of production capacity from 200 to 250 HHP locos. The work was scheduled to be completed by September 2017.

Meanwhile, in view of increasing electrification of routes, Railway Board took a decision (May 2016) to manufacture electric locos at DLW. During 2016-17, DLW manufactured two electric locos. The augmentation work for enhancing the production capacity of diesel loco from 200 to 250 locos was completed in February 2018 at a cost of ₹ 364.41 crore with cost overrun of 37 *per cent*.

Railway Board stated (April 2019) that capacity augmentation project also included commissioning of general utility equipment which can be used for all manufacturing activities including electric locos.

In view of increasing rate of electrification, Railway Board may take a view on how best to utilize the enhanced production facility of diesel locos. Simultaneously, Railway Board may also examine enhancement of capacity of manufacturing electric locos at DLW, due to the electrification programme.

1.11 (iii) *Capacity augmentation of CLW for production of electric locos*

A work for the augmentation of the production capacity of CLW from 200 to 275 HHP locos was sanctioned in 2011. The targeted date of completion was 31 December 2012. Audit noticed that as of March 2019, the physical and financial progress of this work was only 45 *per cent* and 33 *per cent* respectively. The work is now targeted to be completed by December 2019.

Further, to augment the resources of additional electric locos in future, Indian Railways planned (2009-10) to set up an ELAAU at Dankuni for production of 100 HHP locos. The cost of the project was estimated as ₹ 123 crore with targeted date

of completion as 31 March 2012. In May 2012, the work was transferred to Rail Vikas Nigam limited (RVNL). As of March 2019, the physical and financial progress of this work was 98 *per cent* and 105 *per cent* respectively. The work is also targeted to be completed by December 2019.

Thus, large amount of expenditure was incurred for capacity augmentation of DLW for production of diesel locos. The work of capacity augmentation of DLW was completed within five months from the targeted date of completion. However, works for augmentation of capacity of CLW and ELAAU for production of electric locos were running way behind schedule.

In the exit conference, Railway Board stated (May 2019) that augmentation of DLW would reduce vendor dependency for the maintenances of diesel locos in the loco sheds and the same may also be utilised in the production of electric locos at DLW. Railway Boardfurther stated that the funds constraints were the impediment behind augmentation of electric locos capacity of CLW and production at ELAAU.

Railways have decided to stop production of diesel locos from 2019-20 onwards. Therefore, it is necessary that these works are completed at the earliest.

1.12 Allotment of locos to Zonal Railways and their commissioning

As per rules[12]Zonal Railways are required to submit requirement of new locomotives duly vetted by FA & CAO to Railway Board each year. A tentative loco allotment plan for electrical locos is prepared by Railway Board centrally and intimated to all GMs in December-January. Zonal Railways are also required to create infrastructural facilities along with creation of posts and deployment of staff in loco sheds for homing[13] allotted locos. Audit noticed that the allotment plan for electric locos was being prepared by Railway Board without consulting the user Railways. Audit observed that the percentage of actual loco dispatch against proposed allotment was between 68 *per cent* and 133 *per cent* among Zonal Railways during 2012-16. As regards diesel locos, no annual tentative allotment plan was prepared. Only on the receipt of production details from PUs, Railway Board issued the allotment letters to PUs for dispatch to respective Zonal Railways.

[12] Para 1503 and 1526 of Indian Railway Code for Mechanical Department (Workshop)
[13] Locos allotted to a particular shed is called “homing/owning of allotted loco in that loco shed”.

After allotment, locos should be commissioned promptly after their receipt in loco sheds. Audit did not find any time frame fixed by Railway Board for commissioning of new locos. Audit reviewed the position of new locos commissioned for traffic use in the selected 16 diesel and 12 electric loco sheds during 2012-17. Audit observed that 18 *per* cent diesel locos and 13 *per cent* electric locos were commissioned after a delay of one month from the date of their receipt in the loco sheds. The average delays in commissioning of diesel and electric loco were 75 days and 33 days per loco after allowing a grace period of 30 days. Audit also observed that holding and maintaining locos much more than the homing capacity of loco sheds caused delay in maintenance of locos received in loco sheds **(as commented in Para 1.14)**. This factor also leads to the delay in commissioning of new locos. Moreover, shortage of man power, defective material, delay in Commissioner of Railway Safety (CRS) sanction and lack of adequate infrastructure in loco sheds further compounded the problem.

Thus, locos were allotted to Zonal Railways without assessing their requirements as well as infrastructure available. Further, newly allotted locos were commissioned after delays.

In reply, Railway Board stated (April 2019) that allotment was done based on the user Railways' requirement on receipt of requests from them and also considering the overall traffic requirements on monthly basis. Advance intimation for creation of infrastructure was communicated to Zonal Railways based on the production plan, which was again, based on the overall traffic requirements.

Audit, however, noticed huge mismatch between the planned allotments and the actual dispatch. In addition, delay in commissioning of new locos adversely impacted the efficient and optimum utilization of locos received at Zonal Railways.

1.13 Failure of newly commissioned locos

a) Within 50 days and 100 days of their commissioning

Position of failure of newly commissioned locos was examined in selected 15 diesel loco sheds (DLSs)[14] and 10 electric loco sheds (ELSs)[15]. Data of new locos

[14] Diesel Loco Shed – Kalyan/CR, Andal/ER, Samastipur/ECR; Visakhapatnam/ECoR; Lucknow/NR; Jhansi/NCR; Gonda/NER; New Guwahati/NFR; Abu Road/NWR; Erode/SR; Gooty/SCR; Kharagpur/SER; Krishnarajapuram/SWR; New Katni Jn./WCR and Sabarmati/WR,

[15] Electric Loco Shed – Bhusawal/CR; Asansol/ER; Mugalsarai/ECR; Angul/ECoR; Ludhiana/NR; Kanpur/NR; Erode/SR; Vijayawada/SCR; Itarsi/WCR and Valsad/WR.

failed within 50 and 100 days of their commissioning was not provided by three loco sheds[16]. Audit observed that during 2012-17, overall 46 *per cent* locos failed within 100 days of their commissioning. Audit noticed that:

- Out of 696 newly commissioned diesel locos, 33 *per cent* (232 locos) failed within 50 days of their commissioning. Similarly, 14 *per cent* (94 locos) failed within 100 days of their commissioning.
- Out of 330 newly commissioned electric locos, 23 *per cent* (77 locos) and 21 *per cent* (68 locos) failed within 50 days and 100 days respectively of their commissioning.
- Uses of defective material in loco manufacturing, bad workmanship in handling *etc*. were the main causes of failure of newly commissioned locos.

b) Failure of locos within warranty period and time taken in arranging/repair/ replacement of their parts

Audit examined the records of failure of locos within warranty period in the selected loco sheds. Audit noticed that during 2012-17

- 648 new diesel and 417 new electric locos failed on 1,315 and 459 occasions respectively within the warranty period.
- For these failures, 2,595 and 552 repair/replacement claims for diesel and electric locos respectively were lodged by the Zonal Railways with the Production Units.
- The repair/replacement claims of each failed part took an average of 37 days for diesel and 26 days for electric locos.
- No loco failed within warranty period in five loco sheds[17].

Thus, Production Units could not monitor and ensure the quality of material supplied for manufacturing of locos by various firms. Failure of components/ material adversely impacted the quality of in-house production of locos. Further, failure within warranty period resulted in additional expenditure and wastage of loco working days.

In reply, Railway Board accepted (April 2019) the audit comment and stated that large numbers of defaulting vendors were black listed on this account.

[16] Raipur/DLS/SECR, TATA/ELS/SER (2012-15), and Bhilai/ELS/SECR (2012-17)
[17] Asansol/ELS/ER, Angul/ELS/ECoR, Lucknow/DLS/NR, Kharagpur/DLS/SER & Itarsi/ELS/WCR.

Railways need to monitor the quality of material supplied for manufacturing of locos to avoid frequent failure. Also, Railways need to establish effective monitoring mechanism for early repair/replacement of failed locos.

Further, Audit recommends that high failure rate of newly commissioned locos should also be considered by Railways as a factor while assessing loco requirement.

1.14 Adequacy of Infrastructure in loco sheds

Homing[18] capacity of a loco shed is its installed capacity to repair specified number of locos allotted to it during a financial year. Infrastructure facilities are designed accordingly. The holding of a loco shed is the actual number of locos assigned to a loco shed for attending to scheduled repairs. Ideally, the holding of locos should be equal to or not greater than the installed capacity. This minimises detention of locos and ensures the quality as well as timeliness of prescribed maintenance schedules of locos. Audit examined the homing capacities and actual holding of 42 diesel and 30 electric loco sheds over IR.

Audit observed that 33 out of 42 diesel loco sheds and 27 out of 30 electric loco sheds were holding and maintaining locos much more than their homing capacities. The overall gap between the homing capacities *vis-à-vis* actual holding was around 31 *per cent* in respect of diesel and 26 *per cent* in respect of electric loco sheds as on 31 March 2017. Details are given in **Annexure 1.4 A.**

To increase the homing capacity of loco sheds augmentation projects have been taken up in 12 DLSs[19] and 27 ELSs[20] at various points of time since 2006-07.Analysisof the progress of augmentation in these loco sheds as on March 2019 showed that:

Of the 39 works in progress, the original target of completion of 26 works had already passed. While in six works the physical progress of work was more than 95 *per cent*, in 32 cases the physical progress ranged between six to 80 *per cent*. In one work, the physical progress is zero, though it was sanctioned in 2015-16 (Raipur/SECR).

[18]Locos allotted to a particular shed is called “homing/owning of allotted loco in that loco shed”.

[19] Pune/CR, Andal/ER, Vishakhapatnam/ECOR, Gonda/NER, Shakurbasti/NR, Maula Ali/SCR, Guntakal & Kazipet/SCR, Raipur/SECR, Erode/SR, Hubli/SWR, New Katni Jn/WCR and Sabarmati/ WR,

[20] Ajni & Daund/CR, Angul/ECoR, Vishakhapatnam /ECOR, Howrah/ER, Jhansi & Kanpur/NCR, Gorakhpur/NER, Khanalampura, Ghaziabad & Ludhiana/NR, Guntakal, Kazipet, Lallaguda & Vijaywada/SCR, Bilaspur & Bhilai/SECR, Rourkela/SER, Erode & Royapuram/SR, New Katni Jn., Itarsi &Tuqlahabad/WCR, and Valsad & Vadodara/WR.

Audit further noticed that Hon'ble Minister of Railways directed (September 2017) to stop investment in new diesel locos maintenance infrastructure. As Indian Railways is targeting 100 *per cent* electrification by 2022, expenditure needs to be incurred judiciously so that the maintenance facilities are adequate for the existing diesel loco fleet as well as commensurate for the growing electric loco fleet. Details are shown in **Annexure 1.4 B.**

Holding and maintaining locos much more than the homing capacities of loco shed causes delay in maintenance of locos received in loco sheds. This also impacts the quality of maintenance which leads to unscheduled repairs as commented in Para 1.18 (a).

In reply, Railway Board stated (April 2019) that a decision has been taken for homing electric locos in existing diesel sheds. They also stated that in addition to the augmentation works, new loco shed is also being set up.

In view of reduction in fleet of diesel locos in coming years, the utilisation of diesel loco sheds would drastically reduce. As such, the decision to maintain electric loco sheds in the existing diesel loco sheds is appreciated. Railways need to upgrade the infrastructure of existing loco sheds without any delay to avoid the idling of existing loco sheds in coming years.

1.15 Availability of manpower for loco operations

Indian Railway Operating Manual (IROM) provided the detailed procedure for calculating the crew requirements. While assessing the requirement of locos, availability of manpower for running the locos is a significant factor to be considered. Audit examined the norms, status of sanctioned strengths (SS) and actual working (AW) of loco pilots as on 31 March 2017 in various Zonal Railways as detailed in **Annexure1.5.** Audit observed that there were wide variations in the SS as well as in the AW requirements of loco pilots per diesel and per electric loco among the Zonal Railways. The same are discussed below:

- No norms have been fixed for number of loco pilots per loco.
- SS of loco pilots per diesel loco ranged between 2.23 (WCR) and 18.00 (NCR), and per electric loco it ranged between 2.23 (WCR) and 15.59 (NCR).

- AW of loco pilots per diesel loco ranged between 1.99 (WCR) and 13.36 (NCR), and per electric loco it ranged between 1.99 (WCR) to 10.81 (ECoR).

Member, Staff expressed (April 2016) his concern on the wide variation among the Zonal Railways and proposed formula to ensure uniformity in the SS. This concern has not been addressed so far.

There was no uniformity in loco pilots sanctioned and actual working requirements among Zonal Railways. No norms have been fixed for number of loco pilots per loco.

In reply, Railway Board stated (April 2019) that indents were pending with various Railway Recruitment Boards for Assistant Loco Pilots. Conversion courses were being conducted by Zonal Railways Training Centers to train diesel loco pilots to operate electric locos to overcome shortage. In the exit conference, Railway Board further stated (May 2019) that deployments of man power in locos were worked out on the basis of goods tonnage and passenger links. Common yardstick for man power was under consideration for both diesel and electric locos. Time taken in induction of new man power takes almost two years. Zero based review was under process for assessing the requirement of manpower for operation of locos. However, non-uniformity in SS of loco pilots among Zonal Railways were not addressed so far.

The number of loco pilots required should be a function of locos in hand and those planned to be added. Zonal Railways may ensure periodic review of the post of loco pilots as laid down in IROM for this purpose.

1.16 Efficiency indices for loco utilization

Efficient use of locos is a vital factor in maintaining the fluidity of movement of traffic for economical railway operations. To evaluate this, various indices are used in Indian Railways.

Diesel and electric loco holdings in Indian Railways increased by 20 *per cent* (947) and 24 *per cent* (1,123) respectively during 2012-18. Audit noticed that there is significant decline in the important indices over the past years, which are discussed in succeeding paragraphs.

1.16 (a) Engine Kilometers per day per engine 'in use' and 'on line'

Engine kilometres per day per engine 'in use' indicates average kilometres an engine in use, runs daily. Engine kilometres per day per engine 'on line'[21] include[22] engines in use, under or awaiting repair, good repair stored[23] and spares. Increased gap between these two indices would indicate the availability of more locos than the requirements. Audit observed that the gap between these two indices for diesel and electric locos was 86 and 58 in 2012-13. The same was 89 and 29 in 2017-18. Thus, increase in gap in diesel loco indicated availability of more locos than requirements.

1.16 (b) NTKM per goods engine per day 'on line' and 'in use'

NTKM[24] per goods engine per day 'on line', and 'in use' is the most comprehensive index for judging the productivity of locos in respect of freight traffic. During 2012-18, the NTKMs per goods engine per day 'on line' and 'in use' decreased by 11.6 *per cent* and 22.4 *per cent* for diesel locos. The same was decreased by 17 *per cent* and 27.2 *per cent for* electric locos.

The trends in the above efficiency indices indicated that even after adding 2070 new locos to the Indian Railways loco fleet during 2012-18 various efficiency indicators had deteriorated. This was mainly due to addition of new locos and under utilisation of existing locos. Thus, till the time efficient utilization of locos is ensured, railways would continue to manufacture more new locos than actually required.

In reply, Railway Board stated (April 2019) that main reason for low efficiency was under investment in rail infrastructure. Capacity utilization of golden quadrilateral was more than 100 *per cent*. These led to low average speed of the freight trains. Restrictions caused by track geometry, large number of surface crossings, speed

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[21] Engine Kilometres per day per engine on Line is compiled by services and for all services put together. The proportion that this figure bears to the corresponding figure of 'engine Kilometres per engine day per engine in use' indicates the proportion of available engines 'online' that was put to effective use during the period in question.(http://trainguard.in/operating-statistics/).

[22] Para 2 to 5 of Instructions for compilation of different items of Statement 4-A of Manual of Statistical Instructions (Vol. I)}.

[23] Engines which although in good repair are not available for use owing to their parts having been greased or leaded, are kept under category Good Repair Stored (GRS){Para 5 of Instructions for compilation of different items of Statement 4-A of Manual of Statistical Instructions (Vol. I)}.

[24] NTKM-Net Tonne Kilometre –Unit of measure of freight traffic which represent the transport of one tonne goods (including the weight of any packing but excluding the weight of the vehicle used for transport) over a distance of one kilometre.

differential between freight and coaching stocks also impacted the speed of freight trains.

However, the fact remains that Indian railways have more locos in their fleet than requirements and this leads to sub-optimal utilization of the locos, as reflected through various indices over the years.

1.17 Detention of locos in workshops and sheds

Detentions of locos at workshops and locos sheds before; during and after maintenance reduce the availability of loco for operations. Audit reviewed the detention of locos at workshops and loco sheds. The findings are discussed below:

1.17 (a) *Detention at workshops during periodical overhauling (POH) beyond permissible time*

The permissible time limits for POH are decided by the respective workshops on the basis of the infrastructure available in the workshop. Audit noted that permissible number of days for POH in various workshops ranged between 18 and 50 days. In the absence of uniform number of days for identical POH work, Audit inferred that a number of workshops did not have adequate infrastructure for POH of locos. Audit further reviewed the time taken for POH at the selected six diesel loco workshops (DLWS) and six electric loco workshops (ELWSs) during 2014-17 and observed that:

- POH of 82 *per cent* (814 out of 994) of diesel locos was done with delays. The average excess time taken was 17 days[25].
- POH of 65 *per cent* (703 out of 1,084) of electric locos was also done with delays. The average excess time taken was 20 days[26].
- Delays in POH were mainly on account of unavailability of material and heavy repairs.

Audit also noticed pre POH detentions[27]and post POH detentions[28] at the selected exchange yards. The average pre POH detentions per diesel and per electric locos were 5.3 and 2.8 days respectively in the selected workshops. Similarly, average

[25] Maximum of 27 days in Parel/CR and minimum of five days in Kharagpur/SER
[26] Maximum of 32 days in Bhusawal/CR and minimum of six days in Kharagpur/SER
[27] 44 *per cent* diesel locos (306 out of 702) and 14 *per cent* electric locos (69 out of 476) were detained for more than a day before their POH. Records for pre POH detention was not made available by Lucknow /ELWS/NR;
[28] 59 *per cent* diesel locos (344 out of 583) and five *per cent* electric locos (26 out of 476) were detained for more than a day before their POH. Records for post POH detention was not made available by Ajmer/DLWS/NWR.

post POH detentions per diesel and per electric locos were 7.7 and 4.3 days respectively. Details are shown in **Annexure 1.6 A and 1.6 B.**

Thus, there were significant detentions of locos at workshops before, during and after POH. This reduced the availability of locos for operational purposes. The delays were significantly more in respect of diesel locos. This also led to loss of earning capacity.

1.17 (b) *Detention at loco sheds during loco maintenance*

There are three[29] types of maintenance schedules for diesel locos (Alco-LHP and HHP)[30] in loco sheds. Time prescribed for these schedules are four days/16 days/21 days for Alco locos. Audit reviewed the time taken in maintenance of locos in loco sheds against the prescribed schedules. For HHP locos the median of number of days taken for maintenance in respective sheds has been adopted. Audit observed that during 2012-17, on an average an excess time of 17 days was taken for maintenance of 2,248 Alco locos in 15 diesel loco sheds[31]. Similarly, on an average excess time of 10 days was taken for maintenance of 619 HHP locos in 13 DLSs[32].

For electric locos, two major maintenance schedules viz. Annual Overhauling (AOH) and Intermediate Overhauling (IOH) have been prescribed. The prescribed period[33] for maintenances is six days for AOH and nine days for IOH. Audit observed that during 2012-17 on an average the excess time of eight days each was taken for AOH of 3,484 locos and IOH of 1105 locos in 12 selected ELSs[34].

Audit reviewed the reasons behind excess time taken in maintenance schedules. This was due to shortage of man power, infrastructure and space, unplanned major repairs, defective material, constraints in supply of material etc. In addition, excess

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[29] M12/M24/M48 maintenance schedules of Alco/LHP locos and M360/M720/M1080 maintenance schedules of HHP diesel locos

[30] Alco Diesel Locomotive is the Locomotive manufactured by the American Locomotive Company. Alco & LHP is the Low Horse Power Locomotive and HHP is the High Horse Power Locomotive.

[31] Kalyan/CR, Andal/ER, Samastipur/ECR, Vishakapatnam/ECoR, Lucknow/NR, Jhansi/NCR, Gonda/NER, New Guwahati/NFR, Abu Road/NWR, Erode/SR, Gooty/SCR, Kharagpur/SER, Raipur/SECR, Krishnarajapuram/SWR, New KatniJn/WCR.

[32] Kalyan/CR, Andal/ER, Vishakapatnam/ECoR, Lucknow/NR, Jhansi/NCR, Gonda/NER, Ajmer/NWR, Erode/SR, Gooty/SCR, Raipur/ SECR, Krishnarajapuram/SWR, New KatniJn/WCR, Sabarmati/WR.

[33] Chapter 23 of Operating Manual for Indian Railways.

[34] Bhusawal, Asansol, Mughalsarai, Angul, Ludhiana, Kanpur, Erode, Vijayawada, Tatanagar, Bhilai, Itarsi, Valsad.

holding of loco sheds against their homing capacities was also the reason for delay in maintenance of locos.

Thus, inadequate infrastructure and resources led to detention of locos at loco sheds during maintenance. This also impacted availability of locos for operation.

In reply, Railway Board accepted (April 2019) Audit contention. They stated that detention during POH was due to shortage of manpower, infrastructure and funds constraints. Regarding excess time taken in maintenance at loco sheds, Railway Board stated that an action plan was prepared by RDSO and DLW to improve the reliability and time taken for maintenance.

1.18 Quality of loco maintenance

Quality of loco maintenance/repairs in diesel and electric loco sheds was as under:

1.18 (a) Unscheduled repairs

In addition to the scheduled maintenance, unscheduled repairs/out of course repairs are undertaken when locos fail 'on line' or when a serious problem with their working is reported by the loco pilots. High incidences of the unscheduled repairs are reflection of the poor quality of maintenance. Audit reviewed the records of unscheduled repairs at the selected 16 DLSs and 12 ELSs loco sheds and noticed that unscheduled repairs of 17,530 diesel and 22,078 electric locos was undertaken during 2012-17. The diesel and electric locos were rendered ineffective for on an average 2.2 days and 1.8 days respectively. Reasons for unscheduled repairs were inadequate quality control, use of inferior material, poor supervision and inadequate internal control. Details are shown in **Annexure 1.7 A & 1.7 B.**

Unscheduled repairs added extra load on the already overstrained loco sheds.

In reply Railway Board stated (April 2019) that loco sheds and workshops were continuously being advised to take necessary corrective action by ensuring quality checks at all levels of maintenance schedules/production and with reliability action plan.

Railways should improve infrastructure facilities, quality of maintenance and good management practices in loco sheds to minimize unscheduled repairs in future.

1.18 (b) *Failure of locos 180 days after POH*

POH of locos is carried out in workshops nominated for this purpose. During POH, the loco is completely stripped and all its parts and components are repaired and/or replaced, as per required conditions. After POH, the locos are made to be in an 'almost new' condition. After POH and pre-commissioning, locos are also inspected to check the quality of work done. Audit reviewed the failure of locos within 180 days of its POH and noticed that

- In six DLWSs and six ELWSs, 37 *per cent* (641 out of 1715) diesel locos and 18 *per cent* (293 out of 1647) electric locos failed within 180 days of their POH.
- The percentage was more than 50 *per cent* for diesel locos POHed in ER, NWR and SER.

Defective material, defective equipment, poor inspection etc. were the main reasons for loco failures within 180 days of their POH as cited by the Zonal Railways. Details are indicated in **Annexure 1.8.**

In reply, Railway Board stated (April 2019) that procedures for pre and post POH checking was laid down in loco maintenance manuals. Instructions in this regard were reiterated to Zonal Railways from time to time. Failure on line was also monitored at highest level in Railway Board. However, the fact remained that every third diesel and every sixth electric loco failed within 180 days of their POH during 2012-17 on account of defective material, defective equipment, poor inspection etc.

Audit further observed that out of total 10,391 diesel and 6,190 electric locos failures during the review period, 5,363 and 2,800 failures (52 and 45 *per cent*) were after their scheduled maintenance by loco sheds. More than 60 *per cent* failures were in 10 loco sheds[35]. These were on account of defective material. High value items such as crankshafts, engine blocks, power assembly, traction motors, alternators, under gears, transformers and turbo super chargers etc. also failed within warranty period during 2012-17. The number of failure of high value items of diesel and electric locos

[35] Andal/DLS/ER (68%), Asansol/ELS/ER (95%), Mugalsarai/ELS/ECR (70%), Angul/ELS/ECoR (82%), New Guwahati/DLS/NFR, Erode/DLS/SR (68%), TATA/ELS/SER (64%), Raipur/DLS/SECR (64%), Bhilai/ELS/SECR (61%), Sabarmati/DLS/WR (65%)

within warranty period increased by 62 *per cent* and 58 *per cent* respectively in 2016-17 as compared to 2012-13. This also indicated poor material management.

Railways should analyse reasons for failure within 180 days of POH of locos and take remedial actions to minimise the same. Railways need to revisit the monitoring system in vogue and improve internal control in their material management and inspection system. The aim should be to minimize loco failures on account of defective material.

1.19 Conclusion

Timely availability of locos is critical to the operation of train services. Indian Railways spent ₹ 52,198.21 crore on production of locos during the past six years (2012-18) through its Production Units.

Review of the planning process for assessing loco requirement revealed that it was not decided on the basis of actual need, but mainly aimed at utilising the production capacity. The main criteria adopted by Railway Board for the assessment of requirement of locos and production planning were actual production of locos in previous years. Factors like expansion of infrastructural facilities, line capacity constraints, pace of electrification, ideal rake-loco ratio and actual growth of traffic were not comprehensively considered. The production plan had been skewed towards production of diesel locos over the past years, as a result of which, the number of diesel locos have grown much more than electric locos. From 2019-20 onwards, Railway Board has decided to stop production of diesel locos. However, Railway Board need to ensure that the planning for production of electric locos is done taking into consideration parameters such as traffic growth in the coming years, loco utilisation norms, rake-loco ratio as well as production by new units at Madhepura and Marhowra (diesel). For this, they need to work out a scientific methodology giving due cognizance to relevant parameters.

Railway Board has decided (September 2017) to go for 100 *per cent* electrification of Railways by 2022.However, Indian Railways continued to manufacture diesel locos from its PUs till 2018-19. Moreover, a large amount of expenditure was incurred for capacity augmentation of DLW for production of diesel locos. However, works for augmentation of capacity of CLW and ELAAU for production of electric locos were

running way behind schedule. This is not in sync with the overall strategic vision of Indian Railways.

Locos were allotted to Zonal Railways without assessing their requirements as well as infrastructure available with them for maintenance. New allotted locos were commissioned after delays. Audit noticed failures of locos within warranty period after their receipt in Zonal Railways. This resulted in additional expenditure on their repairs and also wastage of loco working days.

There was no uniformity in loco pilots sanctioned and actual working requirements among Zonal Railways. No norms were fixed for number of loco pilots per loco. The issue was raised way back in April 2016 by Member Staff, but was yet to be addressed.

Holding of locos were noted to be more than their homing capacities in the loco sheds checked in Audit. This caused delay in maintenance of locos received in the loco sheds. This also impacted the quality of maintenance which led to unscheduled repairs. Audit noticed that augmentation works of diesel as well as electric loco sheds were going on since 2006-07 and 2008-09 respectively. Indian Railways is targeting 100 *per cent* electrification by 2022. As such, the expenditure needs to be incurred judiciously, so that the maintenance facilities would be adequate for the existing diesel loco fleet. This should also be commensurate for the growing electric loco fleet.

Inadequate infrastructure at the loco sheds/workshops caused detention to the locos at various stages of maintenance such as regular maintenance, Annual, Intermediate and Periodical Overhauling (AOH, IOH & POH) etc.

1.20 Recommendations

1. ***Railways may evolve a suitable methodology for assessing the electric loco requirements, with due considerations to the end user requirements.***
2. ***Railways need to examine the referred augmentation works in the electric loco sheds to avoid the delays/ detention in maintenance of locos.***

3. ***Railways need to revisit upgradation of the infrastructure of existing diesel loco sheds judiciously taking into account the ongoing growth of electric loco fleet.***
4. ***Railways should improve infrastructure facilities, quality of maintenance and promote good management practices in loco sheds to minimize unscheduled repairs in future.***

Chapter 2 Production and Maintenance of LHB Coaches in Indian Railways

2.1 Introduction

Indian Railways have been transporting passenger traffic mainly through conventional coaches of ICF design. These coaches are manufactured at Integral Coach Factory, Perambur (ICF) and Rail Coach Factory, Kapurthala (RCF). A limited number of these coaches are being manufactured at BEML (Bharat Earth Movers Limited)/ Bangalore.

The ICF type of coaches have limitations in terms of speed potential, heavy corrosion, poor riding comfort and wearing of parts in the under gear. To overcome these limitations, Indian Railways entered into Transfer of Technology (ToT) contract with M/s ALSTOM LHB/Germany for production of LHB[36] design stainless steel coaches. Accordingly, their inception and mass production in Railways was started in 2002. First LHB coach was introduced in Indian Railways network in December 2003.

LHB coaches are far superior with respect to passenger comfort, safety, speed, corrosion, maintenance and aesthetics than ICF coaches. These coaches are also

Figure 2.1: ICF Conventional coach and LHB coach

longer as compared to ICF design resulting into more carrying capacity. The benefits from these types of coaches include:

[36]Linke Hoffman Busch coaches

- ***Better Speed Potential*** – Maximum operating speed of LHB coaches is 160 kmph (tested upto 180 kmph) as compared to maximum speed of 140 kmph in ICF coaches. This can increase the availability of path.
- ***Higher carrying capacity*** – These coaches are about two meters longer than ICF coaches. With this extra length two additional rows of chairs in chair cars or one additional bay in sleeper coaches can be accommodated. An AC III Tier coach of LHB design can accommodate 72 passengers as compared to 64 in ICF type. This increases revenue earning in each run.
- ***Better pay to tare ratio***[37] – The weight of LHB coach is lesser as compared to ICF design coaches, leading to lower hauling cost.
- ***Low corrosion*** – Stainless Steel shell eliminates corrosion of LHB coaches.
- ***Low Maintenance leading to improved availability*** – LHB coaches requires less maintenance than that of ICF coaches. Periodical overhauling of LHB coach is done in every 36 months in comparison to 18 months in respect of ICF coach. This reduces the maintenance cost. Disc brakes are provided for efficient braking and lesser maintenance also.
- ***Aesthetically superior interiors*** – LHB coaches have interiors with FRP panels[38] for side wall and roof. They can be removed easily for maintenance, resist water seepage and are wear resistant.

Most importantly, LHB coach offers better passenger safety due to

- use of fire retardant materials for furnishing,
- provision of four emergency openable windows for faster passenger evacuation, and
- vertically interlocked Centre Buffer Couplers with anti-climbing features that prevents the coaches to capsize in case of a derailment.

[37] **Pay-to-tare ratio** is the total payload divided by dead weight of a rolling stock. Tare weight is the weight of the coach without any passenger or luggage on it, that is, without any 'load'. Payload is the maximum amount of weight it can sustain apart from its own weight. LHB coaches weigh approximately 10 *per cent* less than corresponding conventional coaches resulting in saving in haulage cost.

[38] **Glass Fiber Reinforced Plastic panels** are used for interiors of LHB coaches.

Figure 2.2: Accident site of Dibrugarh Rajdhani on 25.06.2014 - None of the LHB coaches turned turtle despite a high speed derailment and there was no loss of life (left).
Accident site of Dehradun-Varanasi Janta Express near Bachrawan Railway Station on 20.03.2015 - Derailment of ICF rake claimed lives of 38 people with injury of 150 others (right).

A comparison of the fatalities caused in the accidents between trains with ICF and LHB design coaches during 2014-15 to 2017-18 revealed the following:

Table 2.1 – Comparison of accidents involving trains with LHB and ICF coaches

Year	No. of Accidents		Type of accidents	Trains with ICF Coaches			Trains with LHB Coaches		
	Derailment	*Collision*		*No. of Trains*	*Deaths*	*Injuries*	*No. of Trains*	*Deaths*	*Injuries*
2014-15	4	1	*Derailment*	3	90	350	1	4	8
			Collision	1	25	60	0	0	0
2015-16	4	0	*Derailment*	3	36	150	1	2	7
			Collision	0	0	0	0	0	0
2016-17	6	1	*Derailment*	6	193	430	0	0	0
			Collision	1	1	22	0	0	0
2017-18	4	0	*Derailment*	3	26	130	1	0	100
			Collision	0	0	0	0	0	0
Total	**18**	**2**		**17**	**371**	**1142**	**3**	**6**	**115**

Out of 20 train accidents/derailments during the past four years, ICF coaches were involved in 17 instances and LHB coaches were involved in three instances. The accidents involving ICF coaches claimed 371 lives and 1,142 injuries, while accidents involving LHB coaches claimed six lives and 115 injuries. Even after allowing for a lower proportion of LHB coaches, fewer casualties in accidents involving LHB coaches proved their superiority over ICF coaches. Thus, there is an urgent need to switch over to LHB rakes to ensure safety of the railway passengers, especially in trains with higher speeds.

Audit objectives:

- Whether the production of LHB coaches was adequate to meet the requirement of conversion of ICF conventional rakes.
- Whether the facilities available in coaching depots and workshops of IR were adequate for maintenance of LHB coaches.

Audit findings

2.2 Recommendation of High Level Safety Review Committee for use of LHB coaches

The High Level Safety Review Committee (HLSRC) had analyzed (February 2012) the casualties of passengers in train collisions and derailments, in addition to other issues. They opined that ICF design passenger coaches were not safe at operational speeds of 100-120 kmph with trailing loads of 20-24 coaches. They strongly recommended complete switching over to the manufacture of LHB design coaches and immediate stopping of manufacture of ICF design coaches. For usage of the existing large fleet of ICF design coaches, they recommended to relegate these coaches in trains having composition of lesser than 18 coaches and with lesser speeds. The XIIth Five Year Plan also envisaged complete switch over to new manufacture of only LHB design coaches by the end of 2017.

Audit observed that Indian Railways stopped production of ICF coaches only with effect from April 2018. Over the last five years the pace of production of LHB coaches has increased. However, the share of LHB coaches to the total coaches of Indian Railways produced during 2013-14 to 2017-18 was about 30 *per cent*.

HLSRC had recommended relegating ICF coaches for running trains with less than 18 coaches and with lesser speeds. Audit scrutiny of records of operating department of Zonal Railways revealed that as of March 2018, 903 rakes of ICF conventional coaches were still being run for trains with 18 or more coaches. Further, the trains had a capacity to run at a maximum speed of 100 kmph or more. Only 252 rakes were running with LHB coaches as of March 2018. Details are shown in ***Annexure 2.1.***

Running of rakes with 18 or more conventional coaches at high speed exposes the passengers to the risk of unsafe journey.

In reply, Railway Board stated (20 June 2019) that ICF designed coaches are perfectly safe for the operating condition defined for running for them on Indian Railways. They further stated that there is no safety risk involved with ICF coaches within the boundaries of defined operating conditions.

The audit observations were based on the recommendations of HLSRC formed by Ministry of Railways itself. The committee has made its recommendations based on analysis of the casualties of passengers in train collisions and derailments in previous years.

2.3 Production of LHB coaches

Indian Railways have three passenger coach manufacturing units viz., Integral Coach Factory Perambur (ICF), Rail Coach Factory Kapurthala (RCF) and Modern Coach Factory Raebareli (MCF). ICF and RCF are manufacturing both conventional and LHB coaches. MCF was set up in April 2011[39] to produce LHB coaches only. As of March 2018, production of conventional coaches in ICF and RCF during last five years was more than three times of production of LHB coaches even after 15 years of introduction of LHB coaches. In addition, Railways also planned to set up new production units of LHB coaches at Kanchrapara and Singur. Proposals for Kanchrapara were sanctioned in the budget of 2009-10 and proposal for Singur was yet to be approved. However, no production plan was programmed from two units (Kanchrapara and Singur) till March 2018.

Audit analyzed the installed capacity of production of ICF and LHB passenger coaches vis-à-vis the production in last five years.

Table 2.2 Production of passenger coaches during 2013-18

Production units	Installed capacity per year		Production Plan for 2013-18		Actual production during 2013-18		Shortfall in production against plan Excess(+)/Short (-)	
	ICF Conventional	LHB	ICF Conventional	LHB	ICF Conventional	LHB	ICF Conventional	LHB
ICF	*1500 in 2013-14 and 1700 from 2014-15 onwards*	*300 from 2015-16 onwards*	8215	1738	8601 5365 (2015-18)	1510 1420 (2015-18)	386	(-)228
RCF	*1500 (combined)*		5027	2626	4879	2495	**(-)148**	**(-)131**
MCF	*0*	*1000*	0	2135	0	1842	**0**	**(-)293**
Total			**13242**	**6499**	**13480**	**5847**	**238**	**(-)652**

From the above table, the following observations emerge:

[39] MCF Raebareli has been declared as a production Unit by Ministry of Railways with effect from 1 July 2014 vide Railway Board's notification dated 30 June 2014.

(a) In ICF, against a total installed capacity of 900 LHB coaches for 2015-18 i.e. three years cumulative, actual production was 1,420 LHB coaches (excess by 58 *per cent)*. Hence, it appears that the installed capacity has not been accurately assessed. Further, against a production plan of 1,738 coaches for 2013-18, it produced 1,510 coaches (shortfall of 13 *per cent*). Audit noted that with accurate installed capacity assessment, the production plans are also likely to be revised.

(b) In RCF, there is no variant wise separate installed capacity. The combined installed capacity is 1,500 coaches per year. During 2013-18, there was a shortfall of 131 LHB coaches against a production plan of 2,626 LHB coaches (shortfall of 5 *per cent*).

(c) In MCF, against a combined installed capacity of 5,000 LHB coaches for 2013-18, i.e. five years cumulative, the production plan was for only 2,135 coaches and actual production was 1,842 LHB coaches (shortfall of 63 *per cent* w.r.t. installed capacity).

Hence, Railways need to accurately assess the installed capacity of manufacturing units and take adequate steps to fully utilize it.

Audit further noticed that out of 19,327 coaches produced by these three production units, 5,847 coaches were of LHB type. Audit noted that

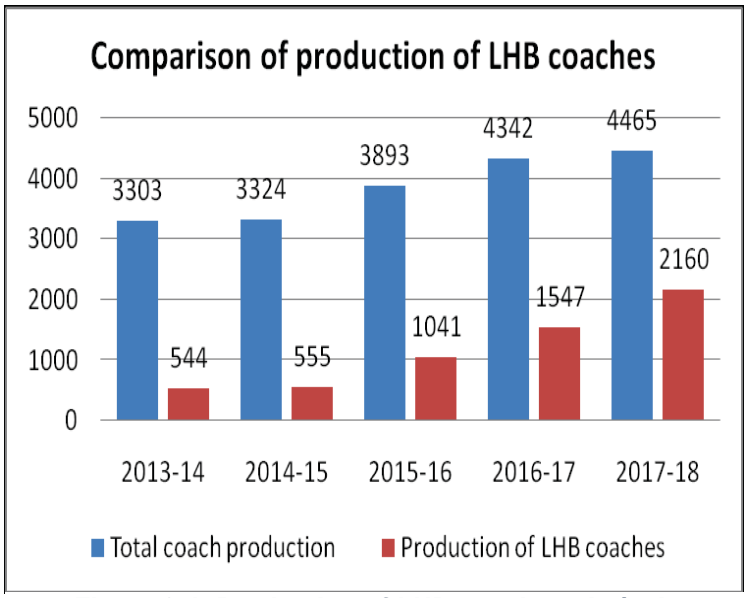

Figure 2.4: Production of LHB coaches vis-à-vis conventional coaches

- Indian Railways have planned for manufacturing of 13,242 conventional and 6,499 LHB coaches through the three production units during 2013-14 to 2017-18. These production units have manufactured 13,480 conventional and 5,847 LHB coaches during these periods. It was seen that conventional coaches were produced more than the targets set. But, 652 less LHB coaches were produced as against the targets of 6,499 coaches.

- Out of 6,499 LHB coaches planned for production during 2013-18, ICF and RCF produced 4,005 LHB coaches. On the other hand, MCF could produce only 1,842 LHB coaches during this period. As such, MCF established for production of only LHB coaches, could produce only 31.5 *per cent* of total LHB coaches during 2013-18. Details are shown in ***Annexure 2.2.***

In reply, Railway Board accepted (20 June 2019) the audit contention and stated that Railways has taken the decision to manufacture only LHB coaches for mainline trains from 1 April 2018. They further stated that Kanchrapara Coach Unit has been kept on hold due to sufficient production by existing coach manufacturing unit. They also stated that production of MCF Raebareli has been enhanced to 1,425 during 2018-19, which would be increased to 1,540 during 2019-20. They clarified that setting up of Singur unit is not yet sanctioned.

Audit is of the view that with stoppage of production of ICF design coaches, requirement of LHB coaches would increase in future. Thus, Railways needs to re-examine the need to enhance the installed capacity of ICF, RCF and MCF for production of LHB coaches, and whether to phase out production of ICF Coaches.

2.3.1 Production of LHB coaches in MCF

Audit observed that MCF could not achieve the production as targeted in the production programme since its inception. The acquisition plan from MCF was 2,800 coaches during the Plan period (2013-14 to 2017-18). But, the production program was set only for 2,135 coaches. However, during 2013-14 to 2017-18, it could actually produce only 1,842 coaches. Audit noticed that

- Important plant and machinery viz, Integrated Shell Assemblies and Assembly Line were yet to be commissioned as of March 2018. These were installed earlier between June and November 2015,
- Other machines[40], procured in February 2014 and December 2012 were rejected in July 2017 and September 2017 due to non-compliance of the productivity standards.
- In addition, CNC laser cutting and welding machines, CNC laser cutting machines, CNC Plasma Profile Cutting machines remained either on breakdown

[40] viz., Bogie Fabrication Line, Slitter-cum-cut-to-length combination line machine

or had not worked as per the specifications. These were procured during May 2012 to January 2013.

As such, non-commissioning/rejection/breakdown of machines was one of the main reasons for shortfall in production by MCF.

Thus, seven years after setting up of MCF in 2011, the production unit was yet to attain production as per the planned installed capacity of 1,000 coaches per annum (as of March 2018). The shortfall in production of LHB coaches impacted conversion of conventional rakes into LHB rakes.

During Exit Conference (6 May 2019) and in reply (20 June 2019) to audit para, Railway Board stated that MCF has now enhanced the production from 130 in 2013-14 to 1,425 in 2018-19 and 2,000 coaches are contemplated for manufacturing during 2019-20. They informed that there is also a proposal for augmenting the capacity of MCF to meet future demand of LHB coaches. They further stated that all important machines except Sliter cum CTL line machine has now been made functional and are being used for regular production.

2.3.2 Conversion of ICF rakes into LHB rakes

Railway Board allot new LHB coaches to the Zonal Railways for conversion of ICF rakes into LHB rakes. Audit examined planning and pace of conversion of ICF rakes into LHB rakes. Over Indian Railways, during the last three years from 2015-16 to 2017-18, 195 rakes were planned for conversion into LHB rakes. However, only 108 rakes could be converted into LHB rakes. The target for conversion was reduced from 102 in 2016-17 to 81 in 2017-18, instead of increasing the same. Zonal Railway wise analysis showed that

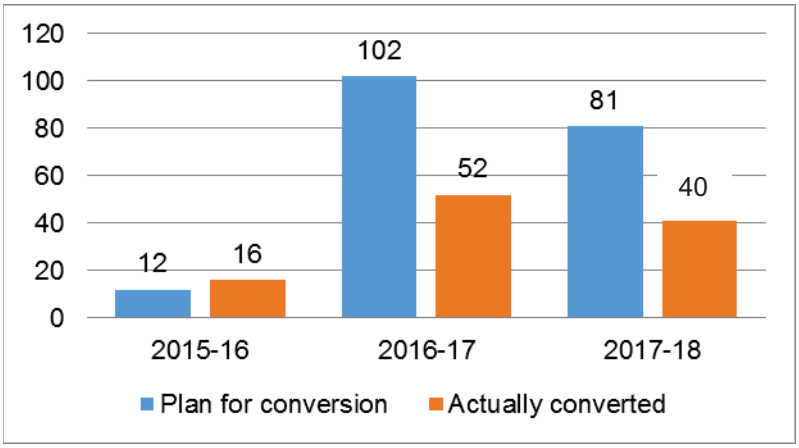

Figure 2.5: Planning and conversion of conventional rakes to LHB rakes

- 65 rakes were converted to LHB rakes in four[41] Zonal Railways, whereas other 11 Zonal Railways could convert only 44 rakes into LHB rakes during the last three years.
- NWR did not convert any rakes into LHB rake, as they did not plan for any.
- In 2015-16 and 2016-17, SECR, SCR and WCR also did not plan for conversion of conventional rakes to LHB rakes.

Details are shown in ***Annexure 2.3.***

Audit also noted that Railway Board did not allot required number of LHB coaches to Zonal Railways. Coaches were allotted in piecemeal due to which coaches received were lying unused till appropriate number of coaches were allotted to form a rake. Audit further noticed that 98 important/prominent Superfast Mail/Express trains are still running with conventional coaches as indicated in ***Annexure 2.3 a.***

Thus, it was seen that the number of ICF rakes planned for conversion was not significant. This would have serious safety risk implication as opined by the High Level Safety Review Committee.

During Exit Conference (6 May 2019) Railway Board stated that conversion plans are drawn up every year for all Zonal Railways. First priority is given to long distance trains and trains having pantry cars. They stated that gradually all trains would be converted into LHB rakes. Audit, however, noticed that no time frame has been fixed for conversion of all existing ICF rakes into LHB rakes.

Audit also carried out age analysis of existing ICF conventional coaches over Indian Railways. Audit noticed that there were 56,093 coaches[42] as on 31 March 2018. Of these, only 7,060 coaches (*12.59 per* cent) were of LHB type and other 49,033 coaches were of ICF conventional coaches. The age-wise details of these ICF coaches are given in Table 2.3.

[41] CR-25, NR-18, ER-11, ECR-11

[42] Type of coaches – AC I, Composite AC I & ACII, AC II, Composite ACII & AC III, ACIII, IIAC seat, Sleeper, Seating ordinary, Pantry car

Table 2.3 – Age analysis of ICF conventional coaches as on 31 March 2018						
Zonal Railway	Number of LHB coaches	Number of conventional coaches				
		Total	*<15 years*	*>15<20 years*	*>20<25 years*	*>25 years*
CR	605	4638	2616	984	868	170
ECoR	371	2335	1509	526	295	5
ECR	654	3095	2099	637	359	0
ER	687	3435	2015	713	614	93
NFR	305	1946	1251	335	321	39
NR	1463	5547	1065	4482	0	0
NWR	90	2765*	1442	251	188	15
SCR	300	4360	2639	912	809	0
SECR	195	1074	836	64	85	89
SER	389	2362	1510	486	349	17
SR	499	5856	3547	1059	1127	123
SWR	344	2455	1766	374	315	0
WCR	57	1393	1125	169	99	0
WR	733	3933	2765	713	441	14
NER	225	2560	1829	449	238	44
NCR	143	1279	1017	111	151	00
Total	**7060**	**49033***	**29031**	**12265**	**6259**	**609**

* Age-wise details of 869 conventional coaches is not available with NWR

As can be seen from the above table, 609 conventional coaches have already attained their codal life of 25 years as on 31 March 2018. Further, about 13 *per cent* (6,259 coaches) were between the age of 20 and 25 years and would need to be replaced in the next five years.

Thus, Indian Railways need to replace at least 6,868 coaches (14 per cent) over a period of next five years. In addition, Indian Railways would also need to manufacture additional new coaches to cater to anticipated increase in passenger traffic. The present production programme is not able to meet the requirement of coach production. As a result, coaches which are very old and about to complete their codal life are being run in the railway system. This leads to an uncomfortable and aesthetically poor travelling experience for the passengers. Further, running 609 over aged coaches in the railway system also has implications on passenger safety.

2.4 Maintenance of LHB coaches

(a) Maintenance facilities at coaching depots

There is need to keep necessary spare items (stock and non-stock) and trained manpower in the coaching depots for maintenance of LHB coaches. Indian Railways have 176 coaching depots. Audit test checked the records of 53 coaching depots to analyse the adequacy of maintenance of LHB coaches. Audit noticed that

- Infrastructure facilities were adequate for maintenance of LHB coaches in 34 coaching depots.
- There were lack of adequate facilities for maintenance of LHB coaches in 19 coaching depots out of which in 14 coaching depots, the required infrastructure facilities have not been proposed.
- Spare items for maintenance of LHB coaches were not being properly maintained in 12 coaching depots. These were made available from other depots/workshops.
- There was lack of trained manpower for maintenance of LHB coaches in seven coaching depots.

Details are shown in ***Annexure 2.4.***

During Exit Conference (6 May 2019) Railway Board stated that Railways have identified constraints and problems facing in maintenance of LHB coaches in coaching depots. All efforts were being made to address the constraints for smooth maintenance of LHB coaches.

In reply, Railway Board stated (20 June 2019) that instructions exist regarding adequate planning for maintenance of LHB coaches. They further stated that Zonal Railways were providing maintenance spares, staff training needs etc. at all coaching depots.

Railway Board did not respond specifically to deficiencies noticed in 53 coaching depots reviewed by Audit. Railway Board need to analyse the deficiencies that exist in the coaching depots for maintenance of LHB coaches.

(b) Maintenance facilities of LHB coaches at Workshops

With the induction of LHB coaches in the services, workshops should have also the facility for Periodic Overhaul/ Intermediate Overhaul (POH/IOH)[43] of LHB coaches including regular maintenance. The structure and composition of LHB coaches are different from that of conventional coaches. As such, specific infrastructure/facilities/M&P are required for POH/IOH of LHB coaches. Audit reviewed the status of availability of infrastructure in workshops over Indian Railways. Audit analyzed whether the infrastructure was adequate for POH/IOH and other maintenance activities of LHB coaches. Zonal Railway wise Audit findings are discussed below:

Central Railway – The work of creation of facilities for maintenance of LHB coaches in Parel workshop was sanctioned in 2017-18 at a cost of ₹ 88.14 crore. Later, Railway Board gave (October 2017) in-principle approval for the closing of Parel workshop for provision of passenger terminal facility. The facility for POH of LHB coaches was not available in Central Railway. Accordingly, CR proposed (January 2018) the work of setting up of POH workshop for 100 LHB coaches per month in Nagpur Division. Railway Board's sanction for the same was yet to be received. At present, LHB coaches are sent to Lower Parel Workshop of WR.

In reply, Railway Board stated (20 June 2019) that it was decided to create facilities for maintenance of LHB coaches in CR's Matunga Workshop, Mumbai. They also stated that proposal for work of setting up of POH workshops in Nagpur division would be sanctioned after presentation of regular budget of 2019-20. However, till the creation of maintenance facilities at Matunga, LHB coaches continued to be sent to Lower Parel Workshop which would increase the burden of existing Workshop.

Eastern Railway – Liluah Workshop is the only carriage maintenance workshop where POH of LHB coaches are undertaken. Only infrastructure development work

[43] **Intermediate overhauling (IOH)** is done every nine months in the nominated Coaching Depots and **Periodical Overhauling (POH)** is done every 18 months in Workshops. During IOH & POH, the coaches are critically examined for corrosion, structural damage, stability and ensuring the fitness of the coaches for its safe run. The coaches are being put into service only after ensuring compliance with maintenance standards.

(facilities for overhauling of new generation coaches including 26 m long coaches) was completed in December 2015. Works of modernization of workshop, included creation of infrastructure for 24 m long LHB coaches was sanctioned in 2008-09. Physical progress of these works was only 65 *per cent*. Another work viz., capacity augmentation work for maintenance of 30 LHB coaches per month was sanctioned in 2012-13. The physical progress of this work was only 29 *per cent* as of November 2018. In reply, Railway Board stated (20 June 2019) that modernization and capacity augmentation works at Liluah were being closely monitored. The target of POH of LHB coaches has been enhanced to 562 coaches this year from 372 coaches last year. They further stated that another work for creation of facility for POH of LHB coaches has been sanctioned at ER's Kanchrapara workshop. Railways need to complete the augmentation work of existing workshop and creation of facilities in new workshops within a prescribed time frame to cater to the existing requirement of POH of LHB coaches. This would also ease the burden of existing Liluah Workshop.

East Central Railway - Carriage Repair Workshop/ Harnaut is the only workshop in ECR. The works of developing infrastructure for POH of wheel set for LHB coaches and developing facility for IOH of LHB and ICF bogies were sanctioned in 2017-18 and 2018-19 respectively. However, no significant progress was noted as of September 2018. At present, the Workshop is carrying out POH of only non-AC conventional coaches. This zone has holding of 654 LHB coaches and for POH, LHB coaches were being sent to Liluah Workshop of ER and Gorakhpur Workshop of NER.

In reply, Railway Board stated (20 June 2019) that ECR was being followed to get the execution of augmentation works of Harnaut workshop expedited. Railway Board needs to keep monitoring for early completion of work. This would avoid operating expenditure on empty haulage of LHB coaches for POH to Liluah and Gorakhpur Workshops.

Northeast Frontier Railway –There are two workshops at New Bongaigaon and Dibrugarh Town in NFR. The facilities for POH of LHB coaches did not exist in these workshops. The work related to facilities for POH of LHB coaches was sanctioned in 2013-14 in Dibrugarh workshop. The work was still under progress

as of August 2018. In New Bongaigaon Workshop, the work of improvement of infrastructure for creation of Refurbishing of LHB coaches was sanctioned in 2018-19. The work was at tendering stage. In reply, Railway Board stated (20 June 2019) that the works in Dibrugarh workshop was in advance stage with 95 *per cent* physical progress as of April 2019. They further stated that work for setting up of new Bongaigaon workshop was started in December 2018. Railway needs to expedite completion of these works at the earliest.

Northern Railway – NR has two workshops viz., Jagadhari and Alambagh. The number of holding of LHB Coaches has been increased from 514 in 2012 to 1,463 in 2018. Accordingly, infrastructure of Plant and Machinery has been augmented in Jagadhari workshop to increase the capacity of POH of LHB Coaches from 20 to 35 coaches per month. However, important machines like Shot/Sand Blasting Plant required for Bogie Frame and Components, Bogie load testing machine and Rail-cum-road vehicle for shunting have not been provided. The Alambagh workshop does not have the facility and infrastructure for maintaining LHB coaches.

In reply, Railway Board stated (20 June 2019) that in addition to the existing two workshops, another workshop has been sanctioned at Sonipat for POH and refurbishment of LHB coaches. They further stated that facilities to cater POH of LHB coaches have been developed at Jagadhari Workshop. However, no mention was made about creation of maintenance facilities for LHB coaches at Alambagh Workshop.

North Western Railway – NWR has two workshops viz. Ajmer and Jodhpur. In Ajmer workshop, there was shortage of one hydraulic material carrying and lifting system and one single car testing for air brake system (Fixed). This hampered the maintenance of LHB coaches as per plan. Further, POH facility of LHB coaches is not available in Jodhpur workshop. In reply, Railway Board stated (20 June 2019) that facilities have been developed at Ajmer workshop. In the current year target of POH of 190 coaches has been given in comparison to target of 112 coaches last year. However, they have not responded on the non-availability of facilities in Jodhpur workshop.

South Central Railway - The POH facilities for LHB stock exist only in Lallaguda workshop. All the LHB stock from all the divisions of the zone are being sent to this

workshop for POH. The work for augmentation of Carriage Repair Shop, Tirupathi for POH of LHB coaches was sanctioned in 2017-18. However, the work could be started only in November 2018.In reply, Railway Board stated (20 June 2019) that the augmentation work at Tirupathi was under progress and a target of 55 coaches has been given for the current year. Railways need to expedite this work to enhance the POH of LHB coaches.

South Eastern Railway – There is only one workshop in SER at Kharagpur. No project in connection with augmentation of capacity of the workshop was taken up during last five years. However, a work was proposed in 2017-18 for development of infrastructure, Plant and machineries required for POH/IOH/Maintenance of LHB coaches, However, the same was yet to be sanctioned (November 2018). In reply, Railway Board stated (20 June 2019) that the work has been approved at a cost of ₹ 29.60 crore. A target of POH of 48 coaches has been given for the current year. Railways need to expedite this work to enhance the POH of LHB coaches.

Southern Railway – POH of LHB coaches of SR is being carried out in Carriage Works/Perambur. Further, a work related to shed for POH of 300 to 400 LHB coaches per year was sanctioned in 2016-17. The work was to be executed by Construction Organisation of SWR. This was later assigned to SR in August 2018. The work was still in its initial stage. No infrastructure facility for the same was created at Central Workshop/ Golden Rock (GOC) of SR. A work "GOC workshop – POH facilities for maintenance of LHB coaches" has been recently sanctioned by Railway Board in August 2018. In reply, Railway Board stated (20 June 2019) that the construction activities as well as procurement of M&P were in progress and was closely monitored. Railways need to expedite this work to enhance the POH of LHB coaches.

South Western Railway – No specific infrastructural works were taken up for maintenance of LHB coaches. The facilities existed such as sick lines[44], which are capable for maintenance of LHB coaches. Further, a work of 'Augmentation of

[44]**Sick line** is the workshop for the major and periodical maintenance of the coaches. It consists of modern facilities like pit for working under frame and crane for separation of coach & bogie for repair of all type of defects. Sick line is generally provided in the vicinity of the coaching depots and is provided with requisite machinery and plants including facilities for lifting of coaches."

POH Capacity of Mysore Workshop in Ashokpuram' was sanctioned in 2016 the contract for which could be awarded only in June 2018. The work was in its initial stage. In reply, Railway Board stated (20 June 2019) that works have been undertaken for creation of facilities for POH of LHB coaches in both Mysore and Hubli workshops. However, it was not indicated that by when these works would be completed. Railway needs to expedite these works to cater to the increasing demand of POH of LHB coaches.

Western Railway – The POH facilities of LHB coaches exist in Lower Parel workshop. Further, a work of capacity augmentation of POH of LHB coaches from 15 to 30 coaches per month was sanctioned in 2012-13 for Lower Parel Workshop. The work was to be completed by March 2015. After lapse of six years, civil works like construction of Pit line and service building works could not be completed (31 January 2019). Further, provision of electric fittings and power supply were in tender stage. In reply, Railway Board stated (20 June 2019) that the work was at an advance stage with 77 *per cent* physical progress and expected to be completed during 2019-20. Railways need to expedite this work to enhance the POH of LHB coaches.

South East Central Railway – None of the Workshops in SECR have the facility for POH of LHB coaches. LHB coaches are sent to workshops of other Zonal Railways[45] for maintenance. These are located at a distance of 512 to 1403 kms from Bilaspur Coaching Depot. In reply, Railway Board stated (20 June 2019) that coach POH facilities were being developed at Motibagh workshops in Nagpur. Railways need to expedite this work to enhance the POH of LHB coaches.

West Central Railway – None of the Workshops in WCR have the facility for POH of LHB coaches. For this purpose, Ajmer and Jodhpur workshop of NWR have been nominated. These workshops are at a distance of 899 kms and 1,048 kms respectively from Jabalpur Depot. In reply, Railway Board stated (20 June 2019) that a proposal has been received for creating LHB coach POH facilities at the existing Coach Rehabilitation Workshop at Bhopal and it is under consideration.

[45]Perambur Workshop (SR), Kharagpur Workshop (SER) and Mancheswar Workshop (ECoR) - located at 1403 Km, 610 Km and 512 Km respectively from Bilaspur Coaching Depot

Railway needs to expedite this work to avoid empty haulage of LHB coaches to other workshops.

North Central Railway - There is no workshop for maintenance of LHB coaches in NCR. For POH, LHB coaches are sent to Ajmer Workshop of NWR from Allahabad and Kanpur coaching depots. This workshop is at a distance of 627 kms and 823 kms from Allahabad and Kanpur coaching depots respectively. In reply, Railway Board stated (20 June 2019) that coach POH facilities are being developed at Jhansi workshop. Railway needs to expedite this work to avoid empty haulage of LHB coaches to other workshops.

Thus, Indian Railways are in the process of developing adequate facilities in their workshops for POH/IOH of LHB coaches. In some workshops, the POH/IOH of LHB coaches was carried out, but the facilities need to be augmented to handle the increase in number of LHB coaches. Further, the works taken up for augmentation of facilities for maintenance of LHB coaches were either taken up recently or wherever taken up earlier are still in progress. As a result, the LHB coaches were to be sent to other workshops. This resulted in extra time as well as empty haulage of coaches.

In reply, Railway Board stated (20 June 2019) that in order to accommodate increased POH arising, facilities are being created in all major workshops and are closely being monitored for timely completion. They further stated that works to create additional POH capacities of about 2,200 coaches annually are under progress in different workshops.

2.5 Conclusion

Indian Railways has been carrying passenger traffic mainly through conventional coaches of ICF design. These coaches have certain limitations in terms of their speed potential, riding comfort as well as safety in case of accidents. These coaches are also prone to early wear and tear and their under gear corrodes quickly being made of iron. To overcome these limitations, LHB coaches were introduced in Indian Railways in 2003. These coaches made of stainless steel are far superior in respect of the speed at which they can run, provide better riding comfort, safer in case of accidents, easy to maintain and aesthetically better.

Audit observed that share of LHB coaches in total coach fleet of Indian Railways was 12.59 *per cent* (as of March 2018) even after 15 years of introduction of LHB coach. High Level Safety Review Committee recommended (in 2012) to convert ICF rakes to LHB rakes for all the trains having 18 or more coaches and with a capacity to run at a maximum speed of 100 kmph or more. However, 903 such rakes of ICF conventional coaches are still being run. Running of rakes with longer coach formation at high speed exposes the passengers to the risk of unsafe journey. Despite having serious safety risk as assessed by the High Level Safety Review Committee, the pace at which ICF rakes are being converted to LHB rakes, was very slow. The current pace of production was around 2000 LHB coaches per year. As such, it would take Indian Railways at least eight years to convert these 903 rakes (assuming the composition of 18 coaches) to LHB rakes. Audit also noted that Railway Board did not allot required number of LHB coaches to Zonal Railways. Coaches were allotted in piecemeal, as a result rakes could not be formed and coaches were lying unused till appropriate numbers of coaches were allotted.

Audit noticed that out of 49,033 ICF conventional coaches, 609 coaches have already attained their codal life of 25 years as on 31 March 2018. Further, about 13 *per cent* coaches (6,259 coaches) were between the age of 20 and 25 years and would need to be replaced in the next five years. Running of over aged coaches in the railway system has adverse impact on passenger safety.

Audit examined the availability of infrastructure in coaching depots where day to day maintenance of LHB coaches is required to be undertaken. Audit noticed lack of adequate infrastructure in 19 depots while in 12 depots, stock of spare items was not being properly maintained. Audit also examined the availability of infrastructure and facilities required in workshops for Periodical Overhauling (POH)/ Intermediate Overhauling (IOH) of LHB coaches. Audit noted that creation of adequate facilities in the workshops for POH/IOH of LHB coaches in a number of Zonal Railways is work-in-progress. There were also inadequate maintenance facilities in some workshops. As a result, LHB coaches were to be sent to other workshops. This resulted in extra time as well as empty haulage of coaches. In

some workshops, where the POH/IOH of LHB coaches is carried out, the capacity needed to be augmented in view of the increase in numbers of LHB coaches.

Thus, there was lack of adequate pace in production of LHB coaches and non-creation of adequate production facilities in MCF, Kancharapara and Singur units. This impacted the achievement of stated objective of switch over to LHB rakes. Further, inadequate maintenance facilities in depots and workshops also impacted effective and timely maintenance of LHB coaches.

2.6 Recommendations

1. ***Indian Railways need to examine the need to speed up the production of LHB coaches, and ancillary facilities required, if they plan to achieve complete switch over to LHB variant coaches.***
2. ***Availability of adequate infrastructure and other maintenance facilities need to be ensured in the coaching depots and workshops for timely and effective maintenance and POH/IOH of LHB coaches.***

New Delhi **(ROY MATHRANI)**
Dated: 14 February 2020 **Deputy Comptroller and Auditor General**

Countersigned

New Delhi **(RAJIV MEHRISHI)**
Dated: 14 February 2020 **Comptroller and Auditor General of India**

Annexure 1.1 (Para 1.5)

Sample Selection

ZRs	Divisions		Diesel Loco Sheds (DLS)		Electric loco Sheds (ELS)		Diesel Loco Workshop (DLWS)		Electric Loco Workshop (ELWS)	
	Total	Selected	Total	Selected	Total	Selected	Total	Selected	Total	Selected
1	2	3	4	5	6	7	8	9	10	11
CR	**5**	Mumbai and Bhusawal	2	Kalyan (KYN/DLS)	3	Bhusawal (BSL/ELS)	1	Parel (PL/DLWS)	1	Bhusawal (BSL/ELWS)
ER	**4**	Howrah and Asansol	4	Andal (UDL/DLS)	2	Asansol (ASN/ELS)	1	Jamalpur (JMP/DLWS)	1	Kanchrapara (KPA/ELWS)
ECR	**5**	Mugalsarai and Samastipur	3	Samastipur (SPJ/DLS)	2	Mugalsarai (MGS/ELS)	Nil	Nil	Nil	Nil
ECoR	**3**	Visakhapatnam and Khurda Road	1	Visakhapatnam (VSKP/DLS)	2	Angul (ANGL/ELS)	Nil	Nil	Nil	Nil
NR	**5**	Ferozpur and Lucknow	4	Lucknow (LKO/DLS)	3	Ludhiana (LDH/ELS)	1	Lucknow (LKO/DLWS)	1	Lucknow (LKO/ELWS)
NCR	**3**	Allahabad and Jhansi	2	Jhansi (JHS/DLS)	2	Kanpur (CNB/ELS)	Nil	Nil	Nil	Nil
NER	**3**	Izatnagar and Lucknow	2	Gonda (GD/DLS)	1	Nil	Nil	Nil	Nil	Nil
NFR	**5**	Katihar and Lumding	3	New Guwahati (NGC/DLS)	Nil	Nil	Nil	Nil	Nil	Nil
NWR	**4**	Ajmer and Jodhpur	2	Abu Road (ABR /DLS)	Nil	Nil	1	Ajmer (AII/DLWS)	Nil	Nil
SR	**6**	Salem and Tiruchchirappalli	4	Erode (ED/DLS)	3	Erode (ED/ELS)	1	Golden Rock (GOC/DLWS)	1	Perambur (PER/ELWS)
SCR	**6**	Vijayawada and Guntakal	5	Gooty (GY/DLS)	3	Vijayawada (BZA/ELS)	Nil	Nil	Nil	Nil
SER	**4**	Chakradharpur and Kharagpur	3	Kharagpur (KGP/DLS)	4	Tatanagar (TATA/ELS)	1	Kharagpur (KGP/DLWS)	1	Kharagpur (KGP/ELWS)
SECR	**3**	Bilaspur and Raipur	1	Raipur (RSD/DLS)	1	Bhilai (BIA/ELWS)	Nil	Nil	Nil	Nil
SWR	**3**	Bangalore and Hubli	2	Krishnajapuram (KJM/DLS)	Nil	Nil	Nil	Nil	Nil	Nil
WCR	**3**	Bhopal and Jabalpur	2	New Katni Jn (NKJ/DLS).	3	Itarsi (ET/ELS)	Nil	Nil	Nil	Nil
WR	**6**	Mumbai Central and Ahmedabad	3	Sabarmati (SBI/DLS)	2	Valsad (BL/ELS)	Nil	Nil	1	Dahod (DHD/ELWS)
Total	**68**	**32**	**43**	**16**	**31**	**12**	**6**	**6**	**6**	**6**

Annexure 1.2 (Para 1.9.1)

Details of Projected and Actual Growth in Gross Domestic Product, Passenger kilometres, Million Tonne Load, Net Tonne Kilometer during 2012-17 (In percentage)

Year	2012-13	2013-14	2014-15	2015-16	2016-17
Gross Domestic Product (GDP)					
Projected growth	9	9	9	9	9
Actual growth	-	6.4	7.4	8.2	7.1
Passenger kilometers (PKM)					
Projected growth	10.8	10.8	10.8	10.8	10.8
Actual growth	-	3.96	0.53	0.24	0.66
Million Tonne Load (MT Load)					
Projected growth	-	7.8	7.77	7.79	8.08
Actual growth	-	4.37	4.09	0.64	0.36
Net Tonne Kilometer (NTKM)					
Projected growth	-	6.81	7.87	7.8	8.17
Actual growth	-	2.49	2.39	-3.99	-5.24

Annexure 1.3 (Para 1.9.3)

Details of requirement of locos on the basis of total number of rakes and the ideal rake-loco ratio in 2012 -13 and 2017-18

Sr. No.	Description	Passenger	Goods	Total
A. In 2012-13				
1	Total number of coaches (conventional + others) for passenger rake and wagons for goods rake	54,686	2,44,731	
2	Total No. of Rakes @ 20 coaches per passenger rake and @ 59 wagons for goods rake	2,734	4,148	
3	Requirement of loco @ 1:0.8 rake-loco ratio	2,187	3,318	
4	Add. Ineffective percentage (10 *per cent* for passenger loco and 20 *per cent* for goods loco)	219	664	
5	**Total requirement** (diesel + electric)	2,406	3,982	**6,388**
6	**Total number of loco holding** (4,666 diesel + 4,584 electric)			**9,250**
7	**Excess holding (Sr. No. 6-5)**			**2,862**
Actual excess holding of locos of the requirements in 2012-13				**45%**
B. In 2017-18				
8	Total number of coaches (conventional + others) for passenger rake and wagons for goods rake	60,579	2,79,308	
9	Total No. of Rakes @ 20 coaches per passenger rake and @ 59 wagons for goods rake	3,029	4,734	
10	Requirement of loco @ 1:0.8 rake-loco ratio	2,423	3,787	
11	Add. Ineffective percentage (10 *per cent* for passenger loco and 20 *per cent* for goods loco	242	757	
12	**Total requirement** (diesel + electric)	2,665	4,545	**7,210**
13	**Total number of loco holding (5,613 diesel + 5,707 electric)**			**11,320**
14	**Excess holding (Sr. No. 13-12)**			**4,110**
Actual excess holding of locos of the requirements in 2017-18				**57%**

Annexeure 1.4 A (Para 1.14)

Position of homing capacites and actual holding of locos in the loco sheds over Indian Railways on 01.04.2012 and 31.03.2017

ZRs	Name of the Loco Shed	Homing capacity as on 01/04/12	Actual holding as on 01/04/12	Percentage utilization of homing capacity	Homing capacity as on 31/3/17	Actual holding as on 31/3/17	Percentage utilization of homing capacity	Name of the Loco Shed	Homing capacity as on 01/04/12	Actual holding as on 01/04/12	Percentage utilization of homing capacity	Homing capacity as on 31/3/17	Actual holding as on 31/3/17	Percentage utilization of homing capacity
	Diesel							Electric						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CR	Kalyan	36	72	200%	60	93	155%	Bhusawal	150	166	111%	150	197	131%
CR	Ghorpuri	100	167	167%	100	202	202%	Kalyan	200	163	82%	200	200	100%
CR	0	0	0	0	0	0	0	Ajni	100	169	169%	150	221	147%
CR	**Total**	**136**	**239**	**176%**	**160**	**295**	**184%**	**Total**	**450**	**498**	**111%**	**500**	**618**	**124%**
ER	Andal	100	125	125%	120	163	136%	Asansol	100	131	131%	120	137	114%
ER	Howrah	60	72	120%	60	62	103%	Howrah	100	98	98%	100	125	125%
ER	Bardhman	50	73	146%	50	70	140%	0	0	0	0	0	0	0
ER	Jamalpur	60	51	85%	60	63	105%	0	0	0	0	0	0	0
ER	**Total**	**270**	**321**	**119%**	**290**	**358**	**123%**	**Total**	**200**	**229**	**115%**	**220**	**262**	**119%**
ECR	Samastipur (SPJ)	50	77	154%	100	128	128%	Mughalsarai	120	156	130%	150	192	128%
ECR	Mughalsarai (MGS)	20	54	270%	50	74	148%	Gomoh	100	178	178%	120	206	172%
ECR	Patratu	70	114	163%	70	127	181%	0	0	0	0	0	0	0
ECR	**Total**	**140**	**245**	**175%**	**220**	**329**	**150%**	**Total**	**220**	**334**	**152%**	**270**	**398**	**147%**
ECoR	Visakhapatnam	150	185	123%	150	277	185%	Angul	150	101	67%	150	150	100%
ECoR	0	0	0	0	0	0	0	Waltair	175	172	98%	175	234	134%
ECoR	**Total**	**150**	**185**	**123%**	**150**	**277**	**185%**	**Total**	**325**	**273**	**84%**	**325**	**384**	**118%**
NR	Ludhiana	140	170	121%	140	184	131%	Ludhiana	150	152	101%	150	184	123%
NR	Tuklahabad	175	156	89%	175	161	92%	Ghaziabad	150	182	121%	200	215	108%
NR	Shakurbasti	50	30	60%	50	23	46%	Khanalampura	0	0	0	100	22	22%
NR	LucKnow	100	161	161%	100	183	183%	0	0	0	0	0	0	0
NR	**Total**	**465**	**517**	**111%**	**465**	**551**	**118%**	**Total**	**300**	**334**	**111%**	**450**	**421**	**94%**
NCR	Jhansi	72	105	146%	72	137	190%	Kanpur	150	182	121%	150	214	143%
NCR	0	0	0	0	0	0	0	Jhansi	120	184	153%	120	208	173%
NCR	**Total**	**72**	**105**	**146%**	**72**	**137**	**190%**	**Total**	**270**	**366**	**136%**	**270**	**422**	**156%**
NFR	New Guwahati	78	79	101%	133	114	86%	0	0	0	0	0	0	0
NFR	Siliguri (SGUJ)	100	122	122%	100	213	213%	0	0	0	0	0	0	0
NFR	Malda (MLDT)	60	76	127%	60	93	155%	0	0	0	0	0	0	0
NFR	**Total**	**238**	**277**	**116%**	**293**	**420**	**143%**	0	0	0	0	0	0	0
NER	Gonda	100	156	156%	150	162	108%	0	0	0	0	0	0	0
NER	Izatnagar	75	30	40%	75	107	143%	0	0	0	0	0	0	0
NER	**Total**	**175**	**186**	**106%**	**225**	**269**	**120%**	**Total**	0	0	0	0	0	0

Annexeure 1.4 A (Para 1.14)

Position of homing capacites and actual holding of locos in the loco sheds over Indian Railways on 01.04.2012 and 31.03.2017

ZRs	Name of the Loco Shed	Homing capacity as on 01/04/12	Actual holding as on 01/04/12	Percentage utilization of homing capacity	Homing capacity as on 31/3/17	Actual holding as on 31/3/17	Percentage utilization of homing capacity	Name of the Loco Shed	Homing capacity as on 01/04/12	Actual holding as on 01/04/12	Percentage utilization of homing capacity	Homing capacity as on 31/3/17	Actual holding as on 31/3/17	Percentage utilization of homing capacity
	Diesel							Electric						
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
NWR	Abu Road	80	92	115%	80	124	155%	0	0	0	0	0	0	0
NWR	Bhagat Ki Kothi	95	101	106%	145	149	103%	0	0	0	0	0	0	0
NWR	**Total**	**175**	**193**	**110%**	**225**	**273**	**121%**	0	0	0	0	0	0	0
SER	Kharagpur	100	89	89%	100	103	103%	Tata	120	177	148%	120	222	185%
SER	Bokaro Steel City	60	80	133%	60	99	165%	Santragachi	50	70	140%	50	80	160%
SER	Bondamunda	100	130	130%	100	141	141%	Bokaro Steel City	100	NA	-	100	111	111%
SER	0	0	0	0	0	0	0	Bondamunda	175	189	108%	175	212	121%
SER	**Total**	**260**	**299**	**115%**	**260**	**343**	**132%**	**Total**	**445**	**436**	**98%**	**445**	**625**	**140%**
SECR	Raipur	100	139	139%	100	178	178%	Bhilai	175	195	111%	175	232	133%
SECR	**Total**	**100**	**139**	**139%**	**100**	**178**	**178%**	**Total**	**175**	**195**	**111%**	**175**	**232**	**133%**
SCR	Gooty	120	140	117%	200	198	99%	Vijayawada	120	196	163%	175	215	123%
SCR	Kazipet	100	149	149%	120	180	150%	Lallguda	100	162	162%	175	214	122%
SCR	Guntakal	100	102	102%	100	118	118%	Kazipet	125	113	90%	125	160	128%
SCR	Maula Ali	50	57	114%	50	102	204%	0	0	0	0	0	0	0
SCR	Vijayawada	35	31	89%	35	28	80%	0	0	0	0	0	0	0
SCR	**Total**	**405**	**479**	**118%**	**505**	**626**	**124%**	**Total**	**345**	**471**	**137%**	**475**	**589**	**124%**
SWR	Krishnarajapuram	125	151	121%	150	167	111%	0	0	0	0	0	0	0
SWR	Huballi	150	181	121%	200	201	101%	0	0	0	0	0	0	0
SWR	**Total**	**275**	**332**	**121%**	**350**	**368**	**105%**	0	0	0	0	0	0	0
SR	Erode	100	110	110%	100	130	130%	Arakkonam	120	126	105%	120	172	143%
SR	Golden Rock	100	92	92%	100	90	90%	Erode	120	168	140%	175	196	112%
SR	Ernakulam	45	43	96%	45	40	89%	Royapuram	50	75	150%	50	79	158%
SR	Tondiarpet	NMA	27	NAP	25	21	84%	0	0	0	0	0	0	0
SR	**Total**	**245**	**272**	**111%**	**270**	**281**	**104%**	**Total**	**290**	**369**	**127%**	**345**	**447**	**130%**
WR	Sabarmati	50	105	210%	100	170	170%	Valsad	100	114	114%	100	202	202%
WR	Ratlam	100	117	117%	100	127	127%	Vadodara	150	168	112%	175	192	110%
WR	Vatva	150	108	72%	150	132	88%	0	0	0	0	0	0	0
WR	**Total**	**300**	**330**	**110%**	**350**	**429**	**123%**	**Total**	**250**	**282**	**113%**	**275**	**394**	**143%**
WCR	New Katni	150	193	129%	150	232	155%	Itarsi	120	171	143%	175	189	108%
WCR	Itarsi	140	152	109%	140	168	120%	New Katni	120	173	144%	175	188	107%
WCR	0	0	0	0	0	0	0	Tuqlahabad	120	178	148%	175	234	134%
WCR	**Total**	**290**	**345**	**119%**	**290**	**400**	**138%**	**Total**	**360**	**522**	**145%**	**525**	**611**	**116%**
IR	**42**	**3696**	**4464**	**121%**	**4225**	**5534**	**131%**	**30**	**3630**	**4309**	**119%**	**4275**	**5403**	**126%**

Annexeure 1.4 B (Para 1.14)										
Details of Diesel and Electric Locos Augmnetation Works - PH42 Works (March 2019)										
Sr. No.	Zonal Rlys	Year of approval	Location	Description	Traction	Cost (₹ in crore)	Original DoC	Revised DoC	Physical prog. %	Financial prog. %
1	CR	2012-13	Daund	Setting up of new electric loco shed for homing 200 3-phase electric locos.	Electric	94.88	Jun-20	-	40	38
2	CR	2015-16	Pune	Diesel loco shed, Pune-Augmentation of capacity by 50 HHP Diesel locos	Diesel	33.45	Dec-12	Jun-20	10	6
3	CR	2015-16	Ajni	Augmentation of homing capacity of Electric Loco Shed, Ajni (ELS/AQ) from 175 to 200 locos.	Electric	15.58	Dec-19	-	90	43
4	ECoR	2015-16	Visakhapatnam	Augmentation of shed for homing 100 HHP Locomotives at Diesel Loco Shed /Visakhapatnam.	Diesel	53.14	Sep-19	Dec-19	45	50
5	ECoR	2015-16	Angul	Augmentation of holding capacity of Electric Loco Shed,Angul from 150 AC locomotives to 200 AC locomotives	Electric	28.00	Jun-19	Dec-19	70	48
6	ECoR	2015-16	Visakhapatnam	Augmentation of ELS/VSKP for homing of 200 locos	Electric	19.66	Dec-19	-	65	60
7	ER	2017-18	Howrah	Division - Extension of Electric Loco Shed, Bamumgachi towards Howrah end for augmentation of capacity upto 130 locos	Electric	15.44	Jun-10	-	60	58

Annexeure 1.4 B (Para 1.14)										
Details of Diesel and Electric Locos Augmnetation Works - PH42 Works (March 2019)										
Sr. No.	Zonal Rlys	Year of approval	Location	Description	Traction	Cost (₹ in crore)	Original DoC	Revised DoC	Physical prog. %	Financial prog. %
8	NCR	2009-10	Jhansi	(Electric loco shed) - Augmentation for enhancing homing capacity of electric locos upto 175 (Phase-II).	Electric	11.25	Mar-14	Dec-19	99	69
9	NCR	2010-11	Kanpur	Augmentation of holding capacity from 150 to 175 electric locos.	Electric	10.93	Feb-13	Jan-20	96	82
10	NER	2011-12	Gonda	Augmentation of homing capacity of diesel shed from 100 to 150.	Diesel	13.24	Dec-19	-	75	70
11	NER	2016-17	Gorakhpur	Proposal for AC Electric Loco Shed having homing capacity of 100 Locomotives at Gorakhpur.	Electric	85.35	Mar-20	-	65	35
12	NR	2008-09	Khanalampura	Setting up of new electric loco shed for homing 100 locos.	Electric	79.61	Mar-12	Mar-19	80	82
13	NR	2010-11	Ghaziabad	(Electric loco shed) - Augmentation of holding capacity from 150 AC locos to 175.	Electric	10.97	Mar-13	Mar-19	50	46
14	NR	2010-11	Ludhiana	(Electric Loco Shed) - Augmentation of holding capacity from 150 AC locos to 175.	Electric	11.98	Dec-19	-	80	29
15	NR	2013-14	Shakurbasti	Diesel Shed - Augmentation of homing capacity for WDM2 locos (50 Nos).	Diesel	22.96	Mar-21	-	8	21
16	NR	2013-14	Ghaziabad	Augmentation of shed capacity from 175 to 200 locos.	Electric	10.59	Mar-20	-	60	10
17	SCR	2006-07	Maula Ali	(Diesel shed) - Additional infrastructure facilities for holding 100 WDM2 locomotives.	Diesel	31.92	Mar-12	Aug-19	98	84

Annexeure 1.4 B (Para 1.14)										
Details of Diesel and Electric Locos Augmnetation Works - PH42 Works (March 2019)										
Sr. No.	Zonal Rlys	Year of approval	Location	Description	Traction	Cost (₹ in crore)	Original DoC	Revised DoC	Physical prog. %	Financial prog. %
18	SCR	2008-09	Guntakal	Setting up of new electric loco shed for homing 100 locos (Phase-I).	Electric	92.80	Mar-13	Mar-22	55	62
19	SCR	2010-11	Kazipet	Augmentation of holding capacity of electric loco shed from 100 to 125 alternative current locos.	Electric	11.02	Mar-15	Mar-20	27	29
20	SCR	2013-14	Vijayawada	Electric Loco Shed - Augmentation of homing capacity from 175 to 225 locos.	Electric	23.51	Mar-15	Mar-21	15	12
21	SCR	2013-14	Guntakal	Diesel Loco Shed - Augmentation of capacity by 50 high horse power locos.	Diesel	37.27	Mar-22	-	37	40
22	SCR	2013-14	Lallaguda	Electric Loco Shed - Augmentation of homing capacity from 175 to 200 locos.	Electric	17.61	Mar-20	-	75	54
23	SCR	2015-16	Kazipet	Augmentation of homing capacity of DLS/KZJ from 100 to 150 locos to home WDG4 locos	Diesel	28.15	Jan-18	Mar-21	25	17
24	SCR	2016-17	Kazipet	ELS/KZJ: Augmentation of homing capacity from 125 to 175 of Electric Loco Shed, Kazipet	Electric	18.00	Mar-21	-	40	30
25	SECR	2008-09	Bilaspur	New electric loco shed with holding capacity of 100 locos.	Electric	52.37	Mar-12	Dec-19	98	88
26	SECR	2015-16	Raipur	Expansion of WDG4 (EMD) loco shed from 50 to 150 locos.	Diesel	52.65	Mar-20	-	0	0
27	SECR	2015-16	Bhilai	Raipur division - Bhilai (Electric Loco Shed) - Augmentation of homing capacity from 175 to 200 Locos.	Electric	23.16	Dec-19	Mar-20	55	23
28	SER	2012-13	Rourkela	Second electric loco shed to home 200 electric locos.	Electric	111.92	Mar-19	Sep-19	60	56

Annexeure 1.4 B (Para 1.14)										
Details of Diesel and Electric Locos Augmnetation Works - PH42 Works (March 2019)										
Sr. No.	Zonal Rlys	Year of approval	Location	Description	Traction	Cost (₹ in crore)	Original DoC	Revised DoC	Physical prog. %	Financial prog. %
29	SR	2008-09	Royapuram	Expansion of air-conditioned electric loco shed to increase loco holding from 50 to 100.	Electric	35.70	Dec-12	Dec-19	95	90
30	SR	2010-11	Erode	(Diesel Shed) - Augmentation of homing capacity from 100 to 150 locos.	Diesel	22.46	Mar-19	-	70	52
31	SR	2016-17	Erode	ELS/ED, :-Augmentation of infra structure facilities to increase holding from 175 to 200 locos	Electric	19.99	Sep-19	Mar-21	20	58
32	SWR	2010-11	Hubli	Diesel Shed - Expansion of homing capacity from 150 to 200 EMD locos.	Diesel	37.60	Dec-14	Mar-21	98	80
33	WCR	2013-14	New Katni	Electric Loco Shed - Augmentation of capacity for holding 250 locos.	Electric	29.99	Dec-16	Dec-19	54	38
34	WCR	2013-14	Tughlakabad	Electric Loco Shed - Augmentation of capacity for holding 250 locos.	Electric	14.96	Feb-18	Sep-19	45	33
35	WCR	2013-14	Itarsi	Electric Loco Shed - Augmentation of capacity for holding 250 locos.	Electric	18.71	Mar-15	Dec-19	60	42
36	WCR	2015-16	New Katni	Augmentation Capacity by 50 HHP diesel locos at NKJ diesel shed	Diesel	25.67	Mar-18	Dec-20	6	6
37	WR	2010-11	Valsad	Augmentation of homing capacity from 100 to 125 locos.	Electric	7.96	Mar-13	Mar-20	60	46
38	WR	2013-14	Sabarmati	Diesel Loco Shed - Augmentation of homing capacity from 100 to 150 broad gauge EMD locos.	Diesel	27.21	Mar-16	Mar-21	50	40

Annexeure 1.4 B (Para 1.14)										
Details of Diesel and Electric Locos Augmnetation Works - PH42 Works (March 2019)										
Sr. No.	Zonal Rlys	Year of approval	Location	Description	Traction	Cost (₹ in crore)	Original DoC	Revised DoC	Physical prog. %	Financial prog. %
39	WR	2015-16	Vadodara	Vadodara Division:-Augmentation of homing capacity of electric loco shed Vadodara from 175 locos to 200 locos at Electric Loco Shed	Electric	24.67	Mar-18	Mar-21	45	32

Annexure 1.5 (Para 1.15)

Details of sanctioned strength and actual working of Loco Pilots among ZRs as on 31.03.2017

ZRs	Total holding of locomotives (Ref:-Ann 3A & 3B)		No. of sanctioned post of Loco Drivers		No. of Loco Drivers Working		Sanctioned strength per loco as on 31 .03.2017		Actual working per loco as on 31 .03.2017		Difference between sanctioned strength and actual working in diesel to electric, i.e., ***in opposite traction***		Difference between sanctioned strength and actual working in diesel to diesel and electric to electric, i.e., ***in same traction***	
	Diesel	Elctric	Diesel	Elctric	Diesel	Elctric	Diesel	Elctric	Diesel	Elctric	Sanctioned strength Col.8- Col. 9	Actual working Col.10- Col. 11	DSL to DSL Col. 8- Col. 10	Elect. to Elect. Col. 9- Col. 11
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CR	295	618	2038	5213	1608	4356	6.91	8.44	5.45	7.05	-1.53	-1.60	1.46	1.39
ER	358	262	3662	2071	2978	1672	10.23	7.90	8.32	6.38	2.33	1.94	1.91	1.52
ECR	329	398	1744	2099	1248	1372	5.30	5.27	3.79	3.45	0.03	0.34	1.51	1.82
ECoR	277	384	1685	5856	2021	4150	6.08	15.25	7.30	10.81	-9.17	-3.51	-1.22	4.44
NR	551	421	4368	2099	3033	1883	7.93	4.99	5.50	4.47	2.94	1.03	2.43	0.52
NCR	137	422	2466	6577	1831	4371	18.00	15.59	13.36	10.36	2.41	3.00	4.64	5.23
NER	269	2	865	0	601	0	3.22	0	2.23	0	0	0	0.99	0
NFR	420	0	2585	0	2088	0	6.15	0	4.97	0	0	0	1.18	0
NWR	273	0	3290	0	2744	0	12.05	0	10.05	0	0	0	2.00	0
SR	281	447	1332	2152	1298	2107	4.74	4.81	4.62	4.71	-0.07	-0.09	0.12	0.10

Annexure 1.5 (Para 1.15)

Details of sanctioned strength and actual working of Loco Pilots among ZRs as on 31.03.2017

ZRs	Total holding of locomotives (Ref:-Ann 3A & 3B)		No. of sanctioned post of Loco Drivers		No. of Loco Drivers Working		Sanctioned strength per loco as on 31 .03.2017		Actual working per loco as on 31 .03.2017		Difference between sanctioned strength and actual working in diesel to electric, i.e., ***in opposite traction***		Difference between sanctioned strength and actual working in diesel to diesel and electric to electric, i.e., ***in same traction***	
	Diesel	Elctric	Diesel	Elctric	Diesel	Elctric	Diesel	Elctric	Diesel	Elctric	Sanctioned strength	Actual working	DSL to DSL	Elect. to Elect.
											Col.8- Col. 9	Col.10- Col. 11	Col. 8- Col. 10	Col. 9- Col. 11
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
SCR	626	589	4036	5291	3037	4064	6.45	8.98	4.85	6.90	-2.53	-2.05	1.60	2.08
SER	343	625	802	4934	656	4671	2.34	7.89	1.91	7.47	-5.55	-5.56	0.43	0.42
SECR	178	232	525	2363	611	2347	2.95	10.19	3.43	10.12	-7.24	-6.69	-0.48	0.07
SWR	368	0	2802	0	2360	0	7.61	0	6.41	0	0	0	1.20	0
WR	429	394	1100	1089	981	948	2.56	2.76	2.29	2.41	-0.20	-0.12	0.27	0.35
WCR	400	611	2252		2012		2.23	2.23	1.99	1.99	0.00	0.00	0.24	0.24
Total and Ranges	**5534**	**5405**	**75296**		**61048**		**2.23 and 18.00**	**2.23 and 15.59**	**1.99 and 13.36**	**1.99 and 10.81**	**(-) 9.17 and 2.94**	**(-) 6.69 and 3.00**	**(-) 1.22 and 4.64**	**0.07 and 5.23**

Annexure 1.6 A (Para 1.17 a)

Statement showing details of detention to Diesel locos due to extra time taken for POH

ZRs	Name of Workshop {Diesel Loco Workshop (DLWS) and Electric Loco Workshop (ELWS)}	2014-15					2015-16					2016-17					Total 2014-17						Reasons
		POH time prescribed in days	Total locos POHed	No. of locos POHed within time	No. of locos POHed beyond permissible time	Average time taken in excess in days	POH time prescribed in days	Total locos POHed	No. of locos POHed within time	No. of locos POHed beyond permissible time	Average time taken in excess in days	POH time prescribed in days	Total locos POHed	No. of locos POHed within time	No. of locos POHed beyond permissible time	Average time taken in excess in days	Total locos POHed	No. of locos POHed within time	No. of locos POHed beyond permissible time	% of locos POHed beyond permissible time	Total time taken in excess (in days)	Average time taken in excess in days	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
CR	Parel (DLWS)	18	71	0	71	23.5	18	66	0	66	33.7	18	48	0	48	21.7	185	0	185	100%	4938	27	-
ER	Jamalpur (DLWS)	18	49	0	49	29.9	18	47	0	47	17.7	18	52	0	52	23.8	148	0	148	100%	3536	24	Want of materials
NR	Lucknow (DLWS)	18	26	9	17	6.8	18	45	10	35	8.5	18	49	1	48	8.6	120	20	100	83%	823	8	Delay in mat. supply
NWR	Ajmer (DLWS)	35	28	8	20	8.6	35	25	11	14	8.2	35	26	5	21	6.4	79	24	55	70%	420	8	Note 4
SR	Golden Rock (DLWS)	18	80	0	80	13.0	18	81	1	80	15.0	18	89	0	89	19.0	250	1	249	100%	3931	16	-
SER	Kharagpur (DLWS)	30	64	40	24	6.2	30	75	48	27	3.9	30	73	47	26	4.9	212	135	77	36%	381	5	Taken for POH as per availability of berth at Diesel Shop which is limited by the capacity of the shop
IR	Six DLWSs	0	318	57	261	17.7	0	339	70	269	17.8	0	337	53	284	16.3	994	180	814	82%	14028	17	0

Statement showing details of detention to Electric locos due to extra time taken for POH

ZRs	Name of Workshop {Diesel Workshop (DWS) and Electric Workshop (EWS)}	2014-15					2015-16					2016-17					Total 2014-17						Reasons
		POH time prescribed in days	Total locos POHed	No. of locos POHed within time	No. of locos POHed beyond permissible time	Average time taken in excess in days	POH time prescribed in days	Total locos POHed	No. of locos POHed within time	No. of locos POHed beyond permissible time	Average time taken in excess in days	POH time prescribed in days	Total locos POHed	No. of locos POHed within time	No. of locos POHed beyond permissible time	Average time taken in excess in days	Total locos POHed	No. of locos POHed within time	No. of locos POHed beyond permissible time	% of locos POHed beyond permissible time	Total time taken in excess (in days)	Average time taken in excess in days	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
CR	Bhusawal (ELWS)	Note 1	111	1	110	25.0	Note 1	121	1	120	35.6	Note 1	117	15	102	34.1	349	17	332	95%	10500	32	-
ER	Kanchrapara (ELWS)	Note 2	97	38	59	14.3	Note 2	101	31	70	9.2	Note 2	97	44	53	8.1	295	113	182	62%	1916	11	NMA
NR	Lucknow (ELWS)	30	13	2	11	24.5	30	26	17	9	7.9	30	14	11	3	9.0	53	30	23	43%	367	16	-
SR	Perambur (ELWS)	30	60	41	19	13.0	30	62	42	20	15.0	30	59	43	16	14.0	181	126	55	30%	771	14	Note 5
SER	Kharagpur (ELWS)	Note 3	58	36	22	5.1	Note 3	66	35	31	4.7	Note 3	61	20	41	6.6	185	91	94	51%	526	6	-
WR	Dahod (ELWS)	30	2	0	2	22.5	30	9	0	9	21.0	30	10	4	6	9.8	21	4	17	81%	293	17	Note 6
IR	Six ELWSs	0	341	118	223	19.1	0	385	126	259	21.7	0	358	137	221	20.3	1084	381	703	65%	14374	20	0

Note 1: Conventional POH -30 days, AC/DC POH - 35 days, 3-Phase POH - 50 days, Conventional POH+RC - 45 days

Note 2: Conventional POH - 30 days, AC/DC POH - 35 days and 3-Phase Locos POH - 50 days.

Note 3: 24 working Days for Coaching Loco and 30 working days for Goods Loco.

Note 4: Non-availability of material, heavy repairs viz. change of Engine Block/Crank Shaft/wheel set etc.; non-availability of site due to modernization work in the workshop.

Note 5: Due to waiting of locos for want of berthing space, major sub assemblies and modifications in locos as requested by customer sheds.

Note 6: Material for POH was arranged from other shed/shops causing delays; Locos have been coverted into TAOCHI for which work was carried out by shop; Two accidental locos involving heavy fabrication, body repair, camber rectification work etc.

Annexure 1.6 B (Para 1.17 a)

Statement showing detention of locos in exchange yard awaiting entry into workshop for POH

ZRs	Name of Workshop {Diesel Loco Workshop (DLWS) and Electric Loco Workshop (ELWS)}	Type of Workshop	2014-15		2015-16		2016-17		Total 2014-17			
			No. of locos detained in yard for more than a day	Average time of detention in yard (days)	No. of locos detained in yard for more than a day	Average time of detention in yard (days)	No. of locos detained in yard for more than a day	Average time of detention in yard (days)	Total locos POHed	No. of locos detained in yard for more than a day	Percentage of detention to locos POHed	Average pre-POH detention in yards (No. of days)
1	2	3	4	5	6	7	8	9	10	11	12	13
CR	PL/DLWS	Diesel	0	0	44	6.7	13	1.7	185	57	31%	2.8
ER	JMP/DLWS	Diesel	20	3	21	8.0	23	4.0	148	64	43%	5.0
NR	LKP/DLWS	Diesel	16	6.9	40	8.5	44	8.9	120	100	83%	8.1
NWR	AII/DLWS	Diesel	6	3.5	8	12.1	8	6.8	79	22	28%	7.5
SR	GOC/DLWS	Diesel	NMA	NMA	14	3.0	49	6.0	170	63	37%	3.0
Total	**Five DLWSs**	**Diesel**	**42**	**3.3**	**127**	**7.7**	**137**	**5.5**	**702**	**306**	**44%**	**5.3**
ER	KPA/ELWS	Electric	29	6.2	16	2.4	12	2.1	295	57	19%	4
NR	LKO/ELWS	Electric	NMA	NMA	NMA	NMA	NMA	NMA	NMA	NMA	NMA	NMA
SR	PER/ELWS	Electric	NMA	NMA	8	4	4	2	181	12	7%	2
Total	**Two ELWSs**	**Electric**	**29**	**6.2**	**24**	**3.2**	**16**	**2.0**	**476**	**69**	**14%**	**2.8**

No loco was detained prior to POH in the exchange yards of KGP/DLWS/SER; BSL/ELWS/CR; KGP/ELWS/SER and DHD/ELWS/WR.

Statement showing detention of locos in exchange yard/workshop after POH for despatch

1	2	3	4	5	6	7	8	9	10	11	12	13
CR	PL/DLWS	**Diesel**	35	1.8	15	1.1	21	1.8	185	71	38%	1.6
ER	JMP/DLWS	**Diesel**	1	17.0	15	18.9	9	9.1	148	25	17%	15.0
NWR	AII/DLWS	**Diesel**	NMA	NMA	NMA	NMA	NMA	NMA	NMA	NMA	NMA	NMA
SR	GOC/DLWS	**Diesel**	80	5.0	81	7.0	87	8.0	250	248	99%	6.7
Total	**Four DLWSs**	**Diesel**	**116**	**7.9**	**111**	**9.0**	**117**	**6.3**	**583**	**344**	**59%**	**7.7**
ER	KPA/ELWS	Electric	7	7.0	2	2.0	11	12.1	295	20	7%	7.0
SR	PER/ELWS	Electric	NMA	NMA	5	3.0	1	2.0	181	6	3%	1.7
Total	**Two ELWSs**	**Electric**	**7**	**7.0**	**7**	**2.5**	**12**	**7.0**	**476**	**26**	**5%**	**4.3**

No loco was detained post POH in the exchange yards of LKO/DLWS/NR; KGP/DLWS/SER; BSL/ELWS/CR; LKO/DLWS/NR; KGP/ELWS/SER and DHD/ELWS/WR.

NMA: Not Made Available.

Annexure 1.7 A (Para 1.18 a)						
Statement showing Unscheduled repairs of Diesel Locos during 2012-17						
ZRs	Year	Name of the Diesel Loco Shed (DLS)	Total no. of locos under taken unscheduled repairs		Time taken in unschedule repairs (in days)	Reasons for unscheduled repairs
			Home Railway	Foreign Railway		
1	2	3	4	5	6	7
CR	2012-13	KYN	0	0	0	0
CR	2013-14	KYN	0	0	0	0
CR	2014-15	KYN	9	0	NMA	EMF piece cracked/Water Leakage/ Tube cracked
CR	2015-16	KYN	29	0	NMA	
CR	2016-17	KYN	14	0	NMA	
CR	**Total**	KYN	**52**	**0**	**0**	**Total**
ER	2012-13	*Andal*	157	0	2004	Material Failure-92, Crew-6, Misc-59
ER	2013-14	*Andal*	137	0	630	Material Failure-84, Crew-8, Misc-45
ER	2014-15	*Andal*	111	0	1988	Material Failure-86, Crew-1, Misc-24
ER	2015-16	*Andal*	134	0	1161	Material Failure-90, Crew-9, Misc-35
ER	2016-17	*Andal*	124	0	1466	Material Failure-98, Crew-4, Misc-22
ER	**Total**	*Andal*	**663**	**0**	**7249**	*Andal*
ECR	2012-13	SPJ	NMA	NMA	NMA	NMA
ECR	2013-14	SPJ	NMA	NMA	NMA	NMA
ECR	2014-15	SPJ	38	0	602	Technical glitch, falure of equipments, etc.
ECR	2015-16	SPJ	27	0	796	
ECR	2016-17	SPJ	47	0	583	
ECR	**Total**	SPJ	**112**	**0**	**1981**	**Total**
ECoR	2012-13	VSKP	69	180	421	Water Level Problem ,Lube Oil Leaking, Fuel Oil Leaking etc.
ECoR	2013-14	VSKP	70	226	558	
ECoR	2014-15	VSKP	84	186	601	
ECoR	2015-16	VSKP	71	183	462	
ECoR	2016-17	VSKP	70	155	430	
ECoR	**Total**	VSKP	**364**	**930**	**2472**	**Total**
NR	2012-13	LKO	NMA	NMA	NMA	NMA
NR	2013-14	LKO	NMA	NMA	NMA	NMA
NR	2014-15	LKO	NMA	NMA	NMA	NMA
NR	2015-16	LKO	NMA	NMA	NMA	NMA
NR	2016-17	LKO	NMA	NMA	NMA	NMA
NR	**Total**	LKO	**NMA**	**NMA**	**NMA**	**NMA**
NCR	2012-13	JHS	0	176	212	Over due schedule, water leakage from expansion tank, Expressor loading/ unloading copper pipe broken, accident account, etc.
NCR	2013-14	JHS	0	147	173	
NCR	2014-15	JHS	0	81	361	
NCR	2015-16	JHS	0	217	336	
NCR	2016-17	JHS	0	222	286	
NCR	**Total**	JHS	**0**	**843**	**1368**	**Total**
NER	2012-13	Gonda	601	166	NMA	NMA
NER	2013-14	Gonda	495	196	NMA	NMA
NER	2014-15	Gonda	492	218	NMA	NMA
NER	2015-16	Gonda	478	189	NMA	NMA
NER	2016-17	Gonda	528	115	NMA	NMA
NER	**Total**	Gonda	**2594**	**884**	NMA	NMA

Annexure 1.7 A (Para 1.18 a)						
Statement showing Unscheduled repairs of Diesel Locos during 2012-17						
ZRs	Year	Name of the Diesel Loco Shed (DLS)	Total no. of locos under taken unscheduled repairs		Time taken in unschedule repairs (in days)	Reasons for unscheduled repairs
			Home Railway	Foreign Railway		
NFR	2012-13	NGC	142	159	397	Lube oil leakage, fuel dilution, pitting mark on wheel, drop down of RTMB belt, R-1- 8 series cylinder head and FIP support changed due to rockor broken, nozzle sleeve crack, cam roller broken, unusual sound, cam lob wornout fuel roller broken. L-1, 2, 3, 4, 5, 7 & 8 cylinder liner FIP support and head changed due to liner crack, liner top landing water leakage, crack in nozzle sleeve etc.
NFR	2013-14	NGC	181	129	440	
NFR	2014-15	NGC	339	69	629	
NFR	2015-16	NGC	383	150	787	
NFR	2016-17	NGC	230	123	896	
NFR	**Total**	NGC	**1275**	**630**	**3149**	**Total**
NWR	2012-13	ABR	8	150	930	Defect in Banzo belt, Inter cooler tube, pipe uncoupled, Engine shut down trouble etc.
NWR	2013-14	ABR	0	239	887	
NWR	2014-15	ABR	0	237	1012	
NWR	2015-16	ABR	0	204	524	
NWR	2016-17	ABR	0	278	732	
NWR	**Total**	ABR	**8**	**1108**	**4085**	**Total**
SR	2012-13	ED	85	0	816	For various kinds of attention like traction motor, cam bush, fuel tank, cam gear etc.
SR	2013-14	ED	86	0	727	
SR	2014-15	ED	100	0	633	
SR	2015-16	ED	130	0	1077	
SR	2016-17	ED	93	0	798	
SR	**Total**	ED	**494**	**0**	**4051**	**Total**
SCR	2012-13	GY	0	0	0	0
SCR	2013-14	GY	0	0	0	0
SCR	2014-15	GY	2	20	44	Wheel turniing, Fuel Leakage, Cab modification, Air Brake failure, GR tripping load meter not working etc.
SCR	2015-16	GY	23	67	180	R4 cam burst, AGFB tripping, Air Brake failure, Downloading event Recorder, Lube oil leakage, BP dropping etc.,
SCR	2016-17	GY	9	48	114	Wheel skidding, MR safety valve continuously blocking, P4 brake in contractor burnt, Fuel leakage from secondary filter etc.
SCR	**Total**	GY	**34**	**135**	**338**	**Total**
SER	2012-13	KGP	42	15	92	Various defects in locos viz. water pump defective, air compressor oil throwing, gear case body bend condition, no.1 EMF crack etc.
SER	2013-14	KGP	44	5	71	
SER	2014-15	KGP	36	5	62	
SER	2015-16	KGP	18	6	39	
SER	2016-17	KGP	28	8	57	
SER	**Total**	KGP	**168**	**39**	**321**	**Total**
SECR	2012-13	R	294	233	953	Water pump leaking, Piston Skirt broken, Break in test, Load box, All parameter checking, Prepriming, start, Cooler housing fittment, Compressor alignment etc.
SECR	2013-14	R	220	123	662	
SECR	2014-15	R	270	135	607	
SECR	2015-16	R	261	149	754	
SECR	2016-17	R	235	128	746	
SECR	**Total**	R	**1280**	**768**	**3722**	**Total**

Annexure 1.7 A (Para 1.18 a)

Statement showing Unscheduled repairs of Diesel Locos during 2012-17

ZRs	Year	Name of the Diesel Loco Shed (DLS)	Total no. of locos under taken unscheduled repairs		Time taken in unschedule repairs (in days)	Reasons for unscheduled repairs
			Home Railway	Foreign Railway		
SWR	2012-13	KJM	103	93	468	Damages to Water riser pipe, Display system, Air brake controller, Lube oil leakage, Leakage in radiator, Slippage of wheels, Speed sensor, Gear case etc.
SWR	2013-14	KJM	107	96	620	
SWR	2014-15	KJM	185	91	1465	
SWR	2015-16	KJM	199	98	781	
SWR	2016-17	KJM	150	115	722	
SWR	**Total**	KJM	**744**	**493**	**4056**	**Total**
WCR	2012-13	NKJ	0	0	0	0
WCR	2013-14	NKJ	0	0	0	0
WCR	2014-15	NKJ	285	726	1011	Cattle run over, less fuel, less water, wrong messaging. Loco coming to shed in unscheduled way, etc.
WCR	2015-16	NKJ	425	754	1179	
WCR	2016-17	NKJ	270	523	793	
WCR	**Total**	NKJ	**980**	**2003**	**2983**	**Total**
WR	2012-13	SBI	0	142	200	1) Breaking of BP angle cock, LP suction valve copper gasket. 2) Leakage in Power Assembly water inlet tube. 3) Defective BPCO, SV card, Circuit Breaker, HP suction valve. 4) Blown off Traction alternate fuses and 18 diodes. 5) Leaking Gear case.6) Burning of FCS-2 Contractor, Flasher Light Interlock, REST-1 & 2 Resistor.
WR	2013-14	SBI	0	85	107	1)Breaking of BP angle cock, LP suction valve copper gasket. 2) Leakage in Power Assembly water inlet tube. 3) Defective BPCO, SV card, Circuit Breaker, HP suction valve. 4) Blown off Traction alternate fuses and 18 diodes. 5) Leaking Gear case. 6) Burning of FCS-2 Contractor, Flasher Light Interlock, REST-1 & 2 Resistor.
WR	2014-15	SBI	0	61	104	
WR	2015-16	SBI	284	58	1343	
WR	2016-17	SBI	259	40	1448	
WR	**Total**	**SBI**	**543**	**386**	**3202**	**Total**
All ZRs	2012-13	16 DLSs	1501	1314	6493	Total
All ZRs	2013-14	16 DLSs	1340	1246	4875	Total
All ZRs	2014-15	16 DLSs	1951	1829	9119	Total
All ZRs	2015-16	16 DLSs	2462	2075	9419	Total
All ZRs	2016-17	16 DLSs	2057	1755	9071	Total
All ZRs	**2012-17**	**16 DLSs**	**9311**	**8219**	**38977**	**Total**
Total Home and Foreign			**17530**		**Total**	**Total**
Average ineffective days for unscheduled repairs					**2.22**	***Note***

***Andal*:** Since the time taken was available for lesser No. of locos, i.e., 2012-13: 536 (in r/o 42 out of 157 locos); 2013-14: 575 (in r/o 125 out of 137 locos); 2014-15: 1433 (in r/o 80 out of 111 locos); 2015-16: 875 (in r/o 101 out of 134 locos); 2016-17 : 1017 (in r/o 86 out of 124 locos), thus the total time taken in unschedule repairs of all the locos has been calculated on average basis arrived as: {(total time taken/no. of locos for which total time taken were available)*Total no. of locos under taken unscheduled repairs}

***Note*:** Average ineffective days of diesel locos on account of unscheduled repairs in days has been assessed for those locos for which "Time taken in unschedule repairs" was made available to Audit. Hence, wherever, NMA has been mentioned, the same locos were excluded {KYN/CR (52 locos) + GD/NER (3478 (2594 + 884) locos)} during 2012-17) while assessing the average time taken in unschedule repairs.

NMA: Not Made Available.

Annexure 1.7 B (Para 1.18 a)						
Statement showing unscheduled repairs of electric locos during 2012-17						
ZRs	Year	Name of Electric Loco Shed (ELS)	Total No. of locos under taken unscheduled repairs		Time taken in unschedule Repair (in days)	Reasons for unscheduled repairs
			Home Railway	Foreign Railway		
1	2	3	4	5	6	7
CR	2012-13	BSL	90	321	822	Heavy repairs work.
CR	2013-14	BSL	85	315	800	
CR	2014-15	BSL	81	351	864	
CR	2015-16	BSL	75	313	776	
CR	2016-17	BSL	74	224	596	
CR	**Total**	**BSL**	**405**	**1524**	**3858**	Total
ER	2012-13	ASN	240	584	909	Equipment Failure, Material Failure, etc.
ER	2013-14	ASN	152	638	1053	
ER	2014-15	ASN	138	559	1098	
ER	2015-16	ASN	191	308	900	
ER	2016-17	ASN	147	216	693	
ER	**Total**	**ASN**	**868**	**2305**	**4653**	Total
ECR	2012-13	MGS	NMA	NMA	NMA	NMA
ECR	2013-14	MGS	NMA	NMA	NMA	NMA
ECR	2014-15	MGS	180	NMA	397	Malfunctioning of equipments of locos.
ECR	2015-16	MGS	227	282	1271	
ECR	2016-17	MGS	234	256	971	
ECR	**Total**	**MGS**	**641**	**538**	**2639**	Total
ECoR	2012-13	ANGL	191	69	666	Wheel skidding,TFP drain plug oil leakage & broken, MU,SIV, DJ trip , blower fault, Both CTF & reverser operates automatically QOP-1 dropping , CCPT was melted repeatedly after taking one notch in loco, TM-2 arc horn flashed, LSRSI continously glowing, QLM dropped. TFP oil spalshed, CHBA not working, PT2, QLM dropped, GR oil splashed and smoke emission near GR, MVSI, MVMT, air leakage, etc.
ECoR	2013-14	ANGL	118	76	443	
ECoR	2014-15	ANGL	168	86	555	
ECoR	2015-16	ANGL	135	75	386	
ECoR	2016-17	ANGL	121	61	347	
ECoR	**Total**	**ANGL**	**733**	**367**	**2397**	Total
NR	2012-13	LDH	316	98	609	Tripping, failure, breakage of different parts etc.
NR	2013-14	LDH	389	15	583	
NR	2014-15	LDH	330	43	583	
NR	2015-16	LDH	286	50	583	
NR	2016-17	LDH	399	59	1706	
NR	**Total**	**LDH**	**1720**	**265**	**4064**	Total
NCR	2012-13	CNB	484	438	1398	GR trouble, SIV internal and external fault, Hand brake not working, VCD problems, TF oil leakage, MPCS problems, SPM not working, etc.
NCR	2013-14	CNB	495	414	1256	
NCR	2014-15	CNB	431	262	1168	
NCR	2015-16	CNB	345	182	995	
NCR	2016-17	CNB	263	183	924	
NCR	**Total**	**CNB**	**2018**	**1479**	**5741**	Total
SR	2012-13	ED	94	25	392	Loco came as dead and repairs to various items like SIV, SPM, TFP, PT1 etc.
SR	2013-14	ED	73	61	398	
SR	2014-15	ED	120	78	617	
SR	2015-16	ED	73	68	437	
SR	2016-17	ED	56	57	327	
SR	**Total**	**ED**	**416**	**289**	**2171**	Total

Annexure 1.7 B (Para 1.18 a)

Statement showing unscheduled repairs of electric locos during 2012-17

ZRs	Year	Name of Electric Loco Shed (ELS)	Total No. of locos under taken unscheduled repairs		Time taken in unschedule Repair (in days)	Reasons for unscheduled repairs
			Home Railway	Foreign Railway		
1	2	3	4	5	6	7
SCR	2012-13	BZA	264	0	528	Air Cooler air leakage, LP expired, BL2 Box bottom cable burnt, TM2 Arm power coil eartherned and burnt, Oil leakage from radiator, CCPT melting TM4 Arc horns flashed etc.
SCR	2013-14	BZA	246	0	492	Cab1 A9 heavy air leaking, QLM along dropped, CCPT melting, TM1 PE bearing seized, GR struck up on notches, SIV tripping frequently, TM1 axle cap MSU bolt broken etc.
SCR	2014-15	BZA	208	0	416	TM2 armeture earthend, A-34 insulator broken, DJ tripped with QSIT, VCB air leaking, ICDJ & 6kg feed valve air leaking, C118 and R118 cable burnts, DBR bottom leaking + PT2 damaged etc.
SCR	2015-16	BZA	147	51	524	MVRH earthed requiring charging. Through SA9 brakes not releasing, SIV tripped, DJ tripped not picking up, wheels having scrach marks, PT1 damaged, GR oil nil, GR strucking between notches etc.
SCR	2016-17	BZA	129	36	533	VCB tripped, SIV & DJ tripped, GR struck up on notches, Low voltage in BA, G/C cadmium compound leakage, QLM dropped, Bg-2 crack in between AB-8 and 10 etc.,
SCR	**Total**	**BZA**	**994**	**87**	**2493**	Total
SER	2012-13	TATA	NMA	NMA	NMA	NMA
SER	2013-14	TATA	500	40	1078	Defects in Traction Motor, TFP, RELAY, SMGR, etc.
SER	2014-15	TATA	490	11	1251	
SER	2015-16	TATA	515	58	1342	
SER	2016-17	TATA	454	195	1137	
SER	**Total**	**TATA**	**1959**	**304**	**4808**	Total
SECR	2012-13	BIA	468	223	1050	HMCS, Traction Bogie isolated, Main power off, Block-1 & 2 Isolated, VCD isolated, Harmonic filter isolated, HQOP/HOBA OFF, SIV Internal/External fault, BA voltage low, All wheel scratch mark, Bogie-2 vertical spring broken from base, CHBA not working, Brake power poor, MVSL-2 AB/SOUND, Pantograh broken, SB Oil leakage, MVMT-2 empellor blade broken, SMGR trouble, ARNO open ckt, SR oil lekage, TFP oil leakage, W/No-9 eq. beam cutter pin broken & shifted, TM isolated, Disturbance in converter, Pipe line crack, MVMT -1 smoke emission, Aux. conv - 1+2 isolated, Relay defective, CTF/Reverser defective. MPCS trouble, TM smoke emission, Machine room blower not working, Motor Temp. Sensor faulti, MCPA burnt, MCB 55.1/1 trip, etc.
SECR	2013-14	BIA	476	152	685	
SECR	2014-15	BIA	566	79	819	
SECR	2015-16	BIA	553	64	882	
SECR	2016-17	BIA	422	38	584	
SECR	**Total**	**BIA**	**2485**	**556**	**4021**	Total
WCR	2012-13	ET	183	35	458	Problems in Electric/ Mechanical parts & wheels which need loco lifting.
WCR	2013-14	ET	178	58	455	
WCR	2014-15	ET	266	29	647	
WCR	2015-16	ET	212	53	644	
WCR	2016-17	ET	215	30	750	
WCR	**Total**	**ET**	**1054**	**205**	**2954**	Total
WR	2012-13	BL	0	0	0	0
WR	2013-14	BL	72	66	164	Faulty SI unit rectifier; Isolate RSI-1 & TM-1; VCB horizantal insulator broken; Defective MPS; Auto D/valve air leakage; SIV internal fault; Broken MVMT-1 blades, etc.
WR	2014-15	BL	153	78	179	
WR	2015-16	BL	100	128	247	
WR	2016-17	BL	204	65	330	
WR	**Total**	**BL**	**529**	**337**	**920**	Total
All	2012-13	12 ELSs	2330	1793	6832	Total
All	2013-14	12 ELSs	2784	1835	7407	Total
All	2014-15	12 ELSs	3131	1576	8594	Total
All	2015-16	12 ELSs	2859	1632	8987	Total
All	2016-17	12 ELSs	2718	1420	8898	Total
All	**2012-17**	**12 ELSs**	**13822**	**8256**	**40719**	Total
Total Home and Foreign Diesel Locos undertaken unscheduled repairs			**22078**		-	Total
Average ineffective days of electric locos on account of unscheduled repairs in days					**1.84**	Total

NMA: Not Made Available.

Annexure 1.8 (Para 1.18 b)

Statement showing loco failures within 180 days of POH during 2012-17

ZRs	Name of Workshop (Diesel Loco Workshop (DLWS) /(Electric Loco Workshop (ELWS)	2012-13		2013-14		2014-15		2015-16		2016-17		Total 2012-17		
		Total No. of locos POHed	No. of locos failed within 180 days of POH	Total No. of locos POHed	No. of locos failed within 180 days of POH	Total No. of locos POHed	No. of locos failed within 180 days of POH	Total No. of locos POHed	No. of locos failed within 180 days of POH	Total No. of locos POHed	No. of locos failed within 180 days of POH	Total No. of locos POHed	No. of locos failed within 180 days of POH	percentage of failures
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CR	PL/DLWS	66	13	70	15	71	9	66	5	48	14	321	56	17%
ER	JMP/DLWS	59	32	63	34	49	32	48	26	53	31	272	155	57%
NR	LKO/DLWS	22	8	20	11	26	12	45	17	49	14	162	62	38%
NWR	AII/DLWS	9	NMA	34	23	28	15	25	14	26	10	122	62	51%
SR	GOC/DLWS	101	30	111	26	80	21	81	20	89	14	462	111	24%
SER	GKGP/DLWS	77	28	87	46	64	50	75	49	73	22	376	195	52%
IR	**Six DLWSs**	**334**	**111**	**385**	**155**	**318**	**139**	**340**	**131**	**338**	**105**	**1715**	**641**	**37%**
CR	BSL/ELWS	105	28	101	11	104	16	113	12	112	19	535	86	16%
ER	KPA/ELWS	56	18	60	33	97	50	101	25	97	25	411	151	37%
NR	LKO/ELWS	19	13	10	6	13	5	26	4	14	1	82	29	35%
SR	PER/ELWS	57	NMA	58	NMA	60	0	62	0	59	0	296	0	0
SER	KGP/ELWS	57	6	56	3	58	7	66	3	61	3	298	22	7%
WR	DHD/ELWS	4	0	0	0	2	1	9	3	10	1	25	5	20%
IR	**Six ELWSs**	**298**	**65**	**285**	**53**	**334**	**79**	**377**	**47**	**353**	**49**	**1647**	**293**	**18%**

NMA: Not Made Available

Annexure 2.1 (Para 2.2)			
Number of trains operated with 18 coaches or more per rake and running at a maximum speed of >=100 kmph as on March 2018			
Zonal Railway	**Total number of rakes with conventional coaches**	**LHB rakes**	**No. of conventional rakes with 18 or more coaches running with maximum speed of >=100 kmph**
CR	141	29	55
ER	137	24	100
ECR	171	16	0
ECoR	90	15	38
NR	245	65	36
NCR	73	5	14
NWR	135	6	44
NER	125	4	45
NFR	141	7	56
SR	201	16	114
SWR	66	12	49
SER	129	18	84
SECR	41	6	22
SCR	224	8	120
WR	116	20	95
WCR	82	1	31
Total	**2117**	**252**	**903**

Annexure 2.2 (Para 2.3)								
Analysis of production of coaches during the last five years								
Production units	Original plan of production		Changes in production plan during the year		Final production Plan		Actual production	
	Conventional	LHB	Conventional	LHB	Conventiona	LHB	Conventiona	LHB
ICF								
2013-14	1548	50	1537	50	1612	50	1597	25
2014-15	1565	67	1905	100	1629	67	1639	65
2015-16	1508	285	1812	238	1668	285	1775	230
2016-17	1580	420	1871	458	1700	478	1877	400
2017-18	1547	430	1623	847	1606	858	1713	790
Total	**7748**	**1252**	**8748**	**1693**	**8215**	**1738**	**8601**	**1510**
RCF								
2013-14	0	0	0	0	1184	395	1162	389
2014-15	0	0	0	0	1202	391	1130	350
2015-16	1132	463	0	0	1149	463	1077	526
2016-17	1165	460	894	594	894	615	918	571
2017-18	1015	575	599	836	598	762	592	659
Total	**3312**	**1498**	**1493**	**1430**	**5027**	**2626**	**4879**	**2495**
MCF								
2013-14	0	150	0	150	0	150	0	130
2014-15	0	300	0	200	0	160	0	140
2015-16	0	600	0	500	0	500	0	285
2016-17	0	750	0	625	0	615	0	576
2017-18	0	1000	0	734	0	710	0	711
Total	**0**	**2800**	**0**	**2209**	**0**	**2135**	**0**	**1842**
GT	***11060***	***5550***	***10241***	***5332***	***13242***	***6499***	***13480***	***5847***
2013-14					2796	595	2759	544
2014-15					2831	618	2769	555
2015-16					2817	1248	2852	1041
2016-17					2594	1708	2795	1547
2017-18					2204	2330	2305	2160

Annexure 2.3 (Para 2.3.2)						
Conversion of conventional rakes into LHB rakes						
Zonal Railway	**Year**	**Total number of rakes with LHB coaches as on 1 April of the year**	**Total number of rakes with conventional coaches as on 1 April of the year**	**Planned for conversion into LHB rakes during the year**	**Actually converted into LHB rakes during the year**	**Reasons for non-conversion, if any.**
CR	2014-15	4	159	4	4	NA
	2015-16	5	160	1	1	Not applicable
	2016-17	27	144	22	22	Not applicable
	2017-18	29	141	2	2	Not applicable
	Total				25	
ER	2014-15	13	145	33	0	Non-availability of full complement of LHB coaches; non-availability of CRS sanction of some types of LHB coaches.
	2015-16	13	151	0	1	
	2016-17	13	150	42	5	
	2017-18	19	146	0	5	
	Total				11	
ECR	2014-15	6	163		0	
	2015-16	6	166		4	*New train having no. 82355/82356 & 15563/15564 introduced with LHB coaches on 09.08.2015 and 08.10.2017 respectively.
	2016-17	11	162		6	
	2017-18	17	156		1	
	Total				11	
ECoR	2014-15	NMA	NMA	1	1	Operating Department stated that, "ICF rakes will be replaced according to the directives & allotment from Railway Board. The policy decision to switch over from ICF to LHB coaches lies within the jurisdiction of Railway Board. Further, there is no standing instruction to convert ICF coaches to LHB coaches"
	2015-16	Not made available	Not made available	0	0	
	2016-17	Not made available	Not made available	5	0	
	2017-18	14	90	4	1	Non receipt of coaches from Production Unit. Three rakes have been converted on 12.04.2018, 22.4.2018 and 28.06.2018)
	Total				1	
NR	2014-15	30	280		0	
	2015-16	41	275		5	
	2016-17	51	267	16	5	
	2017-18	54	256		8	
	Total				18	

Annexure 2.3 (Para 2.3.2)						
Conversion of conventional rakes into LHB rakes						
Zonal Railway	**Year**	**Total number of rakes with LHB coaches as on 1 April of the year**	**Total number of rakes with conventional coaches as on 1 April of the year**	**Planned for conversion into LHB rakes during the year**	**Actually converted into LHB rakes during the year**	**Reasons for non-conversion, if any.**
NCR	2014-15	1	76	0	0	Against planned for conversion into 02 LHB rakes, one rake was converted during 2017-18 & remaining one rake was converted in July 2018. Hence position of actually conversion done into LHB rake during 2017-18 was shown one rake.
	2015-16	1	78	0	0	
	2016-17	1	77	2	2	
	2017-18	3	78	2	1	
	Total				3	
NWR	2014-15	4	127	0	0	--
	2015-16	4	130	0	0	--
	2016-17	4	130	0	0	--
	2017-18	5	134	0	0	--
	Total				0	
NER	2014-15	0	128	0	0	Due to non-allotment of rakes
	2015-16	3	125	3	3	
	2016-17	4	124	1	1	
	2017-18	4	125	0	0	
	Total				4	
NFR	2014-15	3	117	0	0	Non availability of LHB coaches
	2015-16	3	130	0	0	
	2016-17	4	131	0	0	
	2017-18	7	141	9	3	short reecipt of LHB coaches
	Total				3	
SR	2014-15	1	190	1	1	-
	2015-16	8	204	2	2	
	2016-17	14	198	3	5	
	2017-18	16	201	9	1	
	Total				9	
SWR	2014-15	5	62	0	0	-
	2015-16	5	62	5	0	-
	2016-17	9	63	8	3	-
	2017-18	12	63	12	0	-
	Total				3	

Annexure 2.3 (Para 2.3.2)						
Conversion of conventional rakes into LHB rakes						
Zonal Railway	**Year**	**Total number of rakes with LHB coaches as on 1 April of the year**	**Total number of rakes with conventional coaches as on 1 April of the year**	**Planned for conversion into LHB rakes during the year**	**Actually converted into LHB rakes during the year**	**Reasons for non-conversion, if any.**
SER	2014-15	4	160	0	0	Not applicable
	2015-16	5	159	0	0	Not applicable
	2016-17	11	160	2	2	Not applicable
	2017-18	15	147	6	2	Delay in conversion for want of stock
	Total				4	
SECR	2014-15	NIL	43	0	0	
	2015-16	NIL	42	0	0	
	2016-17	3	43	0	0	
	2017-18	7	41	7	2	2 Rakes were provided by Rly Board
	Total				2	
SCR	2014-15	2	224	0	0	Conversion done based on allotment received from Rly Board
	2015-16	3	226	0	0	
	2016-17	6	232	0	0	
	2017-18	11	224	5	5	
	Total				5	
WR	2014-15	10	114	0	0	NA
	2015-16	10	114	1	0	Due to non-receipt of required coaches
	2016-17	10	114	1	1	---
	2017-18	14	113	12	8	---
	Total				9	
WCR	2014-15	01*	73	0	0	Requisition was not sent to RB.
	2015-16	1	73	0	0	
	2016-17	0	77	0	0	
	2017-18	1	82	13	1	Only rake allotted by RB.
	Total				1	
Total	**2014-15**			**39**	**6**	
	2015-16			**12**	**16**	
	2016-17			**102**	**52**	
	2017-18			**81**	**40**	
	Grand total			**234**	**114**	

Annexure 2.3 a (Para 2.3.2)		
List of important trains running with conventional coaches		
Railway	Train no.	Name
Zonal Railway	Train number	Train name
ECR	12565/66	Dharbhanga - New Delhi Sampark Kranti Express
	12545/46	Raxaul - Lokmanya Tilak Terminus Karmbhumi Express
	12521/22	Barauni - Ernakulam Rapti Sagar Express
	12391/92	Rajgir - New Delhi Shramjivi Express
	13237/38	Patna - Kota Express
	13202/02	Lokmanya Tilak Terminus - Rajendra Nagar express
ECoR	12074	BBS JAN SHATABDI EXP
	12281	Bhubaneswar Duronto Express
	22805	BBS ANVT SUP EXP
	22882	BBS PUNE EXP
	22871	BBS TPTY WEEKLY EXP
	22879	BBS TPTY SUP EXP
	12819	Orissa Sampark Kranti
	12880	BBS LTT EXP
	18463	PRASANTI EXP
	12880	BBS LTT EXP
	22879	BBS TPTY SUP EXP
	12832	BKSC GARIB RATH
	12892	Bbubaneswar-Bangriposi Superfast Express
	12893	Bhubaneswar-Balangir Express
	12898	Bhubaneswar Pondicherry Express
	18496	BBS RMM EXPRESS
	18447	HIRAKHAND EXP
	18437	BBS BWIP LINK EXP
	22890	PURI DIGHA EXP
	18449	B NATH DHAM EXP
	12896	PURI HWH EXP
	22866	PURI LTT SF EXP
	18407	PURI SNSI EXP
	18473	PURI JU EXPRESS
	12815	Neelanchal Express
	12843	Puri-Ahmedabad Express
	18401	PURI OKHA EXP
	22836	PURI SHM SF EXP
	18421	PURI AJMER EXP
	12881	PURI HWH G RATH
	22883	PURI YPR GARIB RATH
	18410	SRI JAGANNATH EXP
	18414	PURI PRDP
	18425	PURI DURG EXP
	18452	TAPASWINI EXP
	18477	Utkal Express
	12805	Janmbhumi Express
	18507	VSKP ASR HKG EXP
	18501	VSKP GIMB EXP
	18507	VSKP ASR HKG EXP
	20811	VSKP NANDED
	22819	BBS VSKP INTERCITY EXP
	18512	VSKP KPRU
	18518	VSKP KRBA EXP
	18503	VSKP SNSI EXP
	22869	VSKP MAS SF EXP
	20816	VSKP TATA
	18567	VSKP QLN EXP
	18573	VSKP BGKT EXP
	22874	VSKP DIGHA EXP
	22847	VSKP LTT EXPRESS
	22801	VSKP MAS SF EXP
	22810	PRDP SF EXP
	22814	PRDP SRC EXP
	18311	SBP BSB EXPRESS
	18301	SBP RGDA EXP
	18303	SBP PURI INTERCITY
	18309	SBP JAMMU TAWII EXP
	20809	NAGAVALI

Annexure 2.3 a (Para 2.3.2)		
List of important trains running with conventional coaches		
Railway	Train no.	Name
Zonal Railway	Train number	Train name
ER	22201	Sealdah-Puri Duronto Exp.
	12359	Kolkata-Patna Garibrath Exp.
	22309	Howrah-New Jalpaiguri AC Express
	12249	Howrah-Anand Vihar Yuva Express
	12307	Jodhpur Exp.
	12311	Kalka Mail
	12321	Mumbai Mail
	12325	Kolkata-Nangal Dam Express
	12327	Upasana Exp.
	12333	Vibhuti Exp.
	12335	Bbhagalpur-Lokmanyatilak Express
	12337	Santiniketan Exp.
	12339	Coal Field Exp.
	12341	Agnee Veena Exp.
	12343	Darjeeling Mail
	12345	Saraighat Exp.
	12347	Howrah-Rampur Hat Express
	12349	Bhagalpur-New Delhi Express
	12361	Asansol-C Shivaji Maharaj Terminal Express
	12363	Kolkata-Haldibar Express
	12369	Kumbha Exp.
	12371	Howrah-Jaisalmer Express
	12373	Sealdah-Rampur Hat Express
	12383	Asansol-Sealdah Express
	13005	ASR Mail
	13007	Toofan Exp.
	13009	Doon Exp.
	13011	HWH-MLDT Intercity Exp.
	13013	BWN-RPH Exp.
	13015	HWH-BHP Kaviguru Exp.
	13017	Ganadevata Exp.
	13019	Bagh Exp.
	13021	Mithila Exp.
	13023	HWH-GYA Exp.
	13027	HWH-AZ Kaviguru Exp.
	13033	HWH-KIR Exp.
	13043	HWH-RXL Exp.
	13049	HWH-ASR Exp.
	13053	HWH-Siuri Exp.
	13063	HWH-BLGT Exp.
	13071	HWH-JMP Exp.
	13103	Bhagirathi Exp.
	13105	Balia Exp.
	13113	KOAA-Lalgola Exp.
	13117	KOAA-Lalgola Exp.
	13119	SDAH-ANVT Exp.
	13131	KOAA-PNBE Exp.
	13133	SDAH-BSB Exp.
	13137	KOAA-AMH Exp.
	13141	Teesta Torsa Exp.
	13145	Radhikapur Exp.
	13147	Uttarbanga Exp.
	13149	Kanchankanya Exp.
	13151	Jammu Tawi Exp.
	13153	Gour Exp.
	13155	Mithilanchal Exp.
	13157	Tirhut Exp.
	13159	KOAA-Jogbani Exp.
	13161	KOAA-Balurghat Exp.
	13163	Hatey Bazare Exp.
	13165	KOAA-SMI Exp.
	13169	Hatey Bazare Exp.
	13167	KOAA-AGC Exp.
	13185	Gangasagar Exp
	13187	SDAH-RPH Exp.
	13401	BGP-DNR Exp.
	13403	Vananchal Exp.
	13409	MLDT-JMP Exp.
	13413	Farakka Exp.

Annexure 2.3 a (Para 2.3.2)		
List of important trains running with conventional coaches		
Railway	Train no.	Name
Zonal Railway	Train number	Train name
	13415	MLDT-PNBE Exp.
	13417	MLDT-Digha Exp.
	13419	BGP-MFP Exp.
	13421	MLDT-NDAE Exp.
	13423	BGP-All Exp.
	13425	MLDT-ST Exp.
	13429	MLDT-ANVT Exp.
	13465	MLDT-HWH Intercity Exp.
	13483	Farakka Exp.
	13501	ASN-HLZ Exp.
	13505	ASN-Digha Exp.
	13507	ASN-GKP Exp.
	13509	ASN-Gonda Exp.
	13511	ASN-Tata Exp.
	22321	Hool Exp.
SR	12615/12616	Grand Trunk Express(MAS-NDLS)
	12621/12622	Tamil Nadu Express(MAS-NDLS)
	16021/16022	Kaveri Express (MAS-MYS)
	12655/12656	Navajeevan Express (MAS-ADI)
	12605/12606	Pallavan Express(MAS-KKDI)
	12635/12636	Vaigai Express (MS-MDU)
	16345/16346	Netravati Express(TVC-LTT)
NER	12587/12588	Gorakhpur- Jammu Tawi; Amarnath Exp.
	15097/15098	Bhagalpur - Jammu Tawi ;Amarnath Exp.
	12511/12512	Gorakhpur- Trivendrum Central; Rapti Sagar Ex/
	12589/12590	Gorakhpur- Secunderabad Ex.
	12591/12592	Gorakhpur- yashvantpur Ex
	15047/15048	Gorakhpur- Kolkata; Purvanchal Exp.
	15049/15050	Gorakhpur- Kolkata ;Purvanchal Exp.
	15051/15052	Gorakhpur- Kolkata; Purvanchal Exp.
	15017/15018	Gorakhpur- Lokmanyatilak Exp.
	12555/12556	Gorakhpur- Hisar; Gorakhdham Exp.
	15005/15006	Gorakhpur- Dehradun Exp.
	15003/15004	Gorakhpur- Kanpur Anwarganj; Chauri Chaura Exp.
	15007/15008	Lucknow- Varanasi city; krishak Exp.
	12533/12534	Lucknow- Chatrapati Terminus; Pushpak Exp.
	15021/15022	Gorakhpur- Shalimar Exp
	15029/15030	Gorakhpur- Pune Exp.
WR	12267/68	Rajkot -Mumbai Central- Duronto Epress
	12903/04	Mumbai Central-Amritsar-Golden Temple Express
	12909/10	BDTS-NZM-GARIBRATH EXP.
	12919/20	Indore-Shmata Vd Katra (Malwa Express)
	12927/28	Vadodara Express (Mumbai-Vadodra Jn.)
	12925/26	Paschim Express (Bandra Terminus-Amritsar)
	12955/56	Mumbai-Jaipur Superfast Express
	12961/62	Mumbai-Indore-Avantika Express
	19031/32	ADI-HW- HOWRA MAIL
	19017/18	BDTS-JAM EXP.
	19116/15	BHUJ-DDR-SAYAJI EXP.
	19215/16	BCT-PBR-SUARASHTRA EXP.
	19223/24	ADI-JAT-EXPRESS
	19310/09	IND-GNC SHANTI EXP.
	22953/54	BCT-ADI-GUJRAT EXP.
	22955/56	BDTS-BHUJ-KUTCH EXP.
	22945/46	BCT-OKHA EXP.
NCR	11107/11108	Bundelkhand Express
	11123/11124	Barauni Gwalior Express
	11109/11110	Intercity Express
	12179/12180	Intercity Express
	12175/12176	Chambal Express
	12403/12404	Allahabad-Jaipur Express
	14163/14164	Sangam Express
SECR	18239- 2 rakes	Gewra Road- NGP Express
	18234 – 3 rakes	Narmada Express
	18237 – 5 rakes	Chhattisgarh Express
	18253/12854 – 2 rakes	Amarkantak Super Fast Express
	18241/18242 – 2 rakes	Ambikapur Express

Annexure 2.3 a (Para 2.3.2)		
List of important trains running with conventional coaches		
Railway	Train no.	Name
Zonal Railway	Train number	Train name
NWR	12963/64	Mewar Express (H.Nizamuddin-Udaipur)
	12981/82	Chetak Express (Delhi S. Rohilla-Udaipur)
	12987/88	Sealdah Express (Sealdah-Ajmer)
	19609/10	AJMER-HARIDWAR-AJMER EXPRESS
	19611/12	AJMER-AMRITSAR-AJMER EXPRESS
	19613/14	AJMER-AMRITSAR-AJMER EXPRESS
	12461/62	Mandore Express (Delhi-Jodhpur)
	12479/80	Surya Nagri Express (Jodhpur-Bandra Terminus)
	14853/54	VARANASI JU VARANASI MARUDHAR EXPRESS
	14863/64	VARANASI JU VARANASI MARUDHAR EXPRESS
	14865/66	VARANASI JU VARANASI, MARUDHAR EXPRESS
SCR	12760	Charminar Express (Hyderabad Decan-Chennai Central)
	12723	Telangana Express (Hyderabad-New Delhi)
	12728	Godavari Express (Hyderabad-Visakhapatnam)
	12738	Gautami Express (Lingampalli-Kakinada Port)
	12709	Simhapuri Express Gudur-Secunderabad)
	12704	Falaknuma Express (Secunderabad-Howrah)
	12734	Narayanadri Express Lingampalli-Tirupati)
	12764	Padmavathi Express (Secunderabad-Tirupati)
	12797	Venkatadri Express (Kachegua-Chitoor)
	17064	Ajantha Express
NR	12445/46	Udhampur Sampark Kranti Express
	12231/32	Lucknow-Chandigarh Express
	14257/58	Varanasi-New Delhi Kashi Vishwanath Express
SWR	12079/12080	Bengaluru-Huballi -Jan Shatabdi Express
	12607/12608	Chennai-Bengaluru - Lalbagh Express
	12609/12610	Bengaluru-Cheenai - Mysuru Express
	12627/12628	Bengaluru-New Delhi - Karnataka Express
	12629/12630	Yasvantpur-H. Nizamuddin - Sampark Kranti Express
	12657/12658	Chennai-Bengaluru - Bangalore Mail
	16517/16518	SBC-CAN-KAWR-SBC Express
	16531/16532	AII-YPR-AII Garib Nawaz Express
	16589/16590	SBC-KOP-SBC Rani Chennamma Express
	16591/16592	UBL-MYS-UBL Hampi Express
WCR	22192/22191	Jabalpur / Indore
	12059/12060	Kota Nizamuddin Jan Shatabdi
	16517/16518	Kannur Express
	16531/16532	Bangalore Garib Nawaj Express
	16589/16590	Rani Chennamma Express
	16591/16592	Hampi Express
	11447/11448	Jabalpur Howrah Shaktipunj
	11449/11450	Jabalpur Jammutavi Exp
	11464/11463	Jablpur Somnath Exp
	11464/11465	
CR	17411/17412	Mumbai Kolhapur Mahalaxmi Express
	11093/11094	Mumbai Varanasi Mahanagari Express
	11055/11056	LTT Gorakhpur Godan Express
	11057/11058	Mumbai Amritsar Express
	11301/11302	Mumbai Chennai Expres
	16345/16346	LTT Thiruvananthapuram Netravati Express
	11019/11020	Mumbai Bhubaneswar Konark Express
SER	12810/12811	Howrah-C. Shivaji Maharaj Terminal - Howrah Mumbai Mail
	12841/12842	Howrah-Chennai Coromondal Express
	12877/12878	Ranchi-New Delhi Garib Rath
	22213/22214	Shalimar-Patna Duronto Express
	22887/22888	Howrah-Yasvantpur Humsafar Express
NCR	11107/11108	Bundelkhand Express
	11123/11124	Barauni Gwalior Express
	11109/11110	Intercity Express
	12179/12180	Intercity Express
	12175/12176	Chambal Express
	12403/12404	Allahabad-Jaipur Express
	14163/14164	Sangam Express

Annexure 2.4 (Para 2.4)

Maintenance Facilities of LHB coaches at the Coaching Depots

Zonal Railway	Total number of coaching depots in Railways	No. of Depot selected	Name of Depots	No. of depots where infrastructure faciliteis are adequate	Number of depots were trained manpower not available	Number of depots where spare items not being maintained properly	Number of depots where required infrastructure facilites have not been adequately proposed	Details of maintenance facilities available
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
CR	20	6	Lokmanya Tilak Terminus (LTT), Mazgaon (MZN), Manmad (MMR), Ghorpadi Coach Maintenance Complex (GCMC)/ Pune and Ajni depots.	3	0	0	2	At Mazgaon and LTT depots, the works related to maintenance of LHB coaches, though sanctioned was yet to be started. At Manmad depot, proposal for making arrangements for Shop Schedule for LHB coaches was under process. In other two depots, infrastructural facilities were available. In all the above coaching depots, trained staff and spare parts for LHB coaches were available.
ECoR	4	3	PURI (Puri), VSKP (Visakhapatnam) and SBP (Sambalpur)	2	0	0	1	There is sufficient stock of spare items (stock and non-stock) to carry out the maintenance of LHB coaches in PURI and VSKP coaching depots. It was also noticed that manpower is being trained in a phase-wise manner. SBP coaching depot does not have LHB coaches.
ECR	15	3	Rajendra Nagar coaching centre (RNCC), Gaya depot and Jaynagar depot	3	0	2	0	In these three depots, number of holding LHB coaches were 447 during 2017-18. Various works related to extension of pit lines, sick lines and enhancing the capacity of depots for maintenance of LHB coaches have been taken up in these depots. However, some other works relating to maintenance of LHB coaches were pending at various stages as on 30th September 2018. In Rajendra Nagar Coaching Depot (RNCC), dedicated store for LHB spares had not been commissioned till 30th September 2018. A proposal has been initiated by the coaching depot for construction of LHB store only in July 2018 and the same was under approval. Analysis of stock position of the LHB spares at these depots revealed satisfactory position in RNCC, whereas in Gaya and Jayanagar depots, position of the LHB spares in the store of the depot was not satisfactory as number of times, spares had to be brought from other depots
ER	13	4	Tikiapara Coaching Depot, Bhagalpur Coaching Depot, New Coaching Complex and Coaching Depot at Kolkata Terminal	3	0	1	1	Necessary infrastructure was available in all coaching depots, except in Bhagalpur Coaching Depot of Malda Division, where maintenance of LHB coaches was affected due to non-availability of spare items such as primary springs for Non-AC inner and outer, speed sensors, pressure switch etc. The work for augmentation of coaching infrastructure facilities for LHB coaches at Bhagalpur was sanctioned in 2017-18 with the date of completion targeted as February 2019; as of November 2018, the physical progress of the work was only 1 per cent.
NFR	11	3	Kamakhya (KYQ), New Jalpaiguri (NJP) and Dibrugarh (DBRG)	2	2	2	1	KYQ Coaching Depot was equipped with spare items required for maintenance of LHB coaches , whereas NJP Coaching Depot and DBRG Coaching Depot were not equipped with spare items required for maintenance for LHB coaches. Spare items were obtained from neighboring workshops as and when required. In NJP, apart from insufficient capacity of NJP sick line, overhead crane facility was not available there which is a pre-requisite for such maintenance activity. In these two depots, there were no adequate trained staff for maintenance of LHB coaches.

Annexure 2.4 (Para 2.4)

Maintenance Facilities of LHB coaches at the Coaching Depots

Zonal Railway	Total number of coaching depots in Railways	No. of Depot selected	Name of Depots	No. of depots where infrastructure faciliteis are adequate	Number of depots were trained manpower not available	Number of depots where spare items not being maintained properly	Number of depots where required infrastructure facilites have not been adequately proposed	Details of maintenance facilities available
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
NR	13	4	Lucknow, Hazrat Nizamuddin, SVDK and Chandigarh coaching depots	1	1	1	3	In Lucknow coaching depot, no proper infrastructure has been provided for maintenance of LHB rake. Only one curved pit line is available to deal with maintenance of three LHB rakes. In SVDK depot, there was lack of important facilities/infrastructure for the maintenance of LHB coaches such as 25MT EOT crane, LHB tool kits, Trained manpower and timely availability of required items etc. In Chandigarh coaching depot, there was shortage of Under Floor Wheel lathe for eradicating the problem of shelling in wheels. Due to this coaches were being sent to ANVT Depot or wheels changed and sent to JUDW. Hazrat Nizamuddin coaching depot have sufficient infrastructure to maintain LHB coaches. Shortage of trained staff was also noticed in all the four coaching depots.
NWR	9	3	Udaipur, Sri Ganganagar and Jaipur coaching depots	0	0	0	3	Adequate technical training for smooth and efficient maintenance of LHB coaches have been imparted from time to time. However, some of the essential apparatuses and infrastructure facilities required for the proper maintenance activities of LHB coaches such as Synergic Pulse Tag Welding Plants, Welding rectifier, Room for storing cleaning equipment, Storage facility for refrigerants etc. were not available in the coaching depots
SCR	13	4	Secunderabad, Hyderabad, Tirupati and Vijayawada coaching Depots	4	4	0	0	There were shortage of skilled manpower for maintenance of LHB coaches in all the four coaching depots. However, infrastructure facilities were found sufficient to carry out maintenance of LHB coaches
SECR	3	2	Bilaspur and Durg coaching depots	0	0	0	2	Though LHB rakes were being received in these depots for maintenance, no infrastructure were developed in these depots.
SER	**8**	4	Tatanagar, Hatia, Adra and Santragachi coaching depots	**2**	0	3	**1**	Tatanagar was not maintaining adequate spares for maintenance of LHB coaches due to non-supply of spares from General Stores Depot/KGP. Hatia was not maintaining adequate spares. Adra was not maintaining any spares for maintenance of LHB coaches as no maintenance work was done at the depot. However, Santragachi Coaching Depot was maintaining 86 Stock and 89 Non-stock spares for maintenance of LHB coaches. Training for maintenance activities of LHB coaches was provided to staff/ Supervisor on regular basis. Hatia was having sufficient infrastructure for schedule attentions. Tatanagar and Adra have not developed specific infrastructure for maintaining LHB coaches.

Annexure 2.4 (Para 2.4)

Maintenance Facilities of LHB coaches at the Coaching Depots

Zonal Railway	Total number of coaching depots in Railways	No. of Depot selected	Name of Depots	No. of depots where infrastructure faciliteis are adequate	Number of depots were trained manpower not available	Number of depots where spare items not being maintained properly	Number of depots where required infrastructure facilites have not been adequately proposed	Details of maintenance facilities available
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
SR	18	4	Basin Bridge, Coimbatore, Kochuveli and Madurai coaching depots	4	0	1	0	In respect of coaching depots at Basin Bridge, Coimbatore and Madurai, spares were available for LHB coaches which were procured locally and from ICF/RCF. In Kochuveli, stocks of spares materials were not available for LHB coaches, In all the four depots where LHB coaches are maintained, adequate staff were trained for the maintenance of LHB coaches. No deficiencies were noticed in these depots in regard to infrastructure facilities for maintenance of LHB coaches.
SWR	6	3	SBC, MYS and VSG Coaching Depots	3	0	0	0	Necessary spare items (stock and non-stock) were maintained separately for LHB Coaches. All technical staff were imparted training on induction into service
WCR	7	1	Jabalpur Depot	1	0	0	0	No discrepancies were noticed.
WR	17	3	Mumbai Central, Ahmedabad and Indore BG coaching depots	3	0	0	0	The sufficient facilities/infrastructure required for maintenance of LHB coaches in the coaching depots have been provided at all the three depots. No discrepancies were noticed.
NER	11	3	Lucknow, Manduadeeh, Gorakhpur	3	0	0	0	As per Maintenance Manual of LHB coaches, 16 Tools & Plants (T&P) are required. In Lucknow depot, four T & P such as Phosphating plants is not available at any of the selected depot. While CO2 welding plants, Pneumatic hand girders, Component Painting unit are not available at two selected depots.
NCR	8	3	Allahabad, Agra and Gwalior coaching depots	0	0	2	0	All infrastructural facilities/M&P/Spare stock items/trained staff, which are required as per maintenance manual of LHB coaches were not available in the depots. Important items such as Brush Banister, Passenger emergency valve, Sunmica sheet, etc. required for the maintenance of LHB coaches were not available in Allahabad depot. In respect to Agra and Gwalior depot, stock items required for maintenance of LHB coaches were not available
Total	**176**	**53**		**34**	**7**	**12**	**14**	