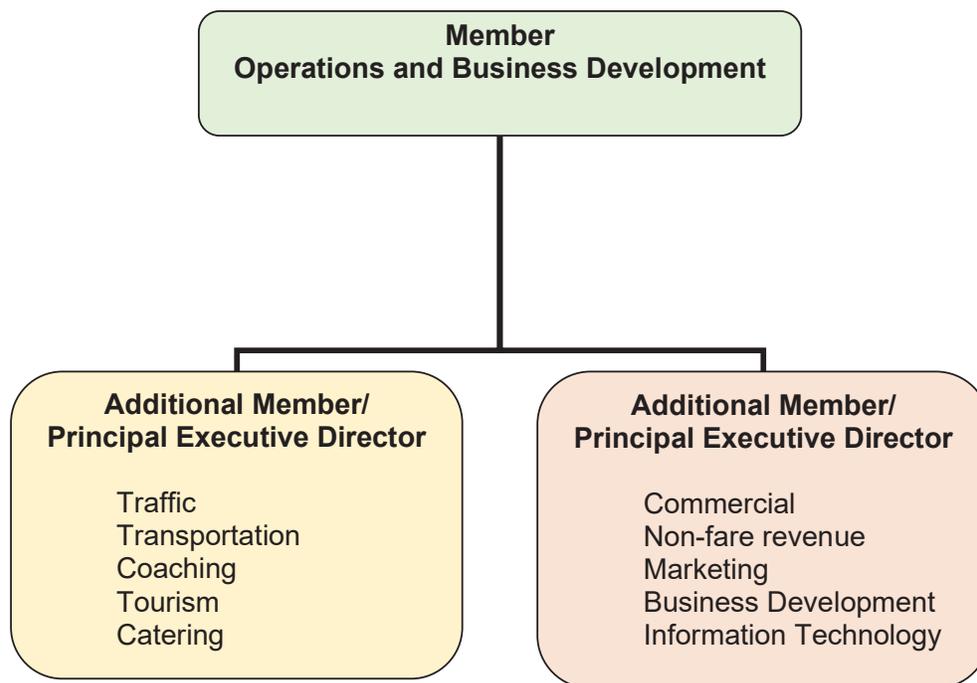


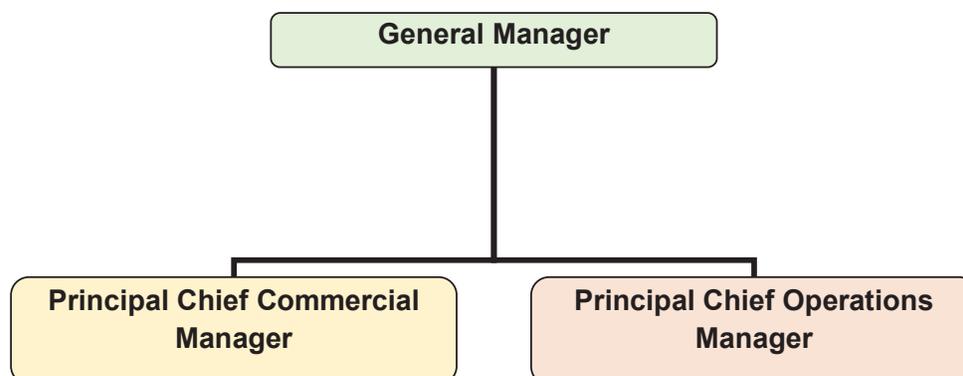
## Chapter 2 – Operations and Business Development

Member (Operations and Business Development) at Railway Board is assisted by Additional Members/Principal Executive Directors for fulfilling his responsibilities.

### Railway Board Level



### Zonal level



At the Zonal level, the Traffic Department has two departments, viz. Operating and Commercial. These are headed by Principal Chief Operations Manager (PCOM) and Principal Chief Commercial Manager (PCCM) respectively, who work under the overall supervision of General Manager of the Zonal Railway. At the divisional level, the Operating and Commercial Departments are

headed by Senior Divisional Operations Manager (Sr.DOM) and Senior Divisional Commercial Manager (Sr.DCM) respectively, who report to Divisional Railway Manager (DRM) of the concerned Division.

The total traffic operating expenses during the year 2019-20 was ₹ 29, 865 crore<sup>10</sup>. Total gross traffic receipt during the year was ₹ 1,74,357 crore<sup>11</sup>. A comparative graph of Gross Traffic Receipts for the last five years is shown below:



During 2019-20, annual growth rate of passenger originating dropped by 4.19 *per cent*<sup>12</sup> over the previous year. Passenger earnings in 2019-20 decreased by 0.78 *per cent*<sup>13</sup> as compared to previous year. In 2019-20, freight loading decreased by 1.07 *per cent*<sup>14</sup>. The freight earnings decreased by 10.94 *per cent* as compared to the previous year. Sundry earnings in 2019-20 decreased by 16.20 *per cent* from ₹ 6,996 crore to ₹ 5,863 crore when compared to the previous year.

During the year, apart from regular audit of vouchers, tenders *etc.*, 1,242 offices of the Commercial and Operating departments were audited.

This Chapter includes a Pan India Paragraph on 'Punctuality and travel time in train operations in Indian Railways' in addition to five individual paragraphs

<sup>10</sup> Sub Major Head 3002-3003 (07)-Operating Expenses - Traffic in 2019-20

<sup>11</sup> Includes Passenger Earnings-₹ 50,669.09 crore, Freight Earnings-₹ 1,13,487.89 crore, Other Coaching Earnings-₹ 4,640.79 crore and Sundry Earnings-₹ 5,862.75 crore, Clearance for Traffic Outstanding (Suspense)-₹ (-) 303.92 crore

<sup>12</sup> Indian Railways carried 8,085.74 million passengers during 2019-20 as against 8,439.06 million passengers in the previous year

<sup>13</sup> ₹ 51,066.65 crore in 2018-19 and ₹ 50,669.09 crore in 2019-20

<sup>14</sup> 1,221.48 million tonne in 2018-19 to 1,208.41 million tonne in 2019-20

discussing compliance issues in the implementation of rules and regulations on Passenger and Freight Business in Indian Railways.

## **2.1 Punctuality and travel time in train operations in Indian Railways**

### **2.1.1 Introduction**

Efficient management of operations in running trains is critical to enhance efficiency of operations in Indian Railways. Delay in running of Passenger/Goods trains results in poor quality of service to passengers/customers leading to dissatisfaction. 'Punctuality' and 'Travel time' are thus two important mobility outcome indicators for operations in Indian Railways.

The audit exercise highlights the extent to which IR could have improved punctuality and reduced travel time within existing resources.

### **2.1.2 Audit Objectives**

**The audit objectives were to assess:**

- i. Whether Indian Railways addressed all the critical factors commensurate to their criticality?
- ii. Whether there is any scope of improvement for Indian Railways to reduce travel time and improve punctuality within the existing resources?

### **2.1.3 Scope**

Given that outcomes change over a period of time, Audit compared the outcomes in train operations viz. Travel time and Punctuality between 2012-13 and 2019-20.

To analyse train operations, Audit also selected four months each during 2015-16 and 2018-19, respectively. Periods of different seasons viz. Summer, Rainy, Regular and Foggy (May, July, October, and January) seasons of 2015-16 and 2018-19 were selected to cover most weather-related challenges. The route of New Delhi (NDLS)- Howrah (HWH) was selected for the simulation analysis.

### **2.1.4 Source of Criteria**

The provisions and instructions contained in the following documents are used as audit criteria:

- Global benchmarks, UIC standards;
- Budget documents, speeches & announcements;
- Indian Railways Vision 2020 (December 2009);
- Speed Policy and Stoppage Policy;
- Operation Chetak (2008) and Mission Raftaar (2016);
- Codes and manuals of Indian Railways;

- Circulars issued by Ministry of Railways, Zonal Railways; and
- Trains at a glance July,2019

### 2.1.5 Methodology

Entry conferences were held (September 2019) at Ministry of Railways and in 16 Zones with the major stakeholders before the commencement of field audit. Audit scrutinized records related to train operations in the departments of Operations, Engineering, Mechanical (Carriage & Wagon), Signal & Telecommunication and Electrical departments at Ministry of Railways, RDSO, and Zones/Divisions.

The field units analysed data of ICMS<sup>15</sup>, FOIS, TMS, Working Time Table, Data Warehouse, TSR and Complaint Management System. Audit findings were shared (April 2021) with the Ministry of Railways and an Exit conference was held in August 2021. Response of the Ministry of Railways has been incorporated in the Audit Report.

### 2.1.6 Sample

All 2951 Mail/ Express trains of 'Trains at a glance', July 2019 were analysed for the review. Sample of routes and sections, traffic nodes viz. junctions, yards and Goods shed, coaching and freight trains and major works selected in 16 Zonal audit offices are detailed in **Annexure 2.1**. All sections of New Delhi- Howrah route including all 92 pairs of MEMU and 152 pairs of Passenger trains were selected for the Simulation Analysis.

### 2.1.7 Acknowledgement

We acknowledge the co-operation extended by the Ministry of Railways, Zonal Railways, Loco pilots, Controllers, Traffic Inspectors, CRIS, and MRVC during the field audit and simulation exercise.

### 2.1.8 Audit findings

Audit reviewed the Policy adopted by Indian railways with relation to factors impacting the two mobility outcomes – Punctuality and Travel Time.

#### Review of Speed Policy

IR introduced "Mission Raftaar" in 2016-17 aiming to double the average speed of freight trains from 25 Kmph to 50 Kmph and to increase the average speed of Mail/Express trains from 50 Kmph to 75 Kmph by the end of 2021-22.

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<sup>15</sup>ICMS – Integrated Coaching Management System, FOIS – Freight Operations Information System, TMS – Track Management System, TSR – Train Signal Register

However, the average speed of Mail/Express trains and Goods trains in 2019-20 was only 50.6 Kmph and 23.6 Kmph, respectively.

**China: Improvement in average speed**

*In the two decades since 1990, average passenger speeds have increased by more than 60 per cent in China. Before 1997, the railway speed in China was only 80 to 100 Kmph. After six rounds of national railway speed acceleration campaigns between 1997 and 2007, the railway speed has accelerated to 120 to 300 Kmph.*

Thus, the targets in respect of average speed are yet to be achieved by IR. IR has adopted rolling stock with the rated capacity of 100 to 160 Kmph and tracks with Maximum Permissible Speed (MPS) of 100-130 Kmph in certain sections of its network. However, audit analysis revealed that

scheduled speed of 97.9 per cent Mail/Express trains was below 75 Kmph. Details are indicated in **Table 2.1**.

**Table 2.1: Average Scheduled speed of 2951 Express trains – ‘Trains at a Glance 2019’**

Range of average speed (Kmph)	Number of Express trains
Below 30	60 (2.0 per cent)
30 to 40	219 (7.42 per cent)
40 to 50	933 (31.61 per cent)
50 to 55	578 (19.58 per cent)
55 to 75	1099 (37.42 per cent)
Above 75	62 (2.1 per cent)

Audit compared the average speed of Express trains during 2019-20 with that of 2012-13. **Table 2.2** indicates that the Travel time for similar distances travelled increased in EMU and Passenger Trains category and marginally decreased in Mail/ Express category.

**Table 2.2: Travel Time comparison**

Train Type	2012-13 <sup>16</sup>		2019 <sup>17</sup> -20	
	Number of trains	Travel time Hours:Minutes	Number of trains	Travel time Hours:Minutes
EMU (for 50 Km)	4728	1:13	5396	1:19
Mail /Express (for 1000 Km)	<b>3187</b>	<b>19:52</b>	<b>4058</b>	<b>19:47</b>
Passenger trains (for 1000 Km)	4201	27:37	3715	29:51

Ministry of Railways stated (November 2021) that average speed of passenger

<sup>16</sup> In 2012-13 the average speed of EMU, Mail/Express (M/E) and Passenger trains was 40.7 Kmph, 50.4 Kmph and 36.1 Kmph respectively.

<sup>17</sup> In 2019-20 the average speed of EMU, M/E and Passenger trains was 37.9 Kmph, 50.6 Kmph and 33.5 Kmph respectively.

*trains is dependent on various factors. The average speed of passenger trains has gradually increased keeping in pace with the up-gradation in the coaching stock, track and related infrastructure. Further, there has been an exponential increase in the number of passenger services, with IR on an average introducing around 200 trains per year, without commensurate enhancement of the infrastructure works. Under the recently concluded exercise of rationalization of Time Tabling, undertaken with the assistance of IIT Mumbai using their traffic simulator, IR has been able to enhance the speeds of over 2000 trains. Under the exercise, the travelling time of more than 900 trains have been reduced by more than an hour while for 1600 trains the travelling time have been reduced by more than 30 minutes. 362 passenger trains have been converted into Mail/Express trains by speeding up while 120 Mail/Express have been converted into super fast service. An increase of 5 per cent in the average speed of passenger train services has been achieved, by rationalization of Time Table.*

Results of zero based time tabling exercise undertaken by Ministry of Railways itself suggested that the optimum utilization of resources was not exploited earlier.

**Maximum Permissible Speed (MPS):**The target of achieving 160 Kmph speed of Coaching trains and 100 Kmph speed of Freight trains, was fixed on several occasions<sup>18</sup> between 1960 to 2016-17. The timeline to increase the speed was constantly revised. However, the same has not been achieved until 2019-20. Thus, even after many years of planning and targeting, there has been no change in the MPS of Rajdhani and Shatabdi trains since their induction. Rajdhani/Shatabdi trains and other Mail/Express trains have a maximum permissible speed (MPS) of 130 Kmph and 110 Kmph respectively in India. As of March 2020, the top speed in India is 160 Kmph and that too for a few special trains in limited segments.

At the end of December 2019, out of 9890 RKMs of Golden Quadrilateral – Golden Diagonal routes over the IR network, only 3030 RKMs (30.6 per cent) are fit for train operation at the speed of 130 Kmph.

Audit also analysed<sup>19</sup> the scheduled speed of trains across zones, which indicated that:

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<sup>18</sup> (1) Modernisation Plan -2005-10 (in November 2004) - 150 kmph –Delhi Patna Howrah and Delhi Chennai. (2) IR Vision 2020 (2009) - 160 to 200 kmph. (3) Work sanctioned in 2017 for increasing speed to 160 kmph in New Delhi Howrah and New Delhi Mumbai route.

<sup>19</sup> ICMS report No. 704

- The average scheduled speed of Express trains<sup>20</sup> was highest in NCR (61.98 Kmph) and lowest in NER (44.84Kmph).
- Out of 16 zones, the average speed of Express trains was more than 55<sup>21</sup> Kmph only in five zones (NCR, NWR, SECR, SER and WCR).

Ministry of Railways replied (November 2021) that with the induction of LHB Coaches, which have certified speed of 130 kmph, trains running with such coaches have also been chartered at 130 kmph.

Audit noticed that there are also some trains in which LHB coaches were inducted but they are still scheduled at MPS of 110 kmph only.

### 2.1.8.1 Punctuality performance – Coaching Trains

IR measures the punctuality of trains at the terminating stations. In other countries, it is measured at the originating point, intermediate station, and at terminating stations.

In addition, for measuring punctuality, IR provides an allowance of 15 minutes delay with reference to the scheduled time. Other countries have a much stricter threshold as shown in **Table 2.3**.

Table 2.3: Yardstick for measuring punctuality in different countries	
Country	Punctuality Yardstick
Japan	In seconds <sup>22</sup>
Netherlands	3 minutes
Germany and Russia	5 minutes
Great Britain	10 minutes
India	15 minutes

Even with a low benchmark and higher threshold, the punctuality of Mail/Express trains over IR declined from 79 per cent (2012-13) to 69.23 per cent (2018-19) that too at the terminating stations only. As per the ICMS report, the poorest punctuality among the zones was in NCR during 2012-13 and 2018-19.

In 2015-16, out of 5.86 lakh trains, 1.27 lakh Express trains reached the destination station with delay. During 2018-19, number of delayed trains increased by 43 per cent. Out of 6.22 lakh trains, 1.82 lakh trains did not meet the punctuality yardstick of 15 minutes. Three zonal railways – NCR, ECR and

<sup>20</sup>All type of train groups including Sub-urban (ICMS report No. 704 – Total Trains 10591)

<sup>21</sup>The criteria laid down by IR to designate a Mail/ Express train as Superfast is 55 Kmph.

<sup>22</sup> In Japan, a train arriving before scheduled time is also considered as punctuality loss

NR – contributed 69 and 67 *per cent* in total delay<sup>23</sup> of IR during 2015-16 and 2018-19.

Review of the Complaint Management System by Audit revealed that there was a sharp increase in the number of complaint cases on punctuality in IR. During the period 2015-16, 2016-17 and 2017-18 the number of complaints that were lodged in the system for late running of trains was 9112, 20,025 and 35,793 respectively. The complaints increased to 40,077 (an increase of 340 *per cent* over the year 2015-16) in 2018-19.

Audit analysed the data for Mail/Express trains for 2016-17, 2017-18 and 2018-19 from ICMS report number 201 and noticed that on an average 13,15,456 trains are reported through ICMS *per annum*. Of these, only 29.64 *per cent* of trains (3,89,877 trains) reached on time (RT) and 20.17 *per cent* of trains (2,65,391 trains) arrived before time (BT). Remaining 50.19 *per cent* of trains (6,60,188 trains) were delayed. Before time cases indicates poor timetabling by provision of extra running time.

*Ministry of Railways stated (November 2021) that IR measures punctuality on terminating basis. However, monitoring of running is done on continuous and real-time basis. To put the punctuality performance in perspective it is to be noted that between 2012-2013 and 2018-2019, the train services have increased in numbers by 20 per cent.*

Audit is of the view that Punctuality measured on terminating basis does not conform to global best practices. Audit noticed that by computerized timetabling, grouping of trains, conflict resolution and integrated maintenance, punctuality of trains can be improved.

#### **2.1.8.2 (a) Average speed**

As against the objective of Mission Raftaar, the average scheduled speed of Mail/Express trains in ECR, ER, NER, NFR, NR and SWR remained below 50 Kmph. The minimum average schedule speed was 44.85 Kmph for NER and maximum was 62.04 Kmph for NCR. The zone wise details are indicated in **Annexure 2.2**.

The average speed of Mail/Express trains over IR remained at the same level even after four years of implementation of 'Mission Raftaar'. The actual average speed of Superfast/Mail/Express trains over IR during 2014-15 to 2018-19 is indicated in **Table 2.4**.

<sup>23</sup>ICMS report No. 35 & 71

**Table 2.4: Actual average speed of Superfast/Mail/Express trains over IR**

Year	Average speed of Mail/Express trains	Number of trains as reported through ICMS
2014-15	51	5,57,023
2015-16	50.95	5,66,231
2016-17	50.61	5,78,542
2017-18	50.25	5,77,740
2018-19	50.20	5,93,358

Ministry of Railways replied (November 2021) that one of the components of Mission Raftaar was replacement of conventional Passenger Trains with fast moving MEMU services. During 2016-17 to 2019-20, 326 trains have been gainfully converted into MEMU services. Besides, under the rationalization exercise 120 Trains (in single) over ECR, ER, NER, NFR, NR and SWR have been speeded up to Superfast category. Besides, over Indian Railways, an increase of 5 per cent in the average speed of passenger train services has been achieved. Over ECoR, the average speed of trains increased from 53.28 kmph to 55.05 kmph.

Audit noticed that before implementation of Mission Raftaar, the average speed of EMU trains in 2015-16 was 41 kmph. Despite induction of fast moving EMU services, the average speed decreased to 37.9 kmph during 2019-20. Thus, no appreciable improvement in the average speed of EMU trains was achieved despite conversion of trains into MEMU/DEMU.

#### **2.1.8.2 (b) Analysis of specific trains**

(1) Audit randomly test checked travel time (Originating to Destination basis) of 300 trains<sup>24</sup> for the year 2012 and 2019. It was observed that there has been an overall average increase of 15 minutes in travel time for these trains.

Like Passenger services, the average speed of freight services also declined. Against the prescribed speed of 100/75 Kmph in Operation Chetak, the planned average speed of Goods path in different sections of IR is lesser. For example, the planned speed of Goods trains in Prayagraj division of NCR is less than 30 Kmph in UP & DN direction between DDU-PRYJ and PRYJ-GMC sections. In mixed traffic regime, the slower speed of Goods trains creates conflicts with other trains.

Ministry of Railways replied (November 2021) that train services increased by more than 1.5 times over 10 years period. The average speed of Mail/Express

<sup>24</sup> 10 per cent of all Express trains of Trains at a glance (July, 2019 and July 2012)

trains during 2006-07 was 48.5 Kmph while during 2018-19 it was 50.2 Kmph. Under the rationalization of Time Table exercise, an increase of 5 per cent in the average speed of passenger train services has been achieved within the existing infrastructure. Under the exercise, the travelling time of more than 900 trains have been reduced by more than an hour while that for 1600 trains the travelling time have been reduced by more than 30 minutes.

Audit is of the view that the increase of only 3.5 per cent of average speed in over 10 years is not a perceptible achievement despite upgradation of track infrastructure, rolling stock and signalling system.

(2) Audit analysed 50 Express trains having worst punctuality in 2015-16 and 2018-19. 23 trains were common in these two years. During 2015-16 and 2018-19, the best punctuality performance of these 50 trains was 21.86 per cent and 13 per cent, respectively. Despite the provision of 24 per cent allowances<sup>25</sup> (EA +TA), the average delay per trip for these trains was 231 minutes (15.71 per cent of the transit time) in 2015-16 and 225 minutes (15.57 per cent of the transit time) in 2018-19. **Some of these trains, like North East Express (12505), Kaifiat Express (12226) were having zero per cent punctuality in 2018-19 i.e., none of these trains reached on time on any day during the year of operations.**

#### 2.1.8.2 (c) Criteria of Superfast trains in IR

In May 2007, IR decided that if the average speed of a train, in both Up and Down directions, is a minimum 55 Kmph on Broad Gauge and 45 Kmph on Metre Gauge, it would be treated as a Superfast (SF) train.

The benchmark of 55 Kmph for classifying a train as Superfast is itself low, given the MPS of rolling stock and sectional speed. There has been no change in the criteria of classification of SF trains since 2007.

Audit found that, out of 478 Superfast trains of IR, the scheduled speed of 123 Superfast trains was less than 55 Kmph.

*Ministry of Railways stated (November 2021) that the extant policy relating to categorisation of services into Superfast train stipulates that the trains should have an average end to end speed of above 55 Kmph so as to qualify as a super fast service.*

The reply is silent on the fact that 123 trains categorised as Superfast were actually scheduled for running at average speed less than 55 kmph fixed as per the extant policy norms.

<sup>25</sup> EA- Engineering Allowance, TA- Traffic Allowance

### 2.1.8.3 Punctuality: Goods trains

As indicated in **Table 2.5**, similar to Passenger services, the average speed of freight services also declined in the Railway system:

Table 2.5: Travel time			
2012-13 <sup>26</sup>		2019-20 <sup>27</sup>	
Number of Goods trains	Travel time for 1000 Km Hours:Minutes	Number of Goods trains	Travel time for 1000 Km Hours:Minutes
7421	39:12	8479	42:22

As against the target of IR to double the average speed of freight trains, the actual average speed of freight trains declined by 7.45 *per cent*. The slow-moving freight trains reduce track availability, thereby impacting the passenger trains also.

Most of the zones have not incorporated Goods paths (time window for operation of freight train) in their Working Time table. Also, the schedule of freight trains is largely not laid down/ fixed. As a result, punctuality in the running of freight trains cannot be measured.

#### 2.1.8.3(a) Guarantee in delivery time

Audit observed that IR has not fixed time of delivery of consignment and schedule for running for Goods trains. Path for freight services are provided after the schedule running of coaching trains. There is no guaranteed /assured delivery time even for the regular freight trains.

In SR, the timetabled services<sup>28</sup> were tried for running of auto rakes in two routes<sup>29</sup>. Audit analysis revealed that the actual time taken was more by 34 to 134 *per cent* of the notified time by the Ministry of Railways.

**Recent initiatives:** IR attempted to introduce Time table for Goods trains. In October 2020, time table for 97 Goods trains were introduced. However, the average speed of these trains was scheduled at 36 Kmph only (Range – 55 Kmph to 20 Kmph), *i.e.* 28 *per cent* less than the target of 50 Kmph.

<sup>26</sup> Average speed of Goods train in 2012-13 was 25.5 Kmph

<sup>27</sup> Average speed of Goods train in 2019-20 was 23.6 Kmph

<sup>28</sup> Ex Melpakkam (MLPM)- Greenfeild PFT of CONCOR Neemrana served by Kathuwas(CMLK) notified vide Railway Board circular No.2015/TC(FM)/4/8dated 11/07/2016 and Ex Melpakkam (MLPM)-Changsari (CGS) notified vide Railway Board circular No.2015/TC(FM)/4/8dated 16/01/2019

<sup>29</sup> Ex Melpakkam (MLPM) - Greenfield PFT of CONCOR Neemrana and Ex Melpakkam (MLPM)-Changsari (CGS).

#### 2.1.8.4 Investment made by IR and its outcomes

IR spent considerable amount for procurement of rolling stock and development of infrastructure with little improvement in reduction in travel time and resultant punctuality performance.

Investment of IR for Infrastructure during the last decade and corresponding Mobility outcomes in terms of punctuality and average speed of trains are indicated in **Table 2.6**.

Table 2.6: Investment and Outcomes(₹ in crore)								
Year	Investment					Mobility Outcomes		
	New Line	Gauge Conversion	Doubling	Electrification	Track Renewal	Punctuality of M/E trains	Average speed M/E trains	Average speed of Goods trains
2008-09	3151	2989	1831	783	4141	69.1	49.9	25.7
2009-10	3638	3320	2372	713	2629	74	50	25.8
2010-11	5262	2845	2115	640	2604	69	50.1	25.6
2011-12	5327	2527	2251	830	3210	77	50.3	25
2012-13	5292	2401	2470	964	3604	79	50.4	25.5
2013-14	5801	2874	2961	1265	3666	82.67	50.6	25.9
2014-15	7107	3520	3859	1387	3734	79.37	50.8	24.2
2015-16	13210	3616	10472	2265	4368	77.51	50.9	23.4
2016-17	14320	3770	9093	2871	5076	76.69	50.6	23.7
2017-18	8195	2880	11240	3770	7728	71.39	50.3	23.3
2018-19	9396	4055	15168	5931	8242	69.23	50.2	23.2
<b>Total</b>	<b>80699</b>	<b>34797</b>	<b>63832</b>	<b>21419</b>	<b>49002</b>			
<b>Total Expenditure ₹ 2,49,749 crore</b>						<b>Source: IR yearbooks for the respective years</b>		

There is a significant increase in capital investment since 2015. However, the increase in investment towards infrastructure creation and asset acquisition over the decade did not yield results in terms of achieving the outcomes of reducing travel time (higher average speed), improved punctuality or guaranteed delivery of Goods.

*Ministry of Railways replied (November 2021) that IR regularly monitors and takes corrective action for cases of punctuality loss at Divisional, Zonal and Railway Board levels. The decline in performance is to be seen with respect to the reasons on case to case basis including external factors beyond control of Railway administration. In the current Financial year upto 30 September, 2021, the punctuality of Indian Railways has been recorded upto 94.29 per cent (as compared 75.38 per cent in 2019-20 to 94.29 per cent in 2020-21 which is an increase of more than 25 per cent).*

The reply is not convincing as the total contribution of external factors for the two year period (2017-19) was merely 12.89 per cent. The achievement of

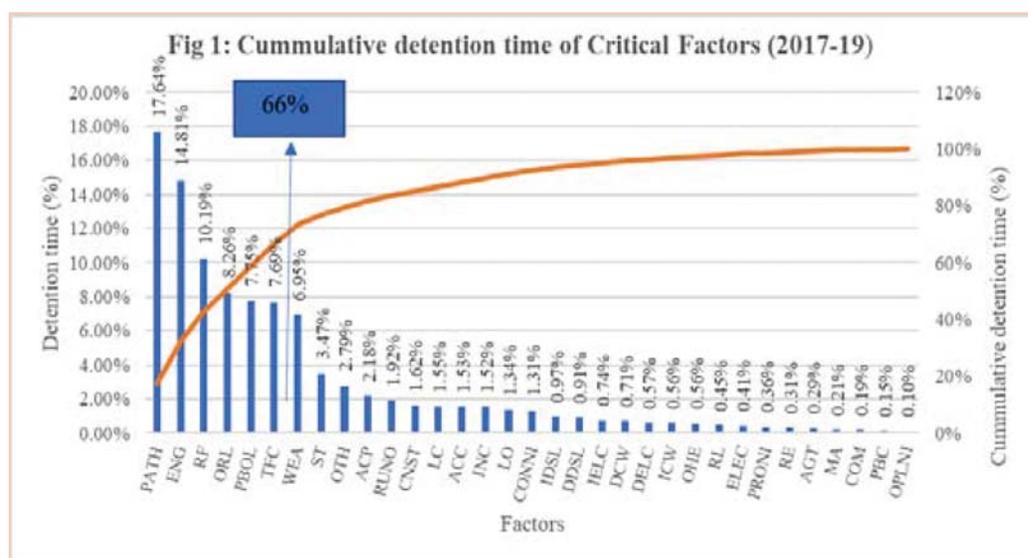
2020-21 is not relevant as very limited number of special trains (excluding passenger trains) were in operations due to Covid pandemic.

### 2.1.8.5 Critical Factors impacting Punctuality

Audit assessed the critical factors that impact Punctuality of Coaching trains.

The ICMS<sup>30</sup> captures all the incidents that caused the train operations' delay and these incidents are classified under 33 factors. Audit analysed the ICMS data for the period 2017-18 and 2018-19 covering all Mail/Express trains in all the 16 Zonal Railways to assess the critical factors for the delay in train operations.

Out of 33 factors, major six factors caused 66 per cent of detention to trains over the IR network. These factors are Out of path, Engineering, Re-scheduling of trains by various Zonal Railways (ZR), delay from other Railways, Planned block open line and Traffic. A Pareto chart of incidents and the detention to trains during 2017-18 and 2018-19 is depicted in figure 1. All the major six factors are internal and amenable to control by IR. The list of factors is enclosed as **Annexure 2.3**.



(Source: ICMS Report No.102)

During 2017-18 and 2018-19, 1,62,581 and 1,78,980 train services were delayed on account of these 33 factors as seen from ICMS Report No.102. These factors contributed to a total detention of 6.65 crore minutes to

<sup>30</sup> Integrated Coaching Management Systems (ICMS) is used in Indian railways for the management of coaching operations and generating reports for managers.

Mail/Express trains over IR for the two years. The ZR wise details of trains detained during 2017-18 and 2018-19 is depicted in **Annexure 2.4**.

Out of 33 factors, 27 factors of punctuality loss are internal factors controlled by Railways and the remaining six factors are external factors<sup>31</sup>. The total contribution of external factors for the two-year period (2017-19) was 12.89 *per cent*<sup>32</sup>.

Of the 16 ZRs, more than 60 *per cent* of detentions occurred in Northern Railway (NR), North Central Railway (NCR) and East Central Railway (ECR). Trains were detained in these three ZRs for 4.19 crore minutes during these two years. The delay due to “Engineering” and “Rescheduling of trains within different Railways” account were the top two critical factors for NR and “availability of path” and delay due to the “Engineering” were the top two critical factors for ECR. For NCR, the “availability of path” (occupancy free section) and delay due to “Traffic” account (High density of unscheduled heterogeneous type of trains) were the top two factors for causing detention to Mail/Express trains. Details are indicated in **Table 2.7**.

<b>Table 2.7: Top two controllable factors 2017-18 and 2018-19 in ZRs</b>		
<b>Zonal Railways</b>	<b>Factors (<i>per cent</i>)</b>	<b>Total (<i>per cent</i>)</b>
<b>NR</b>	Engineering (27.56)	42.50
	Rescheduling of trains within different Railways (14.94)	
<b>ECR</b>	Engineering (14.91)	32.48
	Out of Path (17.57)	
<b>NCR</b>	Out of Path (35.26)	54.91
	Traffic (19.65)	

These three ZRs have not adequately controlled the top two out of the six controllable internal factors.

Despite monitoring detention to train continuously, IR has not devised measures to address the internal factors adequately. Besides, the trend of detention to trains on this account continued year after year.

*In reply, Ministry of Railways stated (November 2021) that external factors such as fog, agitation, alarm chain pulling, run over etc also cause traffic*

<sup>31</sup> The external factors include adverse weather conditions (fog), intermittent natural calamities such as heavy rains, mid-section run over cases involving cattle and humans, multi-faceted law and order problems including public agitations and bandh, miscreant activities such as theft of Railway Asset, Alarm Chain Pulling etc. These six factors were not analysed in Audit.

<sup>32</sup> Weather - 6.95 *per cent*, ACP - 2.18 *per cent*; Runover - 1.92 *per cent*; Law & Order -1.34 *per cent*; Agitation - 0.29 *per cent* and Miscreant Activities - 0.21 *per cent*.

congestion leading to detentions. Besides, continuous monitoring are also done at different levels to ease traffic congestion through infrastructural inputs. Introduction of new trains on existing tracks affects the timings of earlier introduced trains. To put the punctuality performance in perspective it is to be noted that between 2012-2013 and 2018-2019, the train services have increased in numbers by 20 per cent.

Audit already pointed out in the report that the contribution of external factor is only 12.89 per cent (2017-19), and six internal factors, which contributed to 66 per cent and could have been controlled well by IR, were not addressed adequately. The punctuality performance which was 79 per cent during 2012-13 decreased to 75.69 per cent during 2019-20.

Out of 33 factors responsible for punctuality loss, Audit analysed the internal factors – Path availability, delay on Engineering account, delay due to Traffic block (PBOL) and Rescheduling of trains.

#### **2.1.8.5(a) Path availability**

Path i.e. occupancy free section, is the primary requirement for smooth running of trains. The trains starting on right time but get delayed due to non-availability of path indicate inefficient monitoring mechanism. Following are the assessed causes of non-availability of path:

##### **(i) Conflicts in Time Table**

As a rule, to ensure safety, only one train should run in a block section at a time. However, to accommodate higher number of trains in the time table, more than one train are scheduled in a block section. This is referred to as Conflict. A conflict results in providing precedence to one train over other and requirement of additional allowances.

One of the reason for punctuality loss in ECR, NR and NCR is the non-availability of path i.e. congestion in the section, indicating the lack of capacity to run trains. It happens, inter alia, because of inbuilt conflicts of path existing in the time table i.e. more than one train is charted simultaneously in the same section. Audit carried out simulation analysis on RailSys software for the New Delhi - Howrah route. The results indicated 12,466 conflicts of coaching trains running in the route. Similarly, as per simulation exercise done by CRIS on SATSaNG<sup>33</sup>, there are more than 808<sup>34</sup> conflicts in Prayagraj Division. These

<sup>33</sup> Software Aided Train Scheduling and Network Governance

<sup>34</sup> 41 in CYZ-TDL, 458 in TDL-CNB, 84 in CNB-PRYJ, and 225 in PRYJ-DDU section conflicts exist in the working timetable of Prayagraj Division effective from 01 July 2019.

are due to extra allowances, side-tracking, and movement through loop lines etc.

*Ministry of Railways stated (November 2021) that Line capacity is the major cause of conflicts in the time table. On trunk route of WR at several sections, the line capacity utilization is over 150 (with maintenance margin). This is a severe constraint in framing the time table of the new trains.*

Conflict in the time table can be resolved / minimized by computerized time tabling and grouping of similar type of trains.

### **(ii) Congestion at Traffic nodes**

Sectional capacity increased with doubling/tripling/automatic signalling, but the handling capacity of traffic nodes (Junction/yard) were not raised in proportion, resulting in bottlenecks. There is higher line capacity utilization in the adjacent section of the major junctions due to receipt/ dispatch and accumulation of multidirectional traffic; trains get bunched at Major Junctions. For example, the line capacity utilisation near Kanpur Central Junction is 175 *per cent* (Kanpur-Juhi) and in Prayagraj area, it is around 137 *per cent*. Similarly, near Patna junction (PNBE), the line capacity utilization was 172.6 *per cent* in Rajinder Nagar (RJPB)-PNBE and 170 *per cent* in Danapur (DNR)-PNBE section.

Impact of intense capacity utilisation affects traffic at the nodes due to the traction change, reversal, crew change time, watering and other reasons associated with the commercial halt's requirement. The junctions in saturated routes become a speed breaker and time saved in between sectional running does not result in overall reduction in travel time and/or improvement in Punctuality.

The current practice of the faster train overtaking a slower one reduces the line capacity. Each precedence results in a loss of about 15 minutes in sectional capacity. The damage to mobility is in direct relation to the number of precedence it encounters during its run.

*Ministry of Railways stated (November 2021) that availability of terminals / routes is essential to facilitating smooth arrival and departure, running of trains. However, with new trains introduced every year and growing congestion at terminals, the line capacity utilization is adversely affected.*

### **(iii) Control mechanism & ownership (Zones vs Routes)**

The Control Organization of IR is responsible for the asset utilization and management, in a dynamic situation, round the clock for moving trains on its entire network.

There are multiple command & control centres in IR. The Operation Control system are currently divided into 16 zones, further subdivided into 68 divisions and also been extended to Area Control levels and more than 7000 stations<sup>35</sup>. Section oriented command & control creates artificial boundaries at Zonal/Divisional interchange points. There were regular cases of punctuality loss in handing over / taking over at the interchange points. Interchange points are the artificial boundaries between Zones and Divisions. Some examples are given in **Table 2.8**.

<b>Table 2.8: Delay of Goods trains at interchange points</b>		
<b>Name of the interchange point</b>	<b>Zones</b>	<b>Range of detention during 2018-19</b>
Jharsuguda	SER – SECR	2-11936 minutes
BHC	ECoR – SCR	151-248 minutes
Odur	SR – SCR	5-40 minutes
NKJ	SECR – WCR	171 -262 minutes
Gudur	SCR – SR	2-213 minutes
ITR	SECR	66-186 minutes
<b>Coaching train delayed in 2018-19 at Interchange point</b>		
Gudur	SR - SCR	1384
Duvvada	SCR - ECOR	758
Nagpur	CR-SECR	482

Route-bound operation, Centralised & Integrated control with automated tools of traffic control are not available in Indian Railways. Voice commands & distributed control system exist in IR. These are mostly manual & section oriented. Congested nodes are managed through mostly informal communication structure between section controllers of adjacent sections, together with cabins that control the movement through some key points.

All the station resources are bunched together at one location and detailed decisions such as loop/platform allocation were taken manually, which is subjective. The control mechanism should be computerised in route-bound manner to avoid delays at the interchange point.

*Ministry of Railways stated (April 2021) that the monitoring and planning of coaching train services are done on real time basis through Integrated Coaching Management System. The control charting is also automated in the control office Application (COA), which is integrated with ICMS.*

<sup>35</sup> Total stations 7321 in 2018-19. Station Master is overall In-charge of the station.

The reply of the Ministry of Railways is not convincing as decisions such as loop/platform allocation are still being done manually.

#### (iv) Junctions/yards as Speed breakers

Audit noticed abnormal detention of loaded Goods trains at the junctions/yards for selected months during the year 2015-16 and 2018-19.

The major detention took place at Chunar (CAR), GMC, Panki (PNK), Tundla (TDL), Subedarhanj (SFG) stations of NCR; DDU, GAYA, Gomoh (GMO), DHN and Pradhan Khunta (PKA) of ECR and Barddhaman (BWN), ASN, Dumdum Jn (DDJ), Andal (UDL) and Barachak(BCQ) of ER of the NDLS-HWH route. The average detention at the choking points of NCR was 1:18 hours to 78:48 in 2015-16 and 01:22 hours to 50:45 hours in 2018-19. In ECR, major detention took place at in the DDU-PKA route. More than 29 and 19 *per cent* of through freight trains were halted in GMC Yard during the month of July, October and January of 2015-16 and 2018-19. Reasons of halt in most of these cases are the change of crew.

Besides, the average detention in rake examination at the sick line of GMC Kanpur increased from 3 hours in 2015-16 to 5 hours in 2018-19. The main reason for higher detention was the shortage of rake examination facilities viz. staff and types of equipment. Results of test check of other Zonal railways are indicated below.

<b>SR</b>	In Tondiarpet Marshalling yard, it was observed that out of 3,782 Goods trains handled, 1,770 (48.31 <i>per cent</i> ) trains were detained during 2015-16. During 2018-19, 51 <i>per cent</i> of the trains were detained out of 3,362 trains. <i>The main reason for detention was rake formation, path, Train Examiner (TXR). Average detention time was more than two hours during 2015-16 and 2018-19.</i>
<b>SCR</b>	In Vijayawada Goods yard, on an average 16 trains <i>per day</i> were detained at the yard due to cross over movements and each train was detained for 40 minutes <i>per day</i> . <i>There is no Crew Management System (CMS) in the yard and crew are attending the duties from BZA Crew lobby by 4-wheeler resulting in detentions on an average 6 to 7 trains per day by 45 minutes.</i>
<b>SER</b>	In Bondamunda yard, the average detention in case of rake examination at the Marshalling Yard for loaded rakes were 4:55 hours in 2015-16 (408 rakes) whereas in 2018-19 it was 4:00 hours. (216 rakes). Average detention of Premium rakes <sup>36</sup> increased from 5:35 hours in 2015-16 to

<sup>36</sup> For Brake Power Certificate, rakes are classified into two categories-Premium and Close Circuit. Premium Rakes are run on any route of the Indian Railways while Close Circuit rakes run in predefined path.

	5:49 hours in 2018-19. The average detention of originating trains deteriorated from 4:02 hours. in 2015-16 to 4:34 hours in 2018-19.
<b>SWR</b>	During selected months of 2018-19, 64.98 <i>per cent</i> through trains were halted in Hosapete Junction (HPT) yard on account of change of crew besides shortage of rake examination facilities in HPT yard. <i>Non-availability of shunting facilities in south yard, non-provision of starter signal on Line Nos. 8 and 9 etc. also affected the speed of freight trains.</i>
<b>WCR</b>	New Katni Junction yard, shortage in rake examination facility viz. staff and type of equipment existed. In Itarsi yard, due to non-availability of proper receiving lines, there was around 45 minutes detention per train in cross over movement. There is no fencing in Itarsi yard.

Thus, frequent stabling of freight rakes due to lower priority for assigning path to coaching services with higher priority and abnormal detention of rakes has adversely affected the efficient delivery of freight services. Also, the abnormal detention of Goods trains resulted in slowing down of the average speed. Despite high horsepower locomotives introduced by the Railway Administration to increase the average speed of Goods trains, there was a decrease in the average speed of Goods trains during 2018-19, compared to 2015-16.

#### (v) Time table preparation and Allowances

In IR, time table is prepared manually and the existing timetables are being modified based on needs. In comparison, globally, simulators and computerised systems are used in the preparation of the time table. The running time of trains is fixed on scientific calculations. Though IR has simulators but does not use the same for time table preparation.

International Union of Railways (UIC) recommended a time supplement of three to five *per cent* for passenger trains up to speed of 140 Kmph. The UIC has provided guidelines<sup>37</sup> for provision of running time supplements in timetables. In comparison, average allocation of allowances<sup>38</sup> in selected 100 trains was 24 *per cent* of the running time. Maximum allowance of 38 *per cent* was noticed in Balia – Sealdah Express and a 7 *per cent* provision of allowances was noticed in Prayag (PRG)-Kanpur Central (CNB) Inter City Express.

<sup>37</sup> UIC leaflet 451-1

<sup>38</sup> Allowances are extra time values factored with the aim to maintain punctuality of operation in a Timetable. **Engineering Recovery Allowance** is additional time included in train schedules to cover the impact of planned temporary speed restrictions associated with engineering works on the network. **Traffic Recovery allowance** is provided to make Up of train's delay due to line and block section occupancy in heavy traffic.

For “Engineering<sup>39</sup> Allowance”, IR has prescribed yard stick and for “Traffic<sup>40</sup> Allowance”, no yardstick has been prescribed. This resulted in provision of ad-hoc time allowance. There were wide variations (between 7 to 38 *per cent*) in the allocation of allowances across trains and zones. As a result, similar trains with similar infrastructure had varied scheduled speeds in different zones across the route.

*Ministry of Railways replied (April 2021) that the purpose of Traffic Allowance is to provide time/cushion for the unforeseen precedence, loading time, detentions etc. The very nature of these events are unpredictable and unforeseen, as such, prescribing yardstick for traffic allowance does not seem to be tenable. Ministry also stated that traffic allowances were pegged at a maximum of six minutes per 100 Km to take care of unforeseen and unpredicted events.*

#### **(vi) Asset failure**

Asset failure is one of the reasons for the primary and secondary delay. The Primary delays, also called initial delays or source delays, are those delays that are caused by a failure/disturbance<sup>41</sup>. Slack in the timetable can reduce the size of a disturbance before it is measured as primary delay. The primary initial delays of trains may cause a whole cascade of secondary delays of other trains over the entire network. When the network utilization is high, there is a high probability of delay propagation, which leads to a lower punctuality. Secondary delays, or knock-on delays, are delays which are caused by earlier delays. Due to the interdependence in railway systems, a large part of the delays consists of secondary delays.

Asset failures are directly linked to the availability of Asset which, in turn significantly impacted the Punctuality and travel time of train operations. Asset failures are captured through Report 352 of ICMS under five classes viz., Blocks, Electrical, Engineering, Mechanical and Signal & telecommunication. Audit analyzed the data relating to asset failures as reported through ICMS for the year 2018-19. During this year, 4,10,059 cases of asset failures occurred under the five classes. Consequent to the failures of Asset, 5,86,955 trains were delayed.

<sup>39</sup> Engineering is a factor of punctuality loss. It includes delay on activities of Engineering department including block bursting, extra caution deployed, rail/ weld failure etc.

<sup>40</sup> Traffic is a factor of punctuality loss. It causes delays due to precedence, crossing, freight convoy, waiting for signal/ platform, shunting, regaining etc.

<sup>41</sup> Mistakes, malfunctions or deviating conditions within a railway system or its environment, which can influence the railway traffic.

More than 65 per cent of asset failures occurred in NR, SCR,CR,NCR and WR. Audit noticed that asset failure was rampant in Indian Railways. There were more than one lakh failures of Signal in a year (2012-13, 2015-16 and 2018-19). Despite zero-tolerance policy of IR for Rail fracture/ weld failure, there were consistent and increasing trend of asset failures over IR as indicated in **Table 2.9**.

Year	Rail/ Weld fracture	Loco failure	Coach Detachment	Hot axle	OHE	Signal
2012-13	5781	5035	1335	955	368	1,68,259
2015-16	3237	4638	916	726	378	1,38,985
2018-19	5391	24,147	1755	572	2759	1,14,368

*Source: Efficiency and Research Directorate, MoR*

*Ministry of Railways replied (April 2021) that some reduction in the asset failures was noticed in 2019-20 and 2020-21 (upto October 2020 ) in comparison to 2018-19 due to technology upgradation and initiatives.*

Audit however noticed that the asset failure cases of hot axle<sup>42</sup> increased by 21 per cent in 2020-21 in comparison to 2019-20 despite running of less number of trains due to pandemic.

#### **(vii) Integrated maintenance**

In 2016, the IR advised that Inspection/testing/maintenance of track/ signalling/railway electrification asset requires fixed time-integrated corridor blocks for maintenance of asset or dedicated corridor blocks as per world railway practices. Such blocks have to be integrated where all departments take advantage of the block.

Provision of corridor blocks for maintenance was made in the working timetable of the divisions in the Indian Railways. However, maintenance activities were not integrated. There were multiple Block demands from maintenance departments (Engineering, Electrical, Track Machines, Signal and Telecommunication) for their fixed Asset. For example, the share of combined block in 11 Zones<sup>43</sup> in March 2019 was 2.2 per cent only. The

<sup>42</sup> Hot axle in a railway vehicle occurs when inadequate wheel-bearing lubrication or mechanical flaws (bearing failure) cause an increase in temperature. If undetected, the bearing temperature can continue to rise until there is a bearing "burn-off" which may cause a derailment.

<sup>43</sup> NCR, ECR, NR, ER, SECR, SER, SWR, ECOR, NWR, NEFR, SCR

balance 97.8 *per cent* of the blocks were availed by various departments in isolation.

*Ministry of Railways replied (November 2021) that Zonal Railways have been instructed to schedule integrated maintenance activities involving all the maintenance departments, within the stipulated corridor block period, in order to achieve optimal output.*

#### **2.1.8.5(b) Train delay on Engineering account**

Detention on account of “Engineering” is classified under 12 categories and the major categories are ‘Extra caution deployed’, ‘Block bursting’, ‘Rail/Weld failures’, and ‘Waterlogging’. During 2015-16, 4.89 *per cent* of delay occurred on account of engineering asset failure over IR. This rose to 14.81 *per cent* during 2018-19. The range across all the Zonal Railways during 2015-16 was between 1.25 *per cent* (NCR) and 18.85 *per cent* (CR). The delay ranged between 4.21 *per cent* (NCR) and 25.74 *per cent* (NR) during 2018-19 in the Zonal Railways. The temporary speed restrictions are imposed due to track defects or to facilitate the works to be carried out in the tracks. Any delay in completion of the works/removal of defects in the track will adversely affect the mobility of trains in terms of reduction of speed. Increasing detentions on account of the Engineering Asset failures indicate a need for effective maintenance of the track.

#### **(i) Temporary Speed Restrictions (TSR)**

Para 308 of Indian Railway Permanent Way Manual stipulated speed restrictions to be imposed during various sequences of work and the time lines for the same. Caution orders are issued by the Operating Department to restrict the speed of the train for carrying out repairs to tracks. Temporary speed restrictions are to be imposed for a short duration either on account of defects in track and related equipment or to facilitate repairs to the track, Over Head Equipment like electric wire and signalling installations.

Audit observed that the number of trains detained on account of extra caution drive has increased over years resulting in decrease in the actual average speed of the trains.

Because of extra caution drive, the number of trains delayed increased sharply from 1,823 during 2016-17 to 51,040 during 2018-19. More than 70 *per cent* of caution drive over IR was imposed by NR. The imposition of caution drive increased over ECoR, NWR and SR also where more than 500 cases were noticed during 2018-19. In 2016-17, 88 *per cent* of the cases (5,747) pertained to NR.

The excessive caution drive trend has not been curtailed by closely monitoring the ongoing maintenance work duly fixing target time for completion.

Audit analysed the time taken to complete works such as doubling which impact punctuality the most and are indicated in **Table 2.10<sup>44</sup>**.

<b>Table 2.10: Completion time since sanction</b>				
Type of work	No. of works and completion time in years from sanction			The average time taken in completion
	1-2 Years	2-5 Years	> 5 Years	
Doubling	2	15	22	7.5 yrs
Traffic facility	107	233	126	4.5 yrs
Track Renewal	191	340	240	4.6 yrs
Signal	107	299	157	4.6 yrs
<b>Total 1839 works (per cent)</b>	<b>407 (22)</b>	<b>887 (48)</b>	<b>545 (29)</b>	<b>Overall average 5.3 years</b>

IR acknowledged this issue in the White paper of 2015. Delay in completion of the works resulted in non-improvement of line capacity and non-achievement of consequent benefits arising out of enhanced capacity.

The reasons for the lagging of ongoing maintenance works are inadequate provision of the block, absence of integrated block, higher line capacity utilisation, shortage of track machines, labour problem and fund constraint.

## **(ii) Permanent Speed Restrictions (PSR)**

Permanent Speed Restrictions are permanent in nature based on the conditions of the track. PSR is a serious bottleneck that restricts mobility and impedes speed on IR network. The imposition of speed restrictions on 'Engineering' account without a time-bound action for removal of speed restrictions wherever feasible adversely impacted the speed of trains. Audit noticed through a test check of status of PSRs over Nine ZRs that 2,092 PSRs (CR-149<sup>45</sup>, ECR-87<sup>46</sup>, ECoR-159, NCR-321, SCR-292, SECR-68, SER-275, SR-56 and WR-685) are yet to be removed for increasing the average speed of trains.

In NCR, the analysis of DDU-GZB (UP line) revealed that out of total 29 PSR, 19 PSR are concentrated in PRYJ yard, CNB yard and TDL yard. The details of 19 PSRs in NCR revealed that six PSRs existed for more than twenty years and three PSRs are existed for less than twenty years. Details in respect of

<sup>44</sup> The age profile of those works were not included in which completion date was not mentioned in the IRPSM.

<sup>45</sup> Mumbai, Bhusawal and Nagpur

<sup>46</sup> Dhanbad, Deen Dayal Upadhyay and Danapur Division

ten PSRs were not available. These PSRs were imposed on account of existence of points and crossings and therefore their continuance is justified. Audit observed that though the issue of removal of permanent speed restrictions (PSR) was discussed long back, no time bound action plan was prepared for complete removal of possible PSRs. Besides, action plan for removal of the existing PSR within five years, as envisaged in Mission Raftaar was also not complied.

#### **2.1.8.5(c) Planned block for maintenance activities (PBOL)**

Track is a basic requirement for train operations. Travel time and Punctuality of trains are directly affected with ongoing work of maintenance on the track due to imposition of Temporary Speed restrictions, traffic block for maintenance and Asset failures. In NCR, two-hour maintenance block consumed 11 *per cent* line capacity.

##### **(i) Provision of integrated corridor block**

Corridor Block is the fixed timing notified in the Working Time Table of Zonal Railways for maintenance works. Audit analysed the provision of integrated corridor blocks for the NDLS-HWH route. As against the prescribed norms of IR, i.e. one corridor block of 240 minutes or two corridor blocks of 150 minutes each, the Corridor block of only 120 minutes was provided in the GZB-DDU route of NCR. Whereas, in the DDU-HWH routes (via Gaya and PNBE), one to three corridor blocks were provided for a duration ranging from 120 minutes to 270 minutes in ECR. Thus, the corridor block was provided less than the norms in NCR whereas in ECR, it was provided more than the norms. In NR and ER, the provision for the corridor blocks was made as per norms. Therefore, the prescribed norms for provision of corridor block were not taken care of in NCR and ECR portion of NDLS-HWH route.

Examination of Block register maintained in engineering control offices revealed that the block was not provided as per the provision made in the Working Time Table. The prime reasons for deviation from the corridor block were the train's late running, introduction of new/special train and running of all Goods trains without any scheduled timing. Besides, blocks were provided less than the demanded block. Less availability of blocks in heavy traffic sections may lead to poor maintenance of the track, thereby leading to trains' failures and detention.

*Ministry of Railways replied (November 2021) that in the rationalized time table, provision of 3 hours dedicated maintenance blocks has been made to provide corridor for all the planned maintenance activities so that trains do not get hampered due to corridor blocks.*

**(ii) Trains scheduled in corridor block**

During planning for the corridor block for maintenance, 12 scheduled trains time were under the 7-corridor block in UP line of PRYJ Division in NCR. In ECR, total of 101 trains Deen Dayal Upadhyaya (DDU-10), Dhanbad (DHN-14) and Danapur (DNR-77) timing was under the 43 corridor block hours. This further hampered the maintenance work, as corridor blocks could not be utilised due to these trains' running during the time of availability of corridor blocks.

*Ministry of Railways replied (November 2021) that in the rationalized Time Table, train schedules have been modified in such a manner that they do not have to be regulated for corridor blocks.*

**(iii) Block bursting<sup>47</sup>**

Blocks are granted by the Operating Department to various departments for carrying out maintenance works and are granted for a fixed time period only. When the blocks that have been granted are utilized by the various departments over and above the time limit, the block is said to have been burst. The extra time taken has a cascading effect on the train operations viz, detention to Rolling Stock, punctuality loss etc.

Examination of data revealed that despite the daily provision of corridor block for maintenance, frequent cases of block bursting were noticed in the year 2018-19 in NCR, ER, ECR and NR. In the six divisions<sup>48</sup> of NCR, ER and ECR falling in NDLS-HWH route, total 4,659 trains were delayed on account of 1,905 cases of block bursting. The average time of block bursting ranged between 38 minutes to 103 minutes. The block bursting resulted in unscheduled stoppage of trains at stations that lead to delay.

*Ministry of Railways replied (November 2021) that bursting of planned block takes place due to lack of proper coordination between men, machine and materials. Sometimes the machine deployed at the site fails at the time of functioning. On some other occasions, sufficient manpower either could not be assessed or provided, whereas sometimes material being used also fails. All these conditions lead to bursting of blocks. Attempts are being made to improve this situation.*

<sup>47</sup> Availing extra time of block for maintenance activities than provided by the Operating department

<sup>48</sup> PRYJ of NCR; DHN, DDU, DNR of ECR; HWH, ASN of ER

#### (iv) Maintenance practices

Maintenance practices followed are directly linked with Asset failures, which influence asset availability, i.e., asset uptime/downtime. Asset failure is an appropriate measure for maintenance systems and practices followed, as it may significantly impact Punctuality and travel time of train operations. Out of 33 factors, 10 factors<sup>49</sup> such as failures due to Signal & Telecom, Engineering, OHE, Electric, C&W, Diesel locos and Electric Locomotives are directly/indirectly related to Asset failures. As per Audit analysis, the contribution of Asset failure in punctuality loss against overall loss ranged between 9.35 per cent (NCR) and 37.42 per cent (NWR) in all the 16 ZRs and overall contribution over IR was 22.20 per cent during 2018-19.

Audit test checked the maintenance practices in some of the aspects of Engineering, S&T and Mechanical department. Due to non-availability of sufficient block, delay in proposal, approval and shortage of track machines, the deep screening<sup>50</sup> work was overdue up to 20 years.

During 2018-19, the cases of overdue maintenance & failures and its impact were as follows:

- 782 nos. of Rail/weld failure were reported in 10 division of 5 zonal railways in which 5,644 trains were delayed.
- 16,019 trains were detained on account of 8,464 Signal failures in 8 divisions of six zonal railways. The average detention per signal failure was 51 minutes.
- 4,009 trains were detained on account of 1,601 Track circuit failures noticed in 6 divisions of three zonal railways. The average detention per Track circuit failure was 49 minutes. The major reason for track circuit failure was cable cutting.
- 3,119 trains were detained on account of 1,393 Point failures in six divisions of NCR, ECR and ER. The average detention per Point failure was 44 minutes.

#### 2.1.8.5(d) Rescheduling

IR initiated action for standardization of rakes to enable flexibility in train operations and improve Punctuality. As on 01 July 2019, 1000 rakes out of 2700 have been standardized/integrated. Thus, the rake standardization has

<sup>49</sup> DDSSL, IDSL, DELC, IELC, DCW, ICW, OHE, ENG, ST and ELEC

<sup>50</sup> Deep screening is the process of cleaning the Ballast and maintaining the Ballast height in the tracks as per norms

been done to an extent of 37 *per cent* only but the timeline has not been fixed for complete standardization.

Analysis of rescheduling cases in zonal railways revealed that in 86 *per cent* cases reason of rescheduling was late arrival of link rake. Zone wise details of rescheduling due to late arrival of link rake are given in **Table 2.11**.

Zonal Railways	Total rescheduling 2018-19	Rescheduling cases due to late arrival of link rake 2018-19	Zonal Railways	Total rescheduling 2018-19	Rescheduling cases due to late arrival of link rake 2018-19
NR	13198	12279	NWR	1686	1510
ECR	8793	7976	NFR	1667	1395
NCR	8049	7188	WR	1509	1241
NER	6394	5919	ECOR	1241	838
WCR	3893	3176	SECR	1146	795
ER	3169	2778	SR	1488	781
CR	2417	1836	SCR	1074	777
SER	2172	1644	SWR	778	590
<b>Total cases in IR</b>				<b>58674</b>	<b>50723</b> <b>(86 per cent)</b>

Source: ICMS Report No. 307

Status of rake standardization at PRYJ, CNB, PNBE, Gaya, HWH, Bangalore, Gorakhpur, Jaipur and Marwar Junction of NCR, ECR, ER, SWR, NER, NWR revealed that the rakes of coaching trains were not standardized. The number of coaches in trains varies from 7 to 25 coaches.

The attempt to standardize the rakes has not gained momentum in all the zones and the non-standardization of rakes impacted the Punctuality.

*Ministry of Railways replied (November 2021) that traffic pattern on IR is not uniform and accordingly the rake composition is also not uniform. However, to the extent possible, Indian Railways have been making efforts to standardize rake composition of trains. With the initiation of conversion of ICF coaches into LHB, IR have enhanced its efforts towards standardization and instructions have been issued in October, 2020, for standardizing rakes classifying trains into four broad categories.*

#### **2.1.8.6 Key factors in travel time**

Travel time is the time taken by a passenger on the train from the originating point to the destination. It is in the endeavour of IR to reduce the travel time so that the passengers spend minimum time on the train.

Factors of travel time include: (i) Distance, (ii) Hauling power, (iii) Load of the train, (iv) Permissible speeds, (v) Speed restrictions, (vi) Gradients and curves

and (vii) Stoppages – Halt Time and time required for acceleration and deceleration. These factors for Travel time were examined in Audit. Results are given below:

#### **2.1.8.6(a) Permissible speed of Coaching Trains**

Indian Railways Vision 2020 documents envisaged that use of shared tracks by both freight and passenger traffic, speed differential between passenger and freight trains and the precedence accorded to passenger trains exacerbate the effect. Consequently, neither the freight nor the passenger services run optimally. Freight services suffer the most.

The MPS of track in the ZRs was upto 110/130 Kmph and potential speed of rolling stock varied between 100 and 160 Kmph. The electric and diesel locomotives are also capable of MPS of 110 to 160 Kmph. Despite this, the schedule average speed of coaching trains ranges between 2.64<sup>51</sup> and 110.93<sup>52</sup> Kmph (Special Train)/103.44<sup>53</sup> (regular trains) The Maximum and Minimum average schedule speed is for the trains running in NCR jurisdiction in both the cases.

The average speed is one of the key indicators of the overall railway productivity and efficiency in operations and utilization of Asset. The actual average speed of all types of coaching trains (excluding suburban trains) during 2018-19 ranged from 33 Kmph (NER) to 52.30 Kmph (WR). The overall actual speed of IR was 43.5 Kmph in 2015-16, which remained almost stagnant at 43.90 Kmph in 2018-19. In NCR, the maximum speed of coaching trains has been increased up to 130 Kmph/160 Kmph, but the average speed of Mail/Express trains was hovering around 48 Kmph.

Therefore, despite having the higher capacity of locomotives, rolling stock, track, the actual average speed of coaching trains was not commensurate with the potential of infrastructure and rolling stock. It was also noticed that the average schedule speed of some coaching trains was fixed on much lower side and there was vast variation in the average schedule speed of coaching trains.

*Ministry of Railways replied (November 2021) that all out efforts are being made out to speed-up and improve the punctuality of the trains within the existing infrastructure. Further, exercise of rationalization of Time Table is an ongoing process on Indian Railways.*

<sup>51</sup> Train No. 55325

<sup>52</sup> Train No. 01988D

<sup>53</sup> Train No. 22435

Audit noticed that the scheduled speed of coaching trains were fixed on lower side and not based on the rated capacity of the rolling stock and MPS of the section. The allocation of higher rate of allowances and multiple stoppages including acceleration/deceleration cycle time are major reasons of slow speed. Therefore, to ensure optimum utilization of resources, fastest available path remained untapped.

### (i) Stoppages

Ministry of Railways provided 2219 additional stoppages on experimental basis for six months over Indian Railways during the period of five years<sup>54</sup>, in addition to temporary stoppages provided by General Manager of the Zone concerned during festivals and special occasions. Audit examined the 2951 trains of "Trains at a Glance"- (2019) and noticed that the average number of stoppages for a train in IR were about 23 and the overall average halt time at all the stations combined for these trains was 2 hours 7 minutes.

Certain trains, like Avadh Assam Express and Toofan Express have more than 100 stoppages. Stoppage-wise analysis is indicated in **Table 2.12**.

Number of stoppages	No of trains	Average stoppage time (H:M:S) during a single trip	Acceleration and Deceleration cycle time in minutes (@5 minutes per stoppages
0-5	181	0:16:05	25
6-10	468	0:37:40	30-50
11-20	954	1:18:39	55-100
21-50	1166	3:04:49	105-250
51-75	139	5:36:58	255-375
76-100	33	7:09:31	380-500
More than 100	10	9:18:36	500+

Longer and frequent stoppages create congestion at Junction points and en-route which reduce over-all speed. Increase in number of stoppages impedes the reduction of travel time. It increases operational cost, cycle of acceleration/deceleration, and conflicts (precedence<sup>55</sup> & crossings<sup>56</sup>). It also demands additional infrastructure viz. loops, Platforms and Signals at stations.

*Ministry of Railways replied (November 2021) that Indian Railways has undertaken rationalization of Time Tabling exercise in a scientific manner with*

<sup>54</sup> 1<sup>st</sup> January 2014 to March 2019

<sup>55</sup> Precedence is overtake by another train

<sup>56</sup> Preference of a train by placing another train in loops

the assistance of mixed traffic Simulator of IIT-Bombay on Golden Quadrilateral & diagonals. The Time Table of the entire Indian Railways network has been rationalized accordingly.

### (ii) Stoppages at major Junctions

Kanpur (CNB), Prayagraj (PRYJ), Deen Dayal Upadhyaya (DDU), Patna Junction (PNBE Junction) are the busiest traffic nodes and hubs of multiple routes. Provision of Halt time at the junctions in the working time table of coaching trains was analyzed in Audit and it was observed that the halts at junctions were not standardized and varied widely. Test checks of halts of trains at the junctions of various ZRs are as under:

#### Stoppage time of Vande Bharat:

Stoppage of Vande Bharat (T-18 22435/22436) at CNB and PRYJ Jn. is only for 2 minutes. The halt time includes Crew change at PRYJ. On the similar pattern the stoppages of trains may be considered for reduction by Railways to reduce the travel time and decongest busy traffic nodes.

<b>NCR</b> Kanpur Central Junction	48 <i>per cent</i> of trains (154 out of 319 trains) have more than 5 minutes scheduled stoppage. Halt time for 65 trains was not equal in UP and DN direction. Schedule halts of seven trains were more than 15 minutes.
<b>NCR</b> Prayagraj Junction	70 <i>per cent</i> of trains (130 out of 186 trains) have more than five minutes schedule stoppage. Halt time for 54 trains were not equal in UP and DN direction. Schedule halts of 78 trains (42 <i>per cent</i> ) were more than 15 minutes.
<b>ECR</b> Patna Junction	92 <i>per cent</i> (117 out of 126 trains) have more than 5 minutes schedule stoppage. Schedule halts of 87 <i>per cent</i> of trains (110 trains) were 10 minutes.
<b>ER</b> Bardhaman and Asansol Junctions	Halts of trains were from two minutes to 42 minutes.
<b>WCR</b> Bina junction	Scheduled halts of 11 trains (8 <i>per cent</i> ) were more than 15 minutes.
<b>SER</b> Kharagpur station	Out of 90 trains, 54 trains (60 <i>per cent</i> ) have scheduled stoppage of 5 minutes and 27 trains (30 <i>per cent</i> ) have scheduled stoppage of more than 5 minutes.

Ministry of Railways stated (November 2021) that the stoppage time for intermediate stations is two minutes. The stoppage time of trains beyond two minutes is needed to meet operational requirements. With a view to further

rationalise train operations, Indian Railways, to the extent possible, has decided to discontinue the practice of running of slip coaches and link trains to avoid shunting enroute. Besides, initiatives such as powerful hydrant for speedy refilling, mechanized cleaning etc. are taken to rationalize the stoppages.

Audit noticed that despite the provision of mechanized cleaning and quick watering arrangement for coaches at major stations, stoppage timing remained unchanged. Instances from ZRs are mentioned below.

<p><b>Continuation of unjustified stoppages</b>  <b>SR:</b> Only 30 out of 697 stoppages  <b>SCR:</b> 325 out of 383 stoppages  <b>ECOR:</b> 53 out of 146 stoppages</p>
<p><b>Experimental stoppages</b>  <b>ER:</b> Of 10 long-distance Mail/Express trains at three stations are continued for more than five years. Eight out of ten trains were not commercially justified.  <b>SECR:</b> total 125 experimental stoppages running, out of which 113 were not justified commercially (90.4 per cent).</p>
<p><b>Prolonged continuation of temporary stoppages</b>  <b>NEFR:</b> 129 temporary stoppages for more than 11 years  <b>NWR:</b> 35 temporary stoppages for more than 16 years  <b>SECR:</b> 109 temporary stoppages for more than 10 years</p>
<p><b>Stoppage during odd hours</b>  <b>ER:</b> 83 trains stopped during odd hours (between 0000 and 0400 hours) at 16 Stations. Out of the above, the stoppage of 58 trains at 16 Stations was found to be commercially unjustified as per MoR's policy.  <b>SECR:</b> Out of 125 temporary stoppages, 13 stoppages (10.4 per cent) provided at odd hours  <b>CR:</b> 11 stoppages at odd hours</p>
<p><b>Stoppages in quick succession</b>  <b>ER:</b> 6 stoppages were provided to the Superfast Train no. 12339 within a distance of 50 km. Similarly, for Train no. 13151, within a span of 7.52 km (Andal–Raniganj) two stoppages and within a span of 5.78 km (Kulti-Kumardubi) three stoppages were provided.</p>

Therefore, these practices restricted the speed of trains and reduced line capacity of the section. IR should evaluate these stoppages at fixed intervals so that the stoppages could be rationalized and mobility of trains improved.

*Ministry of Railways replied (November 2021) that a thorough review of all stoppages, including experimental stoppages, existing over Indian Railways, is being undertaken, stoppages having low footfall are being identified and proposed for withdrawal.*

### 2.1.8.6(b) Goods train operations

Goods train operations involve the supply of empty wagons for loading of traffic, picking up and collection of loaded wagons from Goods sheds and sidings, the grouping of loads and formation of trains for varying distances in marshalling yards, arrangement of locomotive and crew, and constant monitoring of the movement of trains of loaded as well as empty wagons right up to the destination.

#### (i) Increasing trend of movement of Goods trains with lower speed up to 20 Kmph

Audit analysed the average speed of Goods trains (both outward and inward traffic) for the selected months of May, July, October and January of the year 2015-16 and 2018-19 in seven zonal Railways.

- In NCR, ECR and ER, 82 *per cent* to 95 *per cent* of the loaded rakes moved with an average speed range of 1-20 Kmph during 2015-16 which increased in NCR and ER to 87 *per cent* and about 98 *per cent* during 2018-19. Similarly, in the case of empty rakes, 67 to 80 *per cent* was running with average speed of 1 -20 Kmph in 2015-16 which was increased in NCR to 74 *per cent* and in ER to 88 *per cent* in 2018-19.
- In four zones (SER, ECoR, SCR and SR), 70 *per cent* of the total rakes moved with average speed range of 1-20 Kmph during 2015-16 which was increased to 75 *per cent* in 2018-19. 29 *per cent* of rakes were moved with average speed range of 20-40 Kmph during 2015-16 which was declined to 24 *per cent* during 2018-19.
- The percentage of rakes in the lowest speed range of 1-20 Kmph increased from 86.01 *per cent* (2015-16) to 88.17 *per cent* (2018-19) in NWR, 82.92 *per cent* (2015-16) to 88.39 *per cent* (2018-19) in NER, 69.02 *per cent* (2015-16) to 78.83 *per cent* (2018-19) in NEFR and 74.05 *per cent* (2015-16) to 76.06 *per cent* (2018-19) in WCR. However, slight improvement in case of SER i.e. 81.30 *per cent* (2015-16) to 70.70 *per cent* (2018-19) in the same speed range was noticed.

The analysis indicated that the speed of freight trains declined rapidly and majority of rakes were operated in a lower speed range up to 20 Kmph.

Over the period 2015-16 to 2018-19, IR had increased its rolling stock (1,025 locomotives and 37,929 wagons). However, average speed of Goods trains was in decreasing trend. The efforts taken to increase the average speed of Goods trains have not yielded fruitful results. The declining trend in the average speed of freight trains resulted in increased congestion as trains

moved very slowly, thereby, straining the track and infrastructure which were already saturated.

As per the prescribed parameters of RDSO, the rated capacity of speed of wagons is 60-75 Km/h in loaded condition and 80-95 Km/h in empty conditions. Audit analysed the speed of Goods trains in loaded and empty conditions from the FOIS data with reference to the parameters prescribed by RDSO in six<sup>57</sup> zonal railways. The analysis of FOIS data revealed that all six zonal railways could not achieve even the halfway mark of the prescribed speed for loaded and empty rakes. ER and SER could not achieve even one fifth of the prescribed speed for loaded and empty rakes.

## (ii) Right Powering

In Mission Raftaar, right powering of freight trains to increase the average speeds of trains as well as to improve traffic throughput was accorded approval with Horsepower-Trailing Load (HP/TL) ratio close to 2.0. Appropriate HP/TL ratio saves about 10 to 12 minutes in the time taken to attain the maximum speed level. Internationally, this ratio is between 2-2.25. On IR, due to increase in trailing load from 2400 ton/3200 ton in 1970 to 5308 ton in 2016, HP/TL ratio has dropped from a level of 1-1.30 to a level of 0.94-1.13 over the same period.

Instances indicating lack of right powering in ZRs leading to slow speed of Goods trains and consequent loss of line capacity are mentioned below.

ER	30 out of 138 rakes (22 <i>per cent</i> ) have gross load more than the hauling capacity of engines and hence multi engines were utilised for such rakes which could have been hauled by single engines with appropriate hauling capacity.
ER, SECR and NCR	During 2018-19, there were 64, 156 and 65 cases of stalling of Goods trains due to inadequate powering in hauling heavily loaded rakes.
NCR	201 trains <sup>58</sup> were delayed for 5,116 minutes due to 65 cases of stalling.
NWR	Ajmer division 60 trains were stalled in the sections during the period 2016-17 to 2018-19. At selected freight terminals <sup>59</sup> , during May 2018, out of 141 freight trains, only six trains were running with right powering standards. In four cases, the HP/TL ratio was less than 1, Multiple Unit was provided to increase the ratio by more than 1. However, in 10 cases, no multiple units were provided to increase the ratio

<sup>57</sup> SR, SER, NCR, ECR, ER, and ECoR

<sup>58</sup> 110 coaching and 91 Goods

<sup>59</sup> CMLK, BGKG and LGH

As per Ministry of Railways circular<sup>60</sup> there would be no WAG-5 SU locomotive hauling freight trains. But in ER<sup>61</sup>, three freight trains during May and July 2018 were hauled from DBCP to NTCD by WAG-5 SU locomotive. It was also provided that all freight trains running in CC+8 and other similar routes with trailing load of 5000 metric tonnes and above would be hauled by multiple units of WAG-7 locomotives (2 locomotives). In ER<sup>62</sup>, three freight trains during May 2018 and January 2019 were hauled by Single WAG-7 or WAG-9 SU locomotive. In SECR, out of 211 freight trains, 160 freight trains were under powered. The cases of Loco stalling increased from 80 in 2015-16 to 156 in 2018-19. Therefore, MoR instructions with respect to hauling of load were not adhered to.

#### 2.1.8.7 Expenditure made to address the critical factors

Audit analysed critical factors for Punctuality and travel time and the expenditure incurred by Railways during last ten years. It was also observed that the expenditure was not prioritized in order of the criticality. IR did not address all the critical factors commensurate to their criticality.

As the outcome indicators (Input/Output) were not fixed by IR, the direct correlation of Infrastructure development work and its outcomes such as Punctuality and travel time could not be established. An analysis was made by audit to correlate the critical factor and investment made by IR in infrastructure work. Details are summarized in **Table 2.13**.

Table 2.13: Critical factors vis-à-vis investment made by IR					
Critical factor	% share	Items of Expenditure (2009-10 to 2018-19)	% share	Expected expenditure for critical factors (₹ in crore)	Actual expenditure incurred (₹ in crore)
Path	17.64	Doubling, 3rd/4th line	9.74	1,12,318	62,003
Traffic	7.69	Traffic facilities and yard remodelling	1.41	48,964	8,982
Engineering & Block	22.56 <sup>63</sup>	Track renewal	7.05	1,43,645	44,860
S&T	3.47	Signal & Telecommunication work	1.62	22,094	10,320

It was observed that as against 51.36 per cent of critical factors which contributed for punctuality loss in IR, only 19.82 per cent of expenditure was

<sup>60</sup> letter No. 2016/mobility/4/1 dated 07.09.2016

<sup>61</sup> Dalurbandh Colliery Siding (DBCP),

<sup>62</sup> Dalurbandh Colliery Siding (DBCP),

<sup>63</sup> Engg – 14.81 per cent, Planned Block Open Line (PBOL) 7.75 per cent,

made against five critical factors. These factors are Path, Traffic, Engineering, Block and S&T. Therefore, IR did not address all the critical factors commensurate to their criticality.

#### **2.1.8.8 Train operations in New Delhi Howrah route- Simulation exercise**

NDLS – HWH (HDN 1) is the most congested route of the IR. There are more than 225 stations on NDLS – HWH route with inter-station distances varying from 1 km to 15 km. Average inter-station distance is 7.8 km<sup>64</sup>.

The total distance of HWH-NDLS is about 1445 Km via Gaya and 1523 Km via Patna. The route falls under the zonal jurisdiction of Eastern, East Central, North Central and Northern Railways. The busiest corridor of IR is serving highly populated cities like New Delhi - Kanpur, Prayagraj, Varanasi, Patna, and Kolkata.

The average speeds of coaching trains and freight trains on NDLS-HWH route are 60.9 Kmph and 23.9 Kmph respectively. Thus, on an average coaching trains and freight trains take 23:55 hours and 61 hours respectively to travel a distance of 1445 Km. The fastest train on this route viz., Rajdhani Express takes 17 hours<sup>65</sup>.

Analysis of causes of train delay revealed that over Ghaziabad –Deen Dayal Upadhyaya section of NDLS-HWH route, (a stretch of 747 km) non-availability of path (34 *per cent* of total delay) was the biggest reason for train delays. Analysis of sub-factors of out of path running of trains revealed that out of 12,101 incidences (of out of path running), 9169 incidences (76 *per cent*) were due to repercussion impact of the past delayed running. If these delays were addressed at primary stages, their cascading impact could have been minimised. During 2018-19, trains were delayed by 17,427 hours, due to 9,169 incidences of the repercussion of past delay (ICMS Report No 4D).

*Ministry of Railways stated (April 2021) that the initial delays have an impact on availability of path in travel ahead as the scheduled path is often lost. There are many external factors beyond the control of Railways, which have been the causes of delays.*

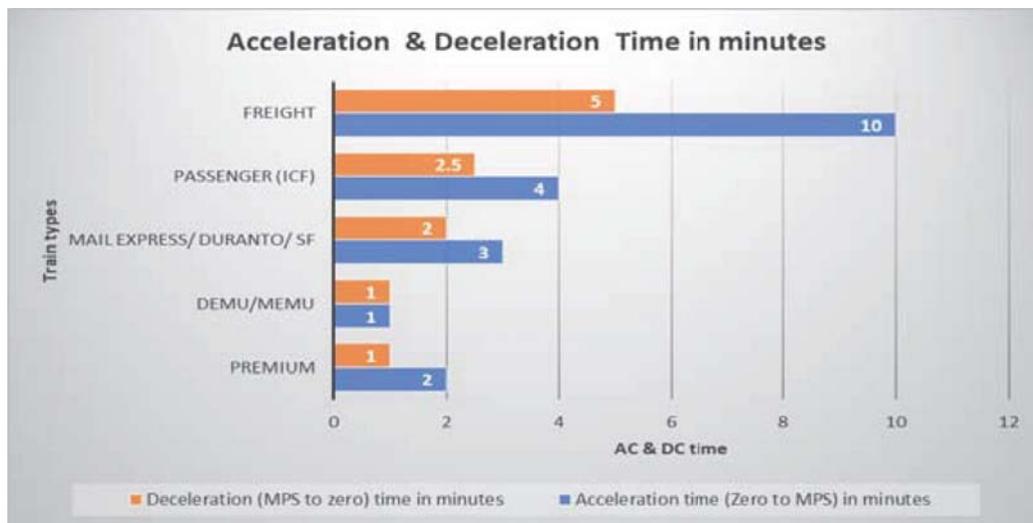
Audit noticed that the contribution of external factors during 2017-19 was about 12 *per cent* only. Therefore, there is a need to minimize the primary controllable delay to reduce the cascading effect.

<sup>64</sup> Source : DPR- work raising of speed to 160/200 Kmph on existing NDLS-HWH route

<sup>65</sup> Source : DPR- work raising of speed to 160/200 Kmph on existing NDLS-HWH route

On 1445 route-km of the section, there are 460 Level crossings (LC) averaging one LC every three to four Km, 87 Permanent Speed Restriction (PSR) averaging one PSR in every stretch of 17 Km. In addition to the above there are 199 turnouts with potential of speed less than 30 Kmph, limited fencing and weak formation in 3.2 Km. Frequent restrictions prevented trains from achieving and sustaining sectional speeds. The absence of high-speed thick web switches and improved Switch Expansion Joints also contributed to lesser speed and loss of punctuality.

Due to the existence of Speed restrictions (PSR and TSR) and multiple halts of trains, the impact of acceleration / deceleration on travel time results in further delays. This is shown in the following bar graph.



### Punctuality of Selected trains in NDLS – HWH route

The average punctuality performance of the eight pair of trains running between NDLS-HWH was merely 27 per cent in 2015-16 and 29 per cent in 2018-19. Punctuality performance of nine trains<sup>66</sup> was less than 10 per cent in the year 2015-16 and 2018-19.

*Ministry of Railways stated (November 2021) that 755 Km of GZB-DDU section of NDLS-HWH route is with NCR with major junction stations like Khurja, Aligarh, Tundla, Etawah, Kanpur, Prayagraj, Naini, Chheoki, Chunar. In Zero Base Time Tabling, all Rajdhani type High Speed Trains are scheduled to run in minimum 8 hours 5 minutes on DDU-GZB section at 130 Kmph speed with enhanced rate of Engineering and Traffic Allowance of 16 minutes per 200 Km at an average speed of 93.40 Kmph. All other LHB stock*

<sup>66</sup> 12324, 12323, 12249, 12250, 12329, 12330, 12304, 12273 and 12303

Mail/Express trains are also charted at 130 Kmph speed. Speed restrictions (PSR/TSR) are imposed by respective departments for maintenance of assets as a safety measure which cannot be avoided.

Reply is not appropriate. Punctuality performance is measured against the given time schedule. All halts at major junctions and PSR / TSR were already factored in the prescribed schedule of the Time Table.

### Speed of trains in different zones in the route

The details of the travel time and average speed of trains in all the four zonal railways for the eight pairs of trains for both routes of HWH-NDLS routes are indicated in **Table 2.14**.

Table 2.14: Average Speed of trains in zones in Kmph					
S. No.	Train No.	NR	NCR	ECR	ER
<b>Via Gaya</b>					
1a	12324	22.80	65.81	59.76	62.51
1b	12323	21.59	70.09	58.66	67.38
2a	12313	31.63	92.05	78.14	78.26
2b	12314	38.80	91.17	79.34	74.46
3a	12301	36.38	93.54	77.12	84.40
3b	12302	38.80	95.19	77.41	83.26
4a	12249	26.54	94.36	82.25	81.97
4b	12250	23.13	95.55	83.58	71.68
5a	12329	24.16	64.13	63.91	68.04
5b	12330	22.49	72.10	62.28	57.91
<b>Via Patna</b>					
6a	12303	33.45	81.78	57.63	67.01
6b	12304	38.80	76.64	55.03	58.48
7a	12273	35.06	84.62	54.54	70.77
7b	12274	40.42	89.87	58.95	58.20
8a	12305	36.38	93.54	58.95	78.63
8b	12306	38.80	95.19	63.61	77.26

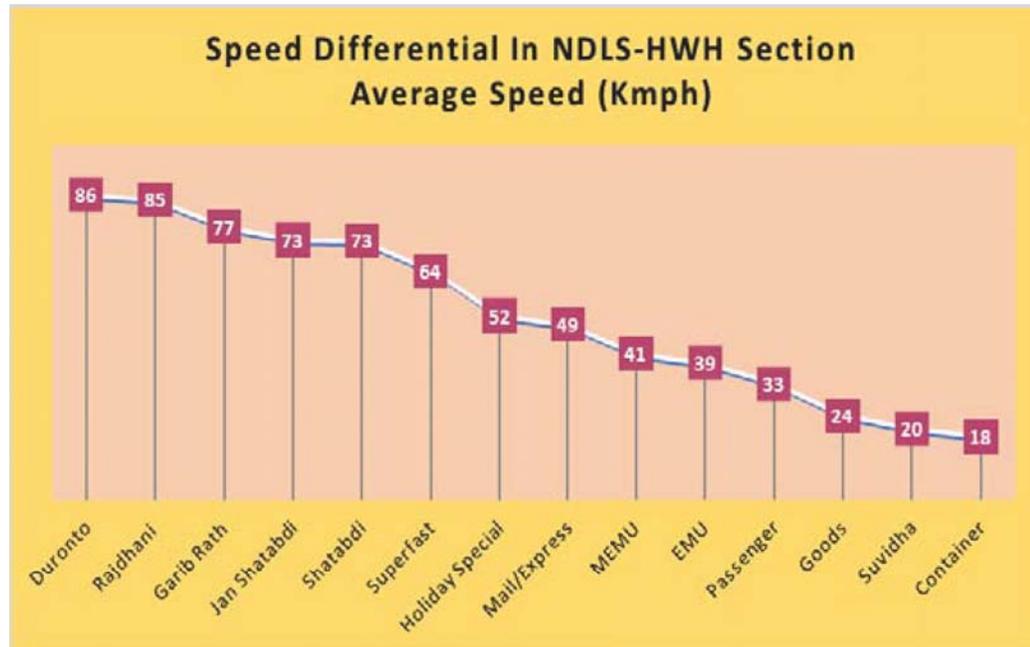
As can be seen, there is a wide variation in average speeds of same trains (i.e. same rolling stock) across zones. It could be due to multiple factors such as slack and allowances. Even though GZB-DDU section of NCR is the most congested section of the route, the average speed of all these trains is highest in NCR portion and lowest in NR portion.

The reasons for higher speed in NCR (755 Km) is increase in capacity due to induction of Automatic Signalling (GZB-CNB, PRYJ—DDU), sectional speed of 130 Kmph and provision of comparatively low allowances. In NR (29 Km) the reason for lower speed is due to higher line capacity utilisation (Tilak Bridge -188 per cent, Sahibabad-222 per cent), terminal constraints, conflicts due to running of suburban trains and low scheduled speed due to congestion.

MoR acknowledged (November 2021) the above stated observations.

### Speed differential

The maximum permitted sectional speed over the NDLS-HWH section is 130 Kmph. While the average speeds of trains range between 18 Kmph to 86 Kmph, there are 14 different average speed groups of trains in NDLS - HWH route. The present practice of the faster train overtaking the slower one is consuming the line capacity. Each precedence results in a loss of about 15 minutes running time along with commensurate loss in sectional capacity.



Ministry of Railways stated (November 2021) that in Zero Base Time Tabling, there are only 4 types of coaching trains according to speed i.e. (i) 130 Kmph (Rajdhani & HSTs), (ii) 110 Kmph (other Express/Conventional Passenger Trains), (iii) 100 Kmph (MEMU services) and (iv) 96 Kmph (EMU services). In present Zero Base Time Tabling, the trains have to be grouped according to speed and stoppages as far as possible. But all trains could not be grouped due to reasons like terminal constraints, time for service, convenient time for arrival and departure at major terminal stations. This has resulted in an increase of average speed of coaching trains and maintenance of corridor block and freight paths with clear corridor.

### Simulation of NDLS-HWH route by RailSys Software

One of the foremost reasons offered by the railway administration for explaining poor timeliness of trains was the 'lack of line capacity' on various routes. On the entire NDLS – HWH route there are many sections where the line capacity utilization was reported to be more than 100 per cent. IR have

made large capital investment on track infrastructure during 2008-09 to 2018-19 for improving punctuality and reducing travel time. IR have introduced high horse power locos, double distant signalling, 30 Kmph cross-overs, computerized operations etc. but a commensurate increase in line capacity has not materialized.

It was hence decided to simulate the trains running on NDLS – HWH route with the latest available ground infrastructure and modern rolling stock fed into an established simulation software.

The train operations were simulated for the entire NDLS-HWH route on RailSys software<sup>67</sup>. It was done to assess the scope of reduction in travel time, improvement in punctuality of trains and identification of freight paths within existing infrastructure. The analysis was conducted on RailSys software of MRVC under the advice of a former Chairman, Railway Board as consultant<sup>68</sup>.

*Ministry of Railways stated (November 2021) that it seems that simulation did not include PSR time loss and major junction constraints such as Kanpur, Allahabad in the sectional run time. Software is not ensuring that train halting at any station has platform on main line or not. In junctions multiple cross-overs, rake reversals, loco reversal, surface crossings and other operational constraints are not included in the simulation exercise. The headway running between two trains are shown as six minutes which is operationally not justified. The headway running of trains to be decided by considering all cross movements and operational constraints enroute.*

Reply is not convincing as Simulation was conducted on the simulation software owned by the Indian Railways. The models developed in simulation of New Delhi Howrah route on the basis of Working Time Table 2019 are available at MRVC/Mumbai. All PSR, Terminal constraints and headway as per permitted capacity of section and rolling stock were included in the Simulation exercise. Using the platform occupancy tool of RailSys software, decisions regarding the platform allocations for the trains were made. Also, by using a visual tool of the software, the platform working of major yards were considered. All this helped in making judicious use of available platform and loop lines which streamlined the operations and reduced the number of cut-across movements.

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<sup>67</sup> There are quite a few railway simulation software options available; out of which two are available to IR: SATSang (developed by CRIS, India) and RailSys (developed by RMcon, Germany). RailSys software is currently available only with MRVC (Mumbai Rail Vikas Corporation), Mumbai.

<sup>68</sup> Shri Vivek Sahai

### Constraints

The magnitude of the work can be understood by the sheer number of nodes that were needed to be created to cover 225 stations in the 1,445 Kms long corridor. In total, 13979 nodes were created, which included 4,481 signals and other points and crossings. One of the key challenges faced during infrastructure creation was that the Signalling and Interlocking Plans (SIP) were not uniform across the zones in the route. SIP of NR and NCR differed from that of ECR and ER zones.

### Principles and methodology followed in Simulation

The simulation of the entire corridor from New Delhi (NDLS) to Howrah (HWH) (in both UP and DN direction) included Anand Vihar Terminus (ANVT) and Old Delhi (DLI) in the NDLS side and both Main Line via Bandel and Howrah Bardhaman chord line via Dankuni in the HWH end.

- The software was used to create a replica of the existing infrastructure of the NDLS - HWH corridor with all the signals, crossovers, stabling lines, loop lines, platforms, permanent speed restrictions and any such restrictions as per the Commissioner of Railway Safety (CRS) guidelines.
- The signals were placed with their respective overlaps of 120m approx.
- The signals overlap and block sections were incorporated in absolute block and automatic block sections accordingly.
- The speed restrictions of crossovers were designed as per the CRS guidelines.
- The different train-type templates were created with all existing combinations of locos, a number of coaches and their speed clearances.
- Audit took the originating time of trains as sacrosanct<sup>69</sup> in simulation. Hence, the HWH timing for UP direction trains and NDLS/ANVT/DLI timing for DN direction trains were kept as it is for the simulation purpose. Similarly process was followed for the time at which other trains enter the NDLS-HWH corridor from various junctions like

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<sup>69</sup> While doing simulation care was taken to retain the origin time of the train and in case of train entering NDLS-HWH corridor from adjoining corridors their time of entering NDLS-HWH corridor was kept sacrosanct. In some cases, these times were altered by a few minutes to ensure their punctual and efficient running.

Tundla, Cheeki, Gomoh, Dankuni etc. Once these timings were provided along with the specifications of the train type, the simulation gave us the standard run time for the given routes.

In the simulated time table of New Delhi – Howrah route, audit incorporated the running of 88<sup>70</sup> pairs of MEMU, 147 trains in UP direction and 143 trains in DN direction. Even though UIC 406 recommends a standard allowance of 3-5 *per cent* of the total running time, a conservative figure of 10 *per cent* has been adopted. The simulation took into account all the variable like MPS, PSR, 10 *per cent* allowance and gave us standard running time between stations. After taking into consideration all the cascading effect, each train and its conflicts were then resolved in the simulated Time Table.

Before giving any preference or additional halts or additional dwell time at any existing halt, the platform utilisation and availability were thoroughly considered. The junctions like Deen Dayal Upadhyaya, Kanpur Central, Prayagraj, Gaya, Bardhaman, in particular, were a major challenge as they exchanged many trains across divisions. Using the platform occupancy tool of RailSys software, decisions regarding the platform allocations for the trains were made. Also, by using a visual tool of the software, the platform working of major yards were considered. All this helped in making judicious use of available platform and loop lines which streamlined the operations and reduced the number of cut-across movements. Once the task of infrastructure creation of the NDLS-HWH corridor was accomplished in the RailSys software, the existing trains (244 pairs) from working timetable of July, 2019 of the six divisions<sup>71</sup> involved were populated in the system.

The Working Timetable (WTT) had around 12,466 conflicts. Out of these conflicts, 4900 caused minimum interference of upto five minutes to the operation. Other conflicts, however, were causing major blockages. Analysis of conflict with respect to the existing WTT revealed that major reasons for these were

- 130 Kmph train preceded by 110 Kmph trains
- Mail Express train preceded by EMU/MEMU trains
- Slack in EMU/MEMU running time
- Inconsistent running times due to erratic allowances
- Differential halts and dwell timings of preceding train

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<sup>70</sup> In MEMU 4 pairs of trains and 5 trains in UP direction and 9 trains in DN directions were kept inactive in simulation exercise.

<sup>71</sup> New Delhi, Allahabad (Prayagraj), Mughalsari, Dhanbad, Asansol, and Howrah

- Unscientific side-tracking to give preferences
- Platform occupancy and management at major terminals

Each conflict was unique and required differential treatment; however, certain principles were followed to resolve them. Firstly, unnecessary preferences to similar speed trains were avoided and given only in case of excessive halts of preceding trains. Secondly, preference was planned wherever the train had a public halt; to avoid unnecessary side-tracking. And, most importantly, the principle of uniform allowances as against the erratic and unscientific allowances was followed.

*Ministry of Railways stated (November 2021) that the methodology adopted in simulation, mainly layout of stations yards is not as per actual and taken in a very simplified manner. Overall 10 per cent extra time provided in simulation is not sufficient.*

Reply of MoR was not convincing as UIC 406 recommends a standard allowance of 3-5 per cent of the total running time, in Simulation exercise a conservative figure of 10 per cent was adopted. Results of zero based time tabling exercise undertaken by Ministry of Railways itself suggested an increase of 5 per cent in the average speed of passenger train services, by rationalization of Time Table.

### **Results of Simulation**

The following findings emerged from simulation:

- i. The Working Time Table of all the concerned divisions need to be recast to remove all conflicts.
- ii. The current Time Table in use can't be expected to deliver high standards of punctuality. On the other hand, it is possible to achieve 100 per cent punctuality in the revised Time Table obtained through a scientifically designed simulation.
- iii. Preparation of time – table on scientific basis leads to generation of additional paths for passenger/freight trains. This leads to a conclusion that the current calculation of line capacity of various sections does not exploit the full potential of the available infrastructure.
- iv. It is beneficial to spread the engineering allowance (EA) throughout the run of the trains instead of loading it on the last block section before a major station. This action alone can increase the line capacity of the section substantially.
- v. Provision of Traffic Recovery Time (TR) and Operational Recovery Time (OP) should be totally dispensed with. It reduces line capacity.
- vi. The first step towards recasting the Working Time Table is to fix the inter station running time for all types of trains – both passenger and

freight, accurately. Running staff need to be trained exhaustively to achieve prescribed time schedule at every block station en route.

- vii. The EMU/MEMU rakes are introduced in a section to provide very fast commuter services in a section during the morning and evening peak hours. The unique selling property (USP) of these rakes is super fast acceleration and deceleration. In addition they can be started with a short halt time (In Mumbai Suburban System a halt of 30 seconds is normal). Both these properties of these rakes have not been exploited in the time – table of this route. The inter station running time gives very low average speeds and halts of five minutes or more are ubiquitous, which is contrary to the characteristics of EMU operations. This needs immediate amelioration.

*Ministry of Railways stated (November 2021) that in rationalization of Time Table exercise, Time Tables have been re-charted with removal of conflicts. In exercise of rationalization of Time Table, help of IIT Bombay and inputs from SATSaNG software have also been taken into consideration. High standard of punctuality can be achieved by practical time table and resolving all conflicts rather than theoretical timings. Further, simulated time will help in improvement in time tabling. Simulator has all filled data which is very large. The rationalization of Time Table has helped in speeding up of trains and increasing maintenance corridor from 2 hours to 3 hours on trunk routes of NCR and also increased freight paths. However, time tabling is a continuous exercise which takes into account small inputs given in infrastructure from time to time.*

#### **Output of Simulation- new Time Table**

After conflict resolution in running time and rationalisation of ad-hoc allowances, a new Time Table for the NDLS-HWH trains has been formulated. In the UP direction there are 235 trains. In the Down direction there are 231 trains. The simulation exercise did not cover nine trains on the UP direction and 13 trains on the Down direction. Under normal conditions, it is possible to achieve 100 per cent punctuality in the revised time table.

*Ministry of Railways stated (April 2021) that the simulated time table has taken into account the coaching trains. It is possible to achieve near 100 per cent punctuality, but for the untoward incidents, abnormalities, asset failures and speed differential which takes longer time to clear the block section if running ahead. The punctuality figure for 2021 improved after zero based time table. Further foggy weather each year, for about 3 months deteriorates the average actual figure of punctuality.*

### Average savings in journey time

After collating the complete data, we could quantify average savings in journey time for all Mail/Express trains on the NDLS-HWH route. The quantified data are given in **Table 2.15**

Table 2.15: Average savings in run time			
Train type	Total Train Km	Total Time saved (in min)	Savings per 100 Km
110 Kmph Down direction	37000	9233	25
110 Kmph UP direction	37081	8147	22
130 Kmph Down direction	18361	1925	10
130 Kmph UP direction	18576	2245	12
EMU/MEMU UP direction	9069	3148	17*
EMU/MEMU Down direction	8938	2818	16*

\*Savings per 50 Km run

The exercise informs that for every 100 Km run,

- An average saving of 22-25 minutes is possible for trains cleared for 110 Kmph;
- An average saving of 10-12 minutes is possible for trains cleared for 130 Kmph

For EMU/MEMU trains which have shorter runs compared to Mail Express trains, the possible savings per 50 km is 16-17 mins.

For 130 Kmph trains (8 pairs<sup>72</sup> of Trains) covering the entire distance between NDLS HWH stations, an average saving of 147 minutes in travel time is possible. The range of reduction of travel time is 64 minutes to 386 minutes.

For 110 Kmph trains (Train No 12819/12323, 12820/12324) covering the distance between NDLS HWH stations, there is scope for reduction in travel time of 328 minutes in Up direction and 336 minutes in the DN direction.

*Ministry of Railways stated (November 2021) that under the recently concluded exercise of rationalization of Time Tabling, undertaken with the assistance of IIT Bombay using their traffic simulator, IR has been able to enhance the speed of over 2000 trains. Under the exercise, the travelling time*

<sup>72</sup> Train No 12259/12249, 12301/12305, 12303/12381, 12313, 12302/12306, 12304/12382, 12314

of more than 900 trains have been reduced by more than an hour while for 1600 trains the travelling time have been reduced by more than 30 minutes. 362 passenger trains have been converted into Mail/Express trains by speeding up while 120 Mail/Express have been converted into super fast service. An increase of 5 per cent in the average speed of passenger train services has been achieved, by rationalization of Time Table.

The saving in travel time for trains cleared for 130 Kmph and 110 Kmph are shown in **Table 2.16**.

<b>Table 2.16: Savings in travel time of trains cleared for 130 kmph</b>							
No.	Name	Origin	Destination	Distance	Runtime minutes in		Saving in travel time
					RailSys	Existing	
12250	Howrah Yuva Express	ANVT	HWH	1450	944	1025	81
12302	Rajdhani Express (Gaya)	NDLS	HWH	1450	943	1020	77
12314	Sealdah Rajdhani Express	NDLS	DKAE	1436	954	1021	67
12276	Humsafar Express	NDLS	ALD	633	393	485	92
12424	Dibrugarh Rajdhani Express	NDLS	DDU	785.5	495	553	58
22436	Vande Bharat Express	NDLS	ALD	633	383	383	0
<b>Savings in travel time of trains cleared for 110 kmph</b>							
No.	Name	Origin	Dest.	Dist	Runtime minutes in		Saving in travel time
					RailSys	Existing	
<b>12323</b>	HWH - ANVT SF Express	HWH	ANVT	1437	1007	1335	<b>328</b>
12321	HWH- CSMT Mail (via Gaya)	HWH	ACOI	804	691	802	111
<b>12559</b>	Shiv Ganga Express	ALD	NDLS	635	423	690	<b>267</b>
12349	Bhagalpur- New Delhi SF Express	MPO	NDLS	997	724	926	202

NDLS HWH (HDN 1) is the most congested route of the IR. This route suffers from endemic capacity constraints, making it a veritable quagmire for the punctuality of all trains operating on it. Our Simulation exercise demonstrated substantial savings in travel time (as mentioned above) in the most congested and difficult section of Indian Railways, it is assessed that similar reduction should materialise all over Indian Railways.

Ministry of Railways stated (April 2021) that compaction exercise has been undertaken wherein trains with same speed potential have been bunched together to achieve better mobility and minimise precedence of train services.

*The exercise duly provides for the engineering allowance of 6 minutes per 100 Km (for 110 kmph section) and 8 minutes per 100 Km (for 130 Kmph section) and pegs the Traffic Allowance at a maximum of 6 minutes per 100 Km.*

Audit is of the view that the saving could be enhanced by grouping of similar speed trains and through integrated maintenance.

### Line capacity

Line capacity is an important operating resource which is used for managing the existing services and for investment planning for augmentation/expansion of network.

IR calculates line capacity by Master chart method. The charted capacity for each section is worked out by actual charting of paths in Master Charts. Passenger train path based on scheduled time is plotted first and then Goods train paths are interpolated based on the availability of window for running freight trains. Chartered capacity is based on the train schedule, which included engineering and traffic allowances. While yardstick has been prescribed for engineering allowance, no scientific method of allocation of traffic allowances is prescribed by IR. This leads to different interpretations, and this method is subjective.

As per the Line Capacity utilisation statement (2019-20) of NCR, the most congested sections in Ghaziabad – Deen Dayal Upadhyaya (GZB- DDU) section of Prayagraj division are Kanpur - Juhi West (**172 per cent**); Subedarganj - Fatehpur and Chanderi - Kanpur (**142 per cent**); Fatehpur - Chanderi (**144 per cent**); Mirjapur - Chheoki (**134 per cent**); and Panki - Shikohabad - Tundla (**133 per cent**).

A simulation analysis was carried to assess the line capacity of network from Maripat to Block Hut K (MIU-BHK) section of NCR. For the purpose of simulation, RailSys software of Mumbai Rail Vikas Corporation (MRVC) was used and UIC 406<sup>73</sup> standards were adopted.

The simulation of 116 trains in DN direction Maripat – Block Hut K(MIU-BHK) and 117 trains in UP direction (BHK-MIU) revealed that 33 to 91 free paths are available as against the present calculation of over-utilisation of line capacity.

**Table 2.17** shows the line capacity utilisation in various sections of the route with the existing passenger carrying trains on the section.

<sup>73</sup> The UIC 406 capacity method defines railway capacity as “the total number of possible paths in a defined time window”.

Table 2.17: Details of the Line Capacity utilisation (without M/B) generated in Simulation				
Section	Total Line capacity Passenger trains	Passenger trains, WTT, 2019 (% utilization )	Existing freight path, WTT, 2019	Free paths- Passenger trains
<b>UP direction</b>				
Maripat – Tundla	153	70 (45.7)	37	46
Tundla – Kanpur Central	194	85 (43.8)	33	76
Kanpur Central – Prayagraj	116	51 (44)	32	33
Prayagraj –Block Hut K	175	65 (37)	32	78
<b>DN direction</b>				
Block Hut K – Prayagraj	182	62 (33.9)	34	86
Prayagraj – Kanpur Central	124	56 (44.9)	32	36
Kanpur Central – Tundla	185	87 (46.9)	32	66
Tundla – Maripat	200	73 (36.5)	36	91

There is ample idle line capacity which can be further exploited, and also there is ample scope to further streamline the operations to improve their punctuality.

- The claim of higher line capacity utilisation in GZB- DDU section was not found correct in simulation analysis.
- The assessed reason for higher utilisation figures of line capacity in GZB-DDU section was heterogeneous traffic, overtakes, terminal constraints- higher headway and conflict in paths which arise due to Timetabling issues (unscheduled traffic, lack of grouping and Zonal boundaries).

Line capacity utilisation forms a basis of decision making for future expansion projects. Hence, it must be calculated scientifically. A realistic assessment of line capacity utilisation would help planning the train operations to improve the speed and punctuality. Projects to be sanctioned in future should consider revised line capacity calculation.

*Ministry of Railways replied (November 2021) that adequate/sufficient availability of Line Capacity is the most significant factor for Rail Transport. There are many factors affecting line capacity including mixed mode of traffic (freight & passenger), large number of trains, speed differential of rolling stock, terminal constraints, weather conditions, maintenance blocks etc. The simulation in ideal conditions may not reflect the reality at ground level of*

actual operations. Simulators, however, give a fair evaluation for planning. There will always be a visible gap between simulation results and outputs from ground operations. Recently, Indian Railways has launched Vision-2024 with projects to be completed on top priority for overall improvement of services.

Audit noticed that the excess over the charted line capacity utilization are shown in the calculation for master chart method. Therefore, the calculation is not based on the optimum utilization of capacity. It was established in simulation study conducted by different agencies such as Audit, CRIS and in NITI Aayog Report that there is scope to exploit the ample idle line capacity. It was also seen from the results of Zero Based Time Tabling exercise undertaken by IR that there was scope for improvement of charted line capacity.

### Additional Freight train paths in a few section

In the simulation, the availability of freight paths was calculated in the following sections (both UP and Down) after taking into consideration a two-and-half-hour maintenance block.

- Dankuni -Asansol
- Dhanbad –Gaya
- Maripat –Block Hut K

One of the common concerns for train operations is the sparing out time for the scheduled engineering and other technical maintenance on the tracks. In the exercise, all the daily passenger trains were plotted, and then the graphical timetable feature of the software was used to ascertain the location and time of the maintenance blocks. The present practice of blocks being given during the daylight time was followed. With all these factors in place, the maintenance block location and time were identified in both Down and UP direction with minimum impact on the passenger train movements.

**Table 2.18** shows the available freight paths in UP and Down direction.

Table 2.18: Line Capacity in UP direction						
Section: UP direction	UP	Freight Trains	Passenger trains	Line capacity utilisation with 02:30 maintenance block	hours (per cent)	Total Line Capacity
DKAE - PRAE		50	63		90.90	124
KAN-ASN		55	45		61.80	162
DHN – GAYA		44	40		87.00	96
DN direction						
GAYA – GAP		40	27		74.20	90
GAP-KQR		40	26		57.10	115
KQR-DHN		40	33		90.20	81

Table 2.18: Line Capacity in UP direction				
Section: UP direction	Freight Trains	Passenger trains	Line capacity utilisation with 02:30 hours maintenance block (per cent)	Total Line Capacity
ASN - DKAE	40	95	101.00	134

In the simulation exercise, a 2:30 hours maintenance block led to a drop of 14 *per cent* in the line capacity. Capacity utilisation (after adding maintenance block) and free path available in NCR portion is indicated in **Table 2.19**.

Table 2.19: Line capacity utilisation in NCR portion of NDLS- HWH (UP)				
Section	Total Line capacity for passenger trains in 24 hours	Passenger trains currently operational in 24 hours	Line capacity utilisation by existing passenger trains with maintenance block (per cent)	Free paths available for passenger trains
MIU – TDL	153	70	60	83
TDL – CNB	194	85	58	109
CNB – ALD	116	51	58	65
ALD – BH K	175	65	51	110
DN direction				
ALD – BH K	182	62	58	120
ALD – CNB	124	56	59	68
CNB – TDL	185	87	61	98
TDL – MIU	200	73	51	127

The line capacity utilisation status reflects the availability of free path for Operation. These paths could be utilized for both passenger and Freight Operations. In a reply to an audit query, NCR Administration stated that for maintenance corridor, a provision of 3 hours has been provided in the upcoming Zero Based Timetabling. In addition, an increase of 10 *per cent* in the number of Goods path is envisaged

These results of simulation and comparison proved that the present methodology to calculate Line Capacity needs to be revisited. If timetabling is carried out scientifically, the existing infrastructure itself provides adequate cushion for handling trains efficiently.

*Ministry of Railways replied (November 2021) that at present, preparation of time-table of trains are done manually on master chart. However, in current time tabling exercise help of IITB and SATSaNG software of CRIS has been taken for framing of time table. This has resulted in increased time for maintenance corridor from 2 hours to 3 hours on main lines and also increased number of freight path. However, capacity constraint are due to 'Junction Nodes i.e. junction and cross movement of trains'. The infrastructural inputs are required on these nodes on priority. Some works of grade separator on these are sanctioned as grade separator for removal of these cross movement but have long gestation period.*

### 2.1.9 Conclusion

Indian Railways despite investing ₹ 2.5 lakh crore on track infrastructure during 2008-09 to 2018-19 have failed to improve on the mobility outcomes viz., punctuality and travel time reduction. The average speed of Mail/Express and freight trains is still around 50 Kmph and 23 Kmph, respectively. There has been insignificant improvement in speed of Shatabdi and Rajdhani since their induction in 1970s. Out of 478 super fast trains of Indian Railways, the scheduled speed of 123 super fast trains (26 per cent) was less than the specified speed of 55 Kmph.

The overall average halt time at all the stations for 2951 trains from the Time Table of 2019 were more than two hours. Indian Railways was running 62 Express trains having more than 75 stoppages. Longer and frequent stoppages created congestion at Junction Points and enroute which reduced the overall speed.

Six main internal critical factors contributing 66 per cent of total detention of trains were identified as controllable. Indian Railways did not address these critical factors commensurate to their criticality.

Asset failures had an increasing trend over the previous years. Despite the provision of integrated corridor blocks in the working time table, maintenance activities were not integrated.

Despite having higher capacity of rolling stock/infrastructure, the average speeds of coaching trains are not commensurate with their potential. The halts at junctions are not standardized and they vary widely. Besides, IR has neither standardized the provision of time supplement required for operating reasons nor adopted Global norms. Provision of higher allowances resulted into longer travel time and sub-optimal use of infrastructure.

Indian Railways has no guaranteed delivery time for Goods consignment. This was due to non-scheduling of Goods trains operation. Non-availability of path, congestion at traffic nodes, conflict of paths, longer hour of run in the scheduled Goods paths, delay of through trains in crew change, lack of right powering etc. are the major reasons which resulted in slow speed of Goods trains and adversely affected delivery of freight services.

Audit conducted a simulation exercise using established software with the assistance of an external expert. It revealed that the current Working Time Table for the New Delhi-Howrah route has around 12,500 conflicts. Simulation indicated that there were significant differences between line capacity utilisation figures claimed and those obtained in simulation, indicating over pitching of line capacity utilization. Thus, there is a significant scope of

improvement to reduce travel time and improve punctuality within the existing resources.

Preparation of Time Table on scientific basis leads to generation of additional paths for passenger/freight trains. Audit framed a new Time Table for the New Delhi-Howrah route based on the results of simulation. Simulation exercise informs that for every 100 km run, an average savings of 22-25 minutes is possible for trains cleared for 110 Kmph. Similarly, for trains cleared for 130 Kmph, an average savings of 10-12 minutes is possible. Under normal conditions, it is possible to achieve 100 *per cent* punctuality in the new Time Table.

### 2.1.10 Recommendations

**Ministry of Railways may consider;**

- ***to fix a target date by which IR will achieve the desired increase in the average and maximum speed of Passenger and Freight trains in their network and strive to achieve it.***
- ***to prioritize the usage of integrated corridor blocks so that effective maintenance of assets of all the departments are carried out with minimal disruption to operations.***
- ***to address critical factors of detention with commensurate expenditure on track alignment, track renewal, signaling, doubling work etc.***
- ***to prescribe the norms for traffic recovery time for reducing the higher allocation of traffic allowance and sub-optimal utilization of infrastructure and resources.***
- ***to work out an implementation strategy for a freight service timetable to ensure guaranteed delivery time of consignments to customers.***
- ***to prepare the Time Table on scientific basis which would lead to generation of additional paths for passenger/freight trains. This would also lead to correct assessment of line capacity utilization.***

*Ministry of Railways replied (November 2021) that the recommendations, as made by the Audit, for improvement in average and maximum speed, punctuality and other aspects of trains operation have been noted. Indian Railways would make sincere efforts within its infrastructure / resources for betterment of its services, both passenger and freight operations. As regards target date for achieving the desired increase in the average and maximum speed of Passenger and Freight trains, it is stated that improvement in average speed and other related issues is an ongoing process & subject to*

availability of resources including rolling stock, locomotives & infrastructure like tracks, OHE, signaling gears etc.

## 2.2 Loss on account of non-realization of Service Tax from licensees: West Central Railway and Southern Railway

**Ministry of Railways issued detailed instructions (September/October 2012) regarding levy of Service Tax from the licensees on Goods, Passenger, Parcel and other Auxiliary Services. West Central Railway Administration, however, failed to levy Service Tax from the licensees during the period April 2011 to June 2017. As a result, Indian Railways suffered a loss of ₹ 5.41 crore as Railway Administration made payment of Service Tax demand from its own earnings. Similarly, Southern Railway Administration made service tax payment of ₹ 22.02 crore from its own earnings.**

As per provisions<sup>74</sup> of Finance Act, 1994, renting of immovable property includes renting, letting, leasing, licensing for use in the course of furtherance of business or commerce and is liable to levying of Service Tax. Licensing of space at railway stations comes under the definition of renting of immovable property and is a taxable service.

In September 2012, Ministry of Railways (MoR) issued instructions to Zonal Railways for levy of Service Tax @ 12.36 per cent in all cases of renting of immovable property with the exception of Negative List and Exemption List In the MoR's instructions *ibid*, it was clearly mentioned that Service Tax should be collected at the time of entering into transaction of renting/leasing of immovable property<sup>75</sup>.

In October 2012, MoR issued detailed Accounting procedure for levy of Service tax on Goods, passenger, parcel and other auxiliary services. Zonal Railways were instructed to compile and issue a consolidated list of all Auxiliary Services on which Service Tax is leviable. In cases, where the Agreements are alive and supporting clauses are available, Zonal Railways may pass on the tax liability to the customer, wherever possible. In cases, where Agreements are alive but no supporting clause exists, Zonal Railways shall examine incorporating the same duly negotiating with the contracting party and pass on the tax liability to the customer. In cases, where there is no such possibility, the liability may be assessed and Nodal Directorate in the MoR may be informed for further instructions.

<sup>74</sup> Section 65 (90 a) read with Section 105 (zzzz) of Chapter V of Finance Act, 1994

<sup>75</sup> Para 3(ii) of MoR's letter No. 2012/LML/25/15 dated 28 September 2012

**2.2 (a) West Central Railway**

Audit observed that no action was found to have been taken by the West Central Railway (WCR) Administration in compliance of MoR's instructions issued on Service Tax. No Service Tax was collected from the licensees and deposited with the Tax Authority. The Tax Authority since April 2009 periodically issued Demand Notices for payment of Service Tax on the sundry earnings received from the parties under heads viz. Parking Stand, Catering Stalls, ATM, Commercial Plots, Leasing of SLR/Asstt. Guard Cabin, Parcel Van and Space given for Advertisement etc. The Tax Authorities worked out the total Service Tax and penalty liability of ₹ 12.50 crore<sup>76</sup> against WCR Administration for the period April 2011 to June 2017. Against the Demand Notices of Tax Authority, WCR Administration filed appeals/petitions which were dismissed during February to August 2019.

In December 2019, Superintendent, CGST & Central Excise/Jabalpur advised<sup>77</sup> FA & CAO/WCR to avail the benefit of the 'Sabka Vishwas Scheme' and deposit ₹ 5.02 crore against the Service Tax liability of ₹ 12.50 crore. The WCR Administration decided (December 2019) to avail the benefit of the Scheme "Sabka Vishwas (Legacy Dispute Resolution Scheme, 2019)" and made payment of ₹ 5.02 crore to the Tax Authority in February 2020 from its own earnings. The competent authority (Additional General Manager/ WCR), while approving for payment under Sabka Vishwas Scheme 2019 directed (December 2019) to recover the Service Tax from the concerned licensees.

Audit observed that WCR Administration failed to compile and circulate the consolidated list of Auxiliary Services on which Service Tax was leviable to the Divisional Authorities as mentioned in MoR's instructions of 01 October 2012. Due to non-receipt of instructions from Zonal level, the Divisional Authorities could not levy/collect the Service Tax from the licensees for the Auxiliary Services. Despite demand notices for Service Tax issued by the Tax Authority, Zonal Railway Administration failed to issue instructions to the Divisional Authorities for levy/recovery the Service Tax.

In January 2020, Principal Chief Commercial Manager (PCCM)/WCR approached<sup>78</sup> the MoR for issuing the necessary Guidelines on Service Tax liability imposed by Service Tax Department on various Auxiliary Services<sup>79</sup>.

<sup>76</sup> Service Tax of ₹ 8.773 crore and Penalty of ₹ 3.723 crore=₹ 12.496 crore, say ₹ 12.50 crore

<sup>77</sup> Vide letter No. GL-6/62/R-I/JBP/Railway/ST/2018 dated 23 December 2019

<sup>78</sup> Vide letter No. WCR/HQ/JBP/C/Law/Service Tax dated 06 January 2020

<sup>79</sup> Parking Stand, Catering Stalls, ATM, Commercial plots, leasing of parcelspace and space given for advertisement

In reply, MoR stated (February 2020)<sup>80</sup> that instructions in this regard had already been issued to all Zonal Railways on 01 October 2012 and directed PCCM to take suitable action in concurrence with Zonal Associate Finance.

Thus, due to non-levy of Service Tax from the licensees, WCR Administration had to make an avoidable payment of ₹ 5.41 crore<sup>81</sup> from its own earnings to the Tax Authority. Railway Administration could not recover the Service Tax from the concerned licensees as the Security Deposits of the licensees were returned on expiry of contract period.

The WCR Administration, in its reply, stated (January 2021) that the quoted letter of MoR of 1 October 2012 was not received and hence no appropriate action seems to have been taken. They further stated that both the Departments i.e. Railways and CGST & Central Excise being of Central Government, it was decided to accept the proposal of Superintendent, CGST & Central Excise/Jabalpur to avail the benefit of Sabka Vishwas Scheme to avoid further litigation and unnecessary expenditure.

Reply of Zonal Railway Administration that the quoted letter of MoR was not received, was not acceptable. Audit observed that the *ibid* letter of MoR was received on 19 October 2012 and sent to Chief Commercial Manager and Financial Advisor and Chief Accounts Officer/WCR on 25 October 2012 for further necessary action.

The matter was referred to the MoR in August 2021; no reply was received (November 2021).

## **2.2 (b) Southern Railway**

Audit observed that SR Administration had paid Service Tax to an extent of ₹ 80.22 crore (₹ 58.20 crore + ₹ 22.02 crore) during the period from October 2012 to June 2017. Out of ₹ 80.22 crore, the Service Tax of ₹ 58.20 crore was levied and collected from the concerned parties but ₹ 22.02 crore was paid to Revenue Authorities from the Railways revenue in October 2017 without collecting/levying from the concerned parties/contractors. This was on the basis of summons received from the Directorate General of Central Excise Intelligence, Chennai (March 2017). Audit noticed that SR Administration distributed (October 2017) ₹ 22.02 crore among all Divisions with instructions to form a multi-disciplinary team to revisit all contracts *etc.* during the period

<sup>80</sup> Vide letter No. 2004/TG IV/39/24/Service Tax dated 19 February 2020

<sup>81</sup> Zonal Railway Administration had pre-deposited a sum of ₹ 0.39 crore with the Tax Authority against the Demand Notices of February 2019 and June 2019 on Service Tax.

from October 2012 to March 2014 and identify the parties to collect the Service Tax paid by the Railway Administration.

However, no such action was taken by any Division and as such no Service Tax was collected (June 2020). The possibility of collecting the same is very remote as the contract period was over five years old.

A show cause notice No. 96/2018 dated 06-09-2018 was received from the Directorate General of Central Excise Intelligence, Chennai regarding non-payment/short payment of service tax amounting to ₹ 91.23 crore. SR Administration replied to show cause notice in October 2018 and September 2019. SR Administration did not agree on some issues of service tax on Sundry earnings and requested Revenue Authority to give more time to collate the records and submit a categorical reply in full compliance of requirement.

While the dispute lies unresolved, the Government has come up with an Amnesty Scheme Sabka Vishwas Legacy Dispute Resolution Scheme (SVLDRS) 2019, which allows for a rebate on the outstanding tax dues, besides waiver of interest and penalty. Since, this scheme was beneficial, SR filed an application (January 2020) under the scheme with the approval of Principal Financial Advisor (PFA) to avail the benefits of the scheme and minimize the outgo towards service tax dues. SR also requested to close the case, as Service Tax of ₹ 80.22 crore has already been paid by SR and the balance payment is NIL, by virtue of 50 *per cent* of rebate under the scheme. However, the final order on the above issue is still awaited.

Thus, the failure of the SR Administration to comply with the instructions of the Railway Board had resulted in irrecoverable loss of ₹ 22.02 crore due to payment of Service Tax from its revenue which ought to have been levied and collected from the contractors/licensees.

The matter was referred to MoR in January 2021. In their reply, MoR stated (July 2021) that instructions have been issued to Zonal Railways to ensure compliance to Service Tax guidelines. All the divisions have reviewed the contracts during the said period and have initiated action to recover the service tax from the concerned parties. An amount of ₹ 0.41 crore have been recovered so far and earnest efforts are being made to recover the remaining amounts from the licensees/contractors wherever due.

### 2.3 Avoidable loss due to operation of uneconomic halts: Northern Railway

**Despite no sale of tickets since 2011-12 at two halts in Moradabad Division, Northern Railway Administration did not take steps for closure of halts. This was also in violation of Ministry of Railways' instructions related to closure of un-remunerative halts. Operation of the two halts resulted in loss of ₹ 20.55 crore incurred on operating expenses for stoppage of trains during 2011-20.**

Halt stations are small way side railway stations where very few trains stop. Such railway stations generally are not staffed by railway personnel but by a contractor. As per Para 1908 of Indian Railway Code for Traffic Department (Commercial), a periodical examination of existing halts should be made and the possibility of converting such halts into Flag stations, wherever justified, should be considered on a programmed basis. In June 2005, Ministry of Railways (MoR) issued the revised comprehensive guidelines<sup>82</sup> regarding operation of halts. As per the revised guidelines, if the halt station is un-remunerative and also not justified on passenger amenity grounds, it could be closed by the Railway Administration itself. Zonal Railways should consider the closure of halt stations where average number of passengers is less than 25 per day (outward) on branch lines.

MoR notified the cost of stoppage<sup>83</sup> of the trains from time to time. MoR, while reviewing the stoppage policy (May 2006), stated that at least the cost of stoppage should be recovered. Provision of stoppages without proper commercial and operational justification affects the line capacity, speed of the train and increases coaching losses as well. MoR stated that total cost of tickets sold at the station should be more than the cost of stoppage.

Examination of records of Senior Divisional Commercial Manager/Moradabad/Northern Railway revealed that in case of two halts i.e. Hazrat Nagar (HZN) and Sonekpur (SPB) in Moradabad Division, sale of tickets was nil since 2011-12. Audit noted that a pair of trains<sup>84</sup>, running over Raja-Ka-Sahaspur (RJK) - Sambhal-Hatim Sarai (SHTS) section continuously stopped at these halts. The contractors, appointed for sale of tickets, at these halts had left due to no sale of tickets and no commission.

<sup>82</sup> Para IX of MoR's Commercial Circular No. 26 of 2005 issued vide letter No. 99/TGIV/Halts/Policy dated 24 June 2005

<sup>83</sup> Cost of additional fuel/energy consumption, Cost of train km lost, Loss of time for deceleration, acceleration and halt time

<sup>84</sup> Train nos.54397 (3SRM) and 54398 (4SRM)

Matter of operation of un-remunerative halts was taken up (March 2015) with the Divisional Authorities of Moradabad. In reply, they stated (March 2018) that the two halts were connected with road and the road transport was available throughout the day. In order to minimise the loss over uneconomic line, Moradabad Division had recommended closure of Hazarat Nagar (HZN) and Sonekhpur (SPB) halts in July 2012 and matter referred to Northern Railway Headquarters. The matter was pending despite issue of various reminders in years 2013, 2014 and 2015.

Audit also noted that Moradabad Divisional Authorities did not pursue the matter with Northern Railway Headquarters after July 2015. Northern Railway Administration failed to take a decision for closure of these two un-remunerative halts. Audit further observed that one pair of Trains running on this section was cancelled from 7 November 2016. However, with effect from 4 November 2015, running of three pairs of Diesel Electric Multiple Unit (DEMU) trains<sup>85</sup> was started on this section with stoppage at these two halts.

Audit worked out the cost of stoppage of train at the two halts at the rates notified by MoR. Cost of stoppage of train for two minutes notified by MoR was ₹ 5,145 in 2006-07 and ₹ 21,207 in February 2016. Based on the rates notified by MoR, cost of stoppage of trains worked out to ₹ 20.55 crore during the period 2011-12 to 2019-20.

Thus, non-compliance of MoR's directives for closure of two un-remunerative halts over Moradabad Division of Northern Railway resulted in avoidable loss of ₹ 20.55 crore during the period 2011-12 to 2019-20.

Matter was taken up with the Northern Railway Administration in July 2020. In reply, NR Administration stated (November 2021) that proposal sent by Moradabad Divisional authorities was incomplete and they were asked (November 2020) to submit fresh proposal. Fresh proposal from Moradabad Division was received on 13 October 2021 and after approval by the General Manager/Northern Railway, notice for closure of these halts with immediate effect was issued on 22 October 2021.

From the above, it is evident that Zonal Railway Administration initiated action in November 2020 only after audit raised the issue with the General Manager in July 2020. Moradabad Divisional authorities took another 10 months in submitting the fresh proposal for closure of halts to Northern Railway Headquarter.

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<sup>85</sup> Nos.74302, 74304, 74306/74301, 74303, 74305

Matter was referred to MoR in September 2021; no reply was received (November 2021).

#### **2.4 Non-levy/non-collection of shunting charges from the siding owner: East Central Railway**

**ECR did not follow Railway Board instructions regarding levy of shunting charges. Consequently, Railways suffered a loss of ₹ 18.37 crore.**

Railway Board's Rate Circular No. 14 of 2009 stipulates that shunting charge is leviable for the utilization of railways locomotives (Diesel/Electric) to perform shunting operation in a siding irrespective of the fact whether the siding is notified for charging freight on through distance basis or otherwise. Shunting charge is levied on the basis of actual shunting time and prevailing "All India Engine Hour Cost (AIEHC) for Train Engine or Shunting Engine as the case may be.

Koderma Thermal Power Station (KTPS) siding notified on 21 September 2012 is a private siding of Damodar Valley Corporation (DVC) served by Hirodih station over Dhanbad Division of East Central Railway. Audit observed that the siding was commercially notified on 01 July 2015 and the freight was being levied on through distance basis. The siding handled rake of Hopper wagons (BOBRN) for unloading by using railway engine. The Hopper line has a capacity of 22 wagons for unloading at one time. Thus, the unloading of rake containing 59 Hopper wagons was to be done in three parts by using railway engine from placement of the rake to its release/despatch. However, no shunting charges for the period from September 2012 to October 2018 were levied by ECR Administration. Reasons for non-levy of shunting charges were not found on record.

On being pointed out by Audit (February 2018), ECR Administration preferred the shunting charges bill amounting to ₹ 1.07 crore for the period from February 2014 to November 2017 in November 2018, revised bill amounting to ₹ 3.04 crore for the period from September 2012 to November 2017 in January 2021 and bill amounting to ₹ 1.76 crore for the period from December 2017 to October 2018 in October 2020. Shunting charges from November 2018 and onwards have been recovered from siding owners by ECR Administration.

However, shunting charges amounting to ₹ 5.21 crore for the period from September 2012 to October 2018 as assessed by Audit is yet to be recovered from the siding owner.

In another case, Tenughat Thermal Power Station (TTPS), a private siding was served by the Dumri Bihar station over Dhanbad Division of ECR. Audit

observed that there was full rake facility in the siding for handling Hopper wagons. The siding is in round shape where unloading facility for 16 Hopper wagons is available at a time. Once the unloading of first batch of Hopper wagons (16 Nos.) completes, the railway engine pulls the rake and place next 16 nos. of wagons for unloading. Thus, unloading of rake containing 59 Hopper wagons completes in four successive pulls. Finally, the rake is drawn out from the siding premises by railway engine. During the whole process of unloading of rake, railway engine was utilized and remained attached with the rake. However, no shunting charges were levied by ECR Administration for the period from June 2017 to August 2019. Audit assessed the shunting charges due for recovery from siding owner for the period from June 2017 to August 2021 amounting to ₹ 13.16 crore.

Thus, railway suffered a loss of ₹ 18.37 crore due to non-levy/collection of shunting charges in KTPS and TTPS sidings. Railways need to take immediate action to levy and recover shunting charges from siding owners.

The matter was taken up with ECR Administration (December 2020). Railway Administration replied (November 2021) that in case of KTPS siding, shunting charges were not levied and recovered due to negligence on the part of new staff posted there. The shunting charges were now levied and recovered from September 2012 onwards.

In case of TTPS siding, it was stated that as it comes under the Engine on Load scheme, the railway engine could be utilized within prescribed free time by the siding owner without incurring any additional cost. Hence, no shunting charges were leviable for utilizing the Railway engine for unloading purpose.

The reply to the extent of TTPS siding was not acceptable as agreement for EOL scheme was executed *w.e.f.* 27 October 2021. Hence, shunting charges prior to October 2021 were recoverable from siding owner for utilizing the railway engine for unloading of rakes.

The matter was referred to the MoR in October 2021; no reply was received (November 2021).

## **2.5 Loss of potential earnings due to avoidable detention of locomotives: Western Railway**

**Failure of Railway Administration to enforce contractual obligations by CONCOR and ensure compliance of Railway Board directives regarding installation of EIMWBs, led to avoidable detention of locomotives. As a result there was a loss of potential earnings amounting to ₹ 5.62 crore.**

Railway Board issued (February 2007) guidelines for installation and maintenance of Electronic In-Motion Weighbridge (EIMWB) within the premises of private sidings at their own cost. These were amended in June

2007, permitting installation of Weighbridge partially or wholly on Railway land with approval of Railway Board due to inescapable constraints. These were further relaxed (August 2012) stating that, where installation of EIMWB is not possible within the siding premises due to operational and technical constraints, permission may be granted by the General Manager of the Zonal Railways to install weighbridge on Railway land, the location of which will be decided by the PCOM in consultation with PCCM, PCME and PCE.

CONCOR siding at Khodiyar (CKYR) on Ahmedabad Division was commissioned in July 2010. A draft agreement regarding private siding at Khodiyar, was sent to CONCOR by Sr. Divisional Commercial Manager/Ahmedabad (May 2011). This agreement was signed by CONCOR after a delay of 14 months in July 2012. As per clause 9 (a) of the said agreement, 'the Applicant (i.e. CONCOR) shall provide and maintain at their own expense a suitable EIMWB, weigh bridge house and weighbridge siding etc. within the siding limits'.

During audit of Viramgam Station conducted in November 2016, it was observed that deviating from clause 9 (a) of the said agreement, CONCOR did not install EIMWB at Khodiyar siding. Instead, CONCOR rakes originating from Khodiyar siding were being weighed en-route at Railway owned EIMWB at Viramgam. Analysis of data in this regard for the period August 2012 to March 2021 revealed that en-route weighment of 5698 rakes were carried out at Viramgam during this period and total time taken for these weighments was 7766 hours and 24 minutes, averaging 1 hour and 36 minutes per rake.

Further, Audit observed that an application was submitted (December 2013) by CONCOR for construction of two additional lines (No. 4 and 5) beyond existing 3<sup>rd</sup> line for operation of trains within Inland Container Depot (ICD)/Khodiyar. Thereafter, it submitted (July 2015) the 'Detailed Project Report' (DPR). Sr. DCM/ADI informed (August 2015) CCM/ CCG that CONCOR had been requested long back to install EIMWB as per the agreement but the same had not been installed. CGM/ CONCOR clarified (December 2015) that the siding is taken off on 4 degree curvature, as per RDSO specifications, so provision of EIMWB on this entry point was ruled out. Hence, alternate location was sought from Railway and agreed to provide EIMWB by CONCOR in financial year 2016-17. In March 2016, CONCOR confirmed that it would bear the cost of two EIMWBs at suitable locations as decided by Railways on deposit terms. This was also reiterated in 17 December 2015 and 22 April 2016. CONCOR reminded (August 2016) Railway Administration to finalize the location on Railway Land for setting up of EIMWBs.

After prolonged delay, Divisional Railway Administration Ahmedabad finalized the location (November 2019) for installation of EIMWB at Viramgam where Railway owned EIMWB was already installed and its codal life of eight years was expiring on 26/06/2020. GM/WR approved the proposal for installation of EIMWB at Viramgam with consent of PCOM, PCE, PCME and PCCM. However, CONCOR showed unwillingness (December 2019) at this location citing the reasons that it will be difficult to maintain and operate EIMWB at Viramgam which is distant from CKYR and no administration office is available nearby Viramgam and requested for an alternate location at or near CKYR.

Audit further observed that all the five lines of CKYR –CONCOR siding are feasible for installation of EIMWB after carrying out minor modification work as observed in the joint site inspection conducted (20 January 2021) by supervisors of Commercial, Operating and Engineering Departments of Ahmedabad Division and representative of CONCOR. No further action has been taken by Railway Administration thereafter. As a result of improper action by the Railway Administration in the matter and delay tactics of CONCOR by diverting the issue for not complying with the clauses in the agreement avoidable detention of locomotives still continues due to en-route weighment of CONCOR rakes at Viramgam station.

It was also observed that actual time required for weighment of a rake was 12 minutes (July 2018). However, Audit has adopted the time frame of 30 minutes to complete the entire weighment process as informed by the Chief Goods Supervisor of M/s Gateway Rail Freight Limited, Viramgam (GRFV) and M/s. Hasti Petro Chemical & Shipping Limited, Sanand (MHPL) Sidings of Western Railway. Analysis of this data revealed that during the period from October 2017 to March 2021, only 270 (10.38 per cent) out of 2600 rakes were dispatched within 30 minutes of arrival for weighment at VG Station. Total avoidable detention of locomotives due to extra time taken for en-route weighment of the rakes at Viramgam in the absence of EIMWBs in Khodiyar siding premises has been worked out to 4804 hours and 29 minutes (after allowing 30 minutes for complete weighment process), resulting in loss of potential earnings of ₹ 5.62 crore due to detention of Locomotives during the period from August 2012 to March 2021 (based on All India Engine Hours cost).

This issue was initially taken up with WR Administration in October 2019. In their reply, WR Administration stated (November 2021) that the siding agreement was signed between Railway and CONCOR in 2010. Clause for installation of weighbridge was included in the agreement. However, due to technical constraints installation of weighbridge was not feasible.

Subsequently CONCOR agreed to provide weighbridge at a location identified by Railway. As installation of weighbridge in CKYR, siding was not feasible, the rakes originating from the siding had to be weighed en-route. The loss worked out by Audit is notional. Moreover, Viramgam (VG) was found to be best suitable location for installation of EIMWB.

The reply was not acceptable as WR Administration did not make sincere efforts to get the EIMWB installed at CONCOR siding at Khodiyar as per agreement executed by Railway with CONCOR. The installation of EIMWB is feasible on all the five lines of CKYR –CONCOR siding after carrying out minor modifications work as observed during the joint site inspection.

Further, WR Administration conducted Joint Inspection in January 2021 i.e., after more than 10 years from the date of commissioning of Khodiyar Siding. The loss worked out by Audit cannot be termed as notional as the same has been worked out on the basis actual engine hourly cost. The proposal for installation of EIMWB at Viramgram is still pending with CONCOR Corporate office (June 2021).

Thus, failure of Railway Administration to enforce contractual obligations by CONCOR and to ensure compliance of Railway Board directives in this regard has led to loss of potential earnings of ₹ 5.62 crore due to detention of Locomotives during the period August 2012 to March 2021. The loss would continue unless prompt action is taken for installation of EIMWBs at Khodiyar.

The matter was referred to MoR in September 2021; no reply was received (November 2021).

## **2.6 Loss due to allowing excess free time for loading operations in open wagon rakes in a fertilizer siding: West Central Railway**

**West Central Railway Administration did not implement the instructions of Ministry of Railways for allowing restrictive free time in case of combination of manual and mechanized loading. Against allowable five hours free time for loading, free time of nine hours was allowed in a fertilizer siding. Allowing excess free time for loading operations resulted in short realization of demurrage charges of ₹ 2.32 crore during September 2013 to February 2020.**

Railway allows free time for loading/unloading of different types of wagons. The different free time is allowed for mechanized loading/unloading and manual loading/unloading activities. More free time is allowed in case of manual loading/unloading activity in comparison to mechanized loading/unloading. Railway imposes demurrage charges for time taken in

loading/unloading beyond permissible free time to discourage the detention of wagons and improve their availability for freight traffic. Demurrage charge<sup>86</sup> is levied for the detention of railway's rolling stock after the expiry of free time allowed for such detention.

As per Rate Circular No. 74 of 2005<sup>87</sup> issued in December 2005, for open wagons free time for manual loading was prescribed as nine hours and five hours for mechanized loading. In October 2006, Ministry of Railways (MoR), in a clarification issued<sup>88</sup> to East Central Railway, stated that in the cases where both manual and mechanized type of operations are used in combination for loading/unloading of a rake, the more restrictive free time i.e. free time for mechanized loading will be permitted. This was reiterated by MoR in August 2013 while clarifying the free time permissible in case of both mechanical and manual loading/unloading of a rake to Northern Railway.

Scrutiny of records and loading activity of Chambal Fertilizers Limited siding (CFCS)/Bhonra in Kota Division of West Central Railway revealed that loading of Urea and Single Super Phosphate (SSP) bags in the rakes of Open wagons (BOXN/BOXNHL) were done by the combined procedure i.e. mechanized and manual both. The sealed bags of fertilizers were carried from Plant shallow on automated conveyer belt and auto loader suite dropped the fertilizer bags in the open wagons. Thereafter, one or two persons were making sequence/stacking the bags in the wagons. Thus, the loading was done using both mechanized and manual operations and accordingly the prescribed free time for mechanized loading in open wagons was to be allowed.

Audit, however, noted that instead of five hours prescribed for combined loading, Railway Administration allowed nine hours free time for loading of fertilizer bags in open wagons rakes at CFCS/Bhonra for 690 rakes of 40,025 open wagons during the period from September 2013 to February 2020. Allowing excess free time for loading operations resulted in short realization of demurrage charges of ₹ 2.32 crore.

The matter was taken up with the West Central Railway Administration in November 2020. In reply, Railway Administration stated (March 2021) that WCR has followed the Railway Board's policy on free time which specifies rolling stock free time for mechanized and manual loading only. There is no separate column in policy circular specifying free time for combined

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<sup>86</sup> Demurrage charge is levied at the rates notified by MoR from time to time.

<sup>87</sup> Ministry of Railways letter No. TC-I/2005/201/2 dated 19 December 2005

<sup>88</sup> Ministry of Railways letter No. TC-I/2005/201/2 Pt.I dated 30 October 2006

mechanized and non-mechanized loading for open wagons or closed wagons. They further stated that combination of loading i.e. mechanized and non-mechanized is possible only in bulk commodities which are amenable to both manual and mechanized loading. The fertilizer plant do not have mechanized loading and manual labour is used for stacking/loading in wagons.

Railway Administration's reply was not acceptable. Loading of the Urea and SSP bags in the rakes of open wagons (BOXN and BOXNHL) was performed by the combined operations (i.e. Manual and Mechanized both) and free time of nine hours was allowed instead of five hours as clarified by MoR in October 2006 and August 2013. Audit observed that the clarification for allowing restrictive free time for combined operations for loading/unloading of a rake was issued by MoR only to the concerned Zonal Railways<sup>89</sup> who had sought the clarification and not to all the Zonal Railways for similar application. Failure of MoR to circulate the clarification to all Zonal Railways for allowing restrictive free time (applicable for mechanized loading/unloading) for combined operations of loading/unloading of a rake resulted into loss of demurrage charges.

The matter was referred to the MoR in September 2021; no reply was received (November 2021).

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<sup>89</sup> East Central Railway (October 2006) and Northern Railway (August 2013)