Chapter 2 – Engineering – Open Line and Construction

The Engineering department of Indian Railways has two distinct organizations, namely Open Line and Construction. While the Open Line is responsible for maintenance of all fixed assets of Indian Railways, i.e. Tracks, Bridges, Buildings, Roads, Water supply etc., the Construction Organization is responsible for construction of new assets such as New lines, Gauge conversion, doubling and other expansion and developmental works in Railways.

At the Railway Board level, the engineering department is headed by Member Engineering. Major policy decisions are taken at the Railway Board level who is assisted by Additional Member (civil engineering) and Additional Member (works).

At the Zonal level, the department is headed by Principal Chief Engineer (PCE) who is assisted by various chief engineers for tracks, bridges, planning, track machines, general matters etc. In addition, each Zonal Railway has a construction unit headed by a Chief Administrative Officer who is responsible for major construction works such as new lines, doubling, gauge conversions etc., and is assisted by various chief engineers (construction).

Each Zone is divided into four to seven Divisions each, with an average track length of about 1000 km and staff strength of about 15000 headed overall by a Divisional Railway Manager. The Divisions are basic units for execution of works. At this level, the Engineering department is headed by Senior Divisional Engineer.

The responsibility of thematic study on implementation of line capacity augmentation works on High Density Network (HDN) routes was undertaken with the objective to evaluate the extent of integration achieved in planning and selection of line capacity augmentation works on the identified routes vis-à-vis economy, efficiency and effectiveness in project implementation. The responsibility of implementing this project devolved on Engineering – Open Line and Construction departments.

For this study, audit examined capacity augmentation on three HDN routes [HDN 2 – Mumbai-Howrah, HDN 5 – New Delhi–Chennai and HDN 7 – Mumbai–Chennai] besides Delhi-Mathura portion of HDN 3 and covered 162 works including 42 works that were included in the Blue Print. The records maintained in the Railway Board, Zonal Railways/ Construction Organizations concerned, RVNL and their offices where the projects were under implementation were examined for assessment and evaluation of overall planning and co-ordination issues both within the Zonal Railway and across the zones.

This chapter contains the audit findings of the above thematic study.

Implementation of line capacity augmentation works on High Density Network (HDN) routes 2, 5 & 7 (including part of HDN 3: New Delhi-Mathura Jn. section)

Executive Summary

The XI Five Year Plan for Indian Railway had projected an ambitious freight target of 1110 million tonnes by 2011-12 against 726 million tonnes at the end of X five year Plan (2006-07). Pronounced congestion on certain routes carrying bulk traffic became a regular feature. Railway Board identified seven such High Density Network (HDN) routes connecting four metro cities, their diagonals and Delhi- Guwahati and adopted an action plan titled 'Blue Print' in 2007-08 to execute line capacity augmentation works for achieving enhanced throughput. This document proposed to take up 124 works on seven HDN routes and complete them on priority. This included clear priority in terms of providing administrative sanctions and allotment of requisite funds over a definite time period for project completion. To implement this project, a paradigm shift in planning was required; from routine piece-meal sectional approach to a route wise approach. This would up-grade the throughput capacity along the entire HDN route besides elimination of bottlenecks for optimum utilisation of rolling stocks and maximising the returns on the investments.

Audit conducted during 2012-13, a sample study of progress of implementation of line capacity augmentation works identified in the Blue Print or otherwise on three HDN routes. These routes were selected in view of their importance in transporting bulk freight including coal, steel, iron ore etc i.e., HDN 2 (including 2A & 2B), HDN 5 (including part of HDN 3: NDLS-MTJ section) and HDN 7 (including 7A) for the period April 2007 to March 2012 with the following important audit findings.

- The Blue Print did not comprehensively cover all the line capacity augmentation works on HDN routes for priority execution and required up-dation through feedback from the Zonal Railways. However, no further revisions to the Blue Print were made. **(Para 2.5.1.1)**
- Despite the emphasis laid in the Policy document on end-to-end completion for achieving enhanced throughput, absence of integrated approach was observed in identification, sanctioning and execution of the works. There was no policy in place to prioritize/fast track sanction of line capacity augmentation works on HDN routes as these works were proposed by the Railway Administration like any other work and no priority in sanction and funding was accorded by the Railway Board. **(Para 2.5.1.2)**
- Gaps and missing links on HDN routes, continued to exist with regards to provision of double line, Railway Electrification and Automatic Block Signalling (ABS) due to non-adoption of integrated approach in identification, planning and execution of the works. Though the installation of ABS has been considered important for increasing the throughput on parts of

golden quadrilateral routes, most of the portion of HDN routes had not been identified for its installation. **(Para 2.5.1.3)**.

- Slow progress of works was accompanied by huge surrenders/ diversions of funds. **(Paras 2.6.2, 2.6.3.1 and 2.6.3.2).**
- The congestion of traffic during entry in Delhi region could not be eased as line capacity augmentation works for the provision of fourth, fifth and sixth lines in identified portions on busy Delhi- Palwal section remained incomplete, due to change in executing agencies, change in scope of works and other site problems. **(Para 2.7.2.3)**
- Absence of an integrated approach in planning for project implementation across the Zonal Railways, resulted in time over runs leading to non-accrual of anticipated benefits of ₹ 921.17 crore and huge cost overruns of ₹1985.71 crore **(Para 2.7.1)**
- Similar works either executed or in the process of execution by RVNL and the Zonal Railways, were sanctioned during the same period with variation in rates. Further, the rates of certain works were higher as compared to the rates of works sanctioned subsequently, resulting in additional financial liability of ₹243.41 crore **(Para 2.8)**.

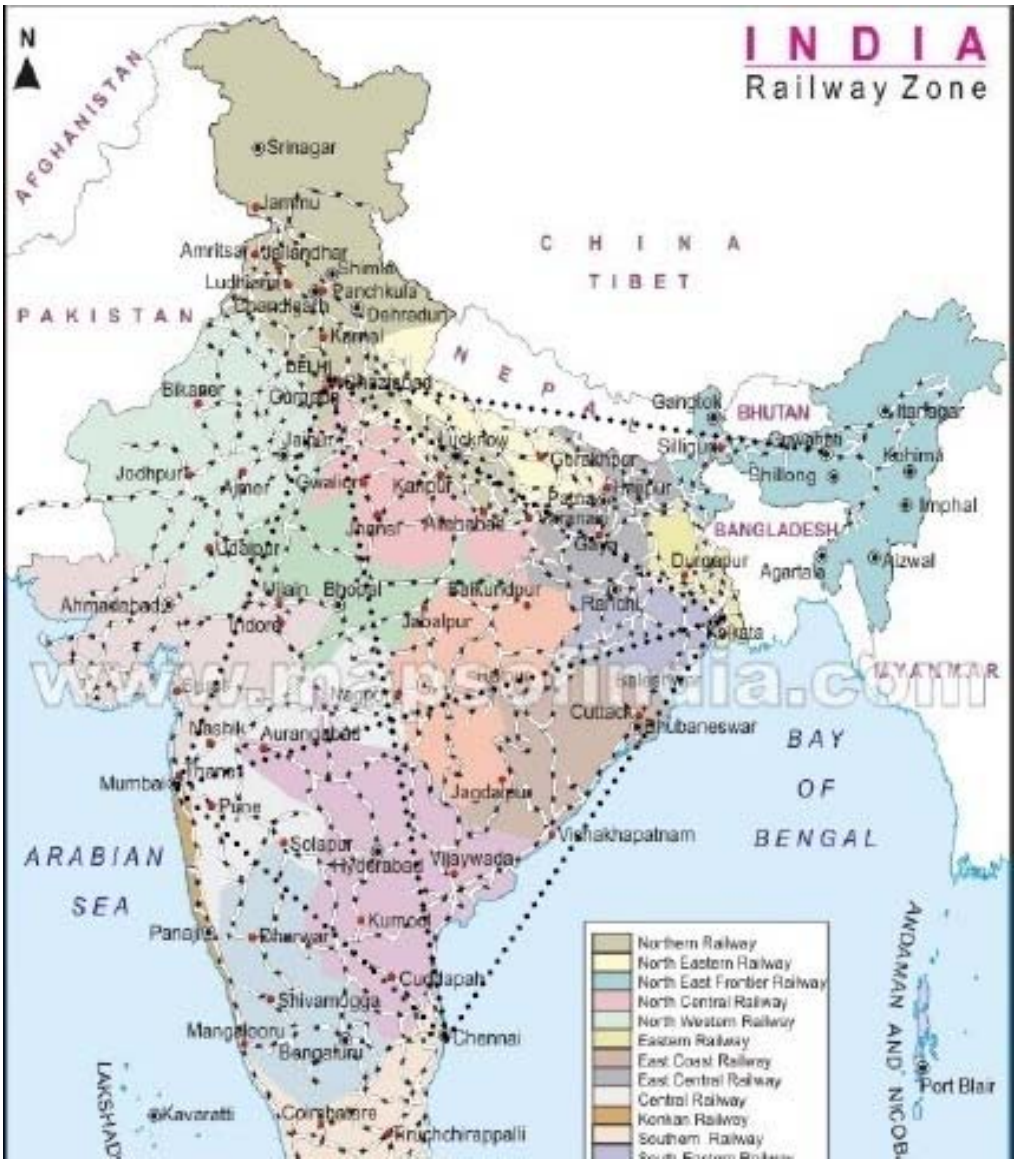
2.1 Introduction

The Indian Railway network comprising 64,460 Kms through the length and breadth of the country is the predominant mode of transportation for long-distance passenger traffic and bulk freight. A common rail track is used for both passenger and freight traffic. With increase in passenger and freight traffic over the recent years, the rail network has experienced severe capacity constraints. The major hub of activity, namely the Golden Quadrilateral and its diagonals connecting the major metros – Mumbai, Delhi, Chennai and Kolkata constitute merely 25 per cent of the total network; but carry around 70 per cent of total freight resulting in consequent over-saturation in levels of capacity utilisation in a number of stretches. In a number of cases, the sections are single line, some non-electrified, others not fit to carry freight of higher loads and already congested requiring additional build- up of capacity. There were a number of critical bottlenecks which constrained further growth of traffic. Non-uniformity of the network prevents optimum utilisation of the same.

The Eleventh Five Year Plan (2007-12) accorded high priority to significant capacity creation not only in terms of building exclusive freight corridors but also through low-cost capacity additions by adopting a route-wise planning for overcoming capacity constraints. For the first time, route-wise planning was emphasised over piece-meal, section-wise approach. This required a paradigm shift in both the planning and implementation of the projects.

In order to handle the anticipated freight projections of over 1100 million tonnes, Railway Board drew an Action Plan titled 'Blue Print' (2007-08) for seven High Density Network (HDN) routes that also incorporated critical sections of coal, iron ore routes, linkages between sources of raw material and steel plants, connectivity with ports for container traffic as well as for facilitating high speed

passenger travel. These seven HDN routes included all the four routes of Golden Quadrilateral and their diagonals, high density feeder/ alternate routes and also Delhi-Guwahati Trunk route. These are illustrated in the map below:-



The Action Plan thus identified 124 line capacity augmentation works at an estimated cost of ₹14,184.77 crore to be completed on priority. While directing the Railway Board to finalize the 'Blue Print', the Minister of Railways had mandated (May 2007) that

(i) all these works be sanctioned either in the supplementary budgets (2007-08) or latest by the main budget for 2008-09; and

(ii) necessary throughput enhancement works be identified in an integrated manner using a route-wise approach, rather than a piece-meal approach to derive maximum benefits.

2.2 Audit objectives

Apart from Zonal Railways, Rail Vikas Nigam Ltd (RVNL), a Special Purpose Vehicle constituted under the Companies' Act (January 2003) was also responsible for the execution of a number of line capacity augmentation works. These works were entrusted to RVNL as a part of National Rail Vikas Yojana (NRVY) and the Company was mandated to raise their own resources for project development and completion. An earlier Audit Report (Report of the Comptroller and Auditor General of India -Union Government- Railways- No.34 of 2010-11), had highlighted inter-alia, that the original mandate of RVNL had not been fulfilled as the basket of projects transferred to RVNL kept changing and included non-bankable projects and the Company was largely dependent on the Ministry for project funding, thereby resulting in a paradox of competing for scarce resources. Action taken by the Ministry had not adequately addressed the issue of project implementation.

In the above context, Audit conducted a study (2012-13) to evaluate the following

- Extent of integration achieved in planning and selection of line capacity augmentation works on the identified routes;
- Economy, efficiency and effectiveness in project implementation;
- Co-ordination among Railway Board, Zonal Railways and RVNL in prioritization, execution and monitoring of works on HDN routes.

2.3 Scope and methodology

Audit selected the following three HDN routes in view of their importance in terms of both passenger traffic and bulk freight including Coal, Steel and Iron Ore, with the principal focus on study of line augmentation works. These pertained to gauge conversion, doubling, additional lines, railway electrification, automatic signaling and traffic facility works.

- HDN 2 – Mumbai-Howrah along with the link route of Bilaspur-Anuppur, Katni-Bina-Kota and Jalgaon- Surat involving CR, SECR, SER, WCR and WR;
- HDN 5 – New Delhi–Chennai via Mathura Junction-Jhansi-Bhopal-Itarsi-Nagpur-Ballharshah involving NR, NCR, WCR, CR, SCR and SR. New Delhi-Mathura Junction section of HDN route 3 of the Railways is also a part of HDN5 and hence included in the study in view of its critical link; and
- HDN 7 – Mumbai–Chennai along with link route of Guntakal-Hospet-Hubli-Vasco involving CR, SCR, SR and SWR.

The records maintained in the Railway Board, Zonal Railways/ Construction Organizations concerned, RVNL and their offices where the projects were under implementation were examined for assessment and evaluation of overall planning and co-ordination issues both within the Zonal Railway and across the zones. The selected routes were studied by Audit on an end-to-end basis in terms of their existing features, the proposed works and missing links, if any. The Audit assessment also focused on the comparative efficiencies achieved in project implementation by the Zonal Railways and RVNL.

The study covered a five year period from 2007-08 to 2011-12.

2.4 Sample Size

The sample study in respect of the three routes selected covered all identified works in the Blue Print and overall 162 works were audited as below:

SNo.	Category of works	Sample Size	No of works
1	Works identified in the Blue Print	100%	42
2	Works mentioned as Sanctioned and in progress in the Blue Print	Estimated cost -₹5 crore and above	39
3	Works under sections identified for Systemic Capacity augmentation in the Blue Print	Estimated cost -₹5 crore and above	09
4	Works (other than identified in the Blue Print) in progress as on 01.04.2007 and sanctioned during 01.04.2007 and 31.03.2012	Estimated cost -₹5 crore and above	72

2.5 Audit findings

2.5.1 Project Planning

The construction on HDN routes required a paradigm shift in both the planning process and execution of works from the routine sectional, piece-meal approach of Indian Railways to an integrated route-wise approach. This would up-grade throughput capacity along the entire route and eliminate bottlenecks and would thus maximise returns on the investments undertaken. The Blue Print had visualised that the works identified would yield not only benefits during the XI Plan but also beyond. This included clear priority in terms of providing administrative sanctions and allotment of requisite funds over a definite time period for project completion.

Minister of Railways (MR) instructed in November 2007 that Railway Board should try to take up all the works included in the Blue Print in the Works Programme of 2008-09 in one go and funds should not be allowed to become a constraint for sanction and execution of these projects. As a follow up, the Chairman Railway Board directed General Managers of the Zonal Railways (November 2007) to ensure the inclusion of all the 124 works in the Works Programme of 2008-09 itself duly prioritising 49 works as high priority, 26 works as medium and nine works as long term. No prioritisation was done in respect of 31 works while nine other works were deferred.

Audit observed that as of January 2008 proposals for inclusion in Preliminary Works Programme for the year 2008-09 were received in Railway Board in respect of only 24 out of 124 works. Even out of 49 high prioritised works, proposals were received only for 13 works.

Audit observed (2012-13) that in respect of selected HDN 2,5 &7 routes (including part of HDN 3 –Delhi-Mathura Jn. section) the pace of inclusion of Blue Print works in works programmes had not shown much improvement even

by March ended 2012. Out of 42 Blue Print works, proposals for 11 works had yet to be received including six high priority tagged works.

2.5.1.1 Blue Print- Completeness

A total and comprehensive approach required complete integration of all related augmentation works during planning and project execution. However, it was observed in Audit that-

a) The 124 works identified in the Blue Print included works pertaining to systemic capacity augmentation of feeder routes also. Audit observed that in these 124 works, line capacity augmentation works pertaining to all identified feeder routes were not included. It is not clear whether all the identified feeder routes were considered for inclusion of works in the Blue Print or not.

b) As many as 105 line capacity augmentation works were sanctioned by the Railway Board during 2007-08 to 2011-12 on the 10 Zonal Railways involved in selected HDN routes. None of these were included in the Blue Print. This indicated that the Blue Print was incomplete.

c) Work-wise targets for completion were not fixed for works included in the Blue Print and was indicative of poor project management.

d) The Blue Print indicated that 40 sections were fit to carry 25 T axle load. However, an analysis by Audit revealed that the assessment was incorrect as none of these sections were fit to carry 25 T axle load as shown below:

HDN route	No of sections	Blue print status	Actual status
2	20	Fit to carry 25T axle load	Fit to carry 20T to 22.32T
7	20	Fit to carry 25T axle load	Fit to carry 20.55T to 22.86T

e) Contrary to the indication in the document, no attempts were made to update the Blue Print through further feedback from the Zonal Railways (March 2012).

As such, the Blue Print adopted by the Railway Board was not complete in all respects and was also based on some incorrect assessments.

2.5.1.2 Level of priority

All the works included in the Blue Print deserved high priority in terms of planning for execution and monitoring. Audit observed (2012-13) that the overall sense of priority allocated to the works on HDN routes was unexceptional.

(i) A macro analysis of the position of line capacity augmentation works either in progress as on 1 April 2007 or sanctioned thereafter during 1 April 2007 to 31 March 2012 on ten Zonal Railways (CR, NCR, NR, SCR, SER, SECR, SR, SWR, WCR and WR) related to the selected HDN routes revealed the following:-

Works	Works in Progress as on 01.04.2007 & sanctioned during 01.04.2007 to 31.03.2012			Works sanctioned on HDN Routes			% of works on HDN Routes w.r.t. total Works on the Zones		
	No. of works	Track length (in kilo metres)	Anticipated Cost (₹ in crore)	No. of works	Track length (in kilo metres)	Anticipated Cost (₹ in crore)	No. of works	Track length (in kilo metres)	Anticipated Cost (₹ in crore)
Gauge Conversion (GC)	48	9591.71	18477.73	4	1328.86	1486.51	8.33	13.85	8.04
Doubling/Multiple Lines (DL/ML)	138	5986.08	22934.03	62	3039.35	14507.48	44.93	50.77	63.26
Railway Electrification (RE)	21	4192.05	3888.84	8	1778.4	1533.38	38.10	42.42	39.43
Traffic facility	760		5830.84	302		2831.89	39.74		48.57
Grand Total	**967**		**51131.44**	**376**		**20359.26**	**38.88**		**39.81**

The above table indicates that the overall share of HDN works vis-à-vis total works both in terms of number and sanctioned cost accounted for less than 40 per cent of works sanctioned/ in progress. Also, the total average track lengths covered by these works was approximately 36 per cent. However, in relative terms, a significantly higher share was accounted for by works under DL/ML (50 per cent) followed by RE (42 per cent) and traffic works (40 per cent approx.). Considering the fact that significant throughput enhancement was expected to be achieved by decongestion of the saturated sections of HDN routes that carried 70 per cent of total freight, there was substantial scope for higher levels of investment and resource allocation as between the HDN routes versus rest of the works.

(ii) As many as 42 works identified in the Blue Print pertained to the selected HDN routes. Out of these, 17 works were sanctioned in time by the Railway Board. Nine works were sanctioned belatedly after a lapse of one to three years (HDN 2-Four, HDN 5-Three and HDN 7-Two works) though these were proposed by the Zonal Railways by 2008-09 with the exception of one work proposed during 2009-10. **(Annexure IV)**

Proposals for three works [10] had been submitted by the Zones in 2008-09, 2009-10 and 2010-11 respectively, Railway Board's sanction was awaited (March 2012). Two works[11] had been sanctioned partially. The reasons for not sanctioning the works/ partial sanction were not available on record. Further, 11 works had not yet been proposed for sanction by the zones (March 2012). **(Annexure V)**

(iii) Keeping in consideration their operational requirements, 10 Zonal Railways related to the selected three HDN routes had identified 76 additional line

[10] Ballharshah-Vojayawada 3rd line remaining portion (HDN5-SCR), Wardha-Nagpur 3rd line (HDN2-CR) and Grade Separator at BINA (HDN5-WCR)
[11] Goelkera-Sini 3rd line(HDN2- SER) and Manmad- Bhusawal 3rd line (HDN2-CR)

capacity augmentation works on HDN routes. They proposed them (2003-04 to 2011-12) for the sanction of Railway Board. These works (anticipated cost- ₹ 1316.77 crore) had not been sanctioned by the Railway Board (March 2012). Reasons thereof were not available on the records of the Zonal Railways. (**Annexure VI**)

(iv) During 2007-08 to 2011-12, 4,504.13 RKMs of Gauge Conversions, 1,691.31 RKMs of Double Line/Multiple Line, 1,162.70 RKMs of Railway Electrification as a whole, were completed by ten Zonal Railways. However, within this, the overall share of completed works on HDN routes was only 42 per cent. The completion of traffic facility works on HDN routes was marginally higher as out of 485 Traffic facility works, 217 works (44.74 per cent) were completed.

Thus, there was no policy in place to prioritize/fast track sanction of line capacity augmentation works on HDN routes. All the works on these routes included in the Blue Print or otherwise were proposed by the concerned Zonal Railway authorities like any other work and no priority in sanction and funding was accorded. The progress of these works was monitored by Zonal Railways on par with other works.

Railway Board accepted (January 2013) that the process and procedure for identification and proposing the work is the same for priority works or otherwise and no separate criteria is adopted for works on HDN routes. There is a large shelf of pending projects and due to high throw forward and very meagre funds availability for completion of the already sanctioned projects, all proposals can not be sanctioned.

Above contention is not acceptable as the line capacity augmentation works identified in the Blue Print were for a very specific purpose and thus, required separate attention. Further, MR had already directed to take up all the works in one go and not allow funds to become a constraint for the sanction and execution of these works. In fact, the overall progress of works executed on HDN routes was not commensurate with the original sense of purpose underlying the scheme and left much scope for a more focused management approach. Thus, Indian Railway failed to implement the paradigm shift in planning and to implement an integrated route approach required for a multiplier increase in throughput capacity.

2.5.1.3 Lack of integration- Missing links

The Standing Committee on Railways, in its 16th Report (2005-06), had recommended that Railways should identify areas and connect all the missing links of Gauge Conversion, Double Line, Electrification and Signalling works for achieving greater throughput in passenger and freight delivery. The Blue Print had mandated that an integrated approach route-wise should be adopted for identifying necessary throughput enhancement works on HDN routes for maximum benefits rather than piece-meal sectional approach. The Blue Print had at the same time cautioned that the works identified were not exhaustive and the gaps left out would be covered through further deliberations. Audit observed that

a few of the missing links over the HDN routes were identified by the Railways subsequently, but many were left uncovered.

(i) Missing links due to non-identification of sections

To enhance throughput, HDN routes required availability of certain minimum infrastructure on the entire track. The minimum infrastructure required has been identified as follows:-

- Double line on the entire HDN route;
- Electrification of the entire tracks; and
- Automatic Block Signalling (ABS).[12]

Further, in case a section already has double line or triple line track and its overall line capacity has been saturated, the minimum requirement for line capacity augmentation would be the provision of an additional line along the existing tracks and stations.

An examination of the selected HDN routes indicated that there were number of sections that had not yet been identified for the provisions of all these features and there were missing links/gaps. The missing links on the HDN routes is discussed below:-

- **HDN route No.2 (with 2A and 2B)-** The track length of the HDN2 route is 3162.40 RKMs. It was seen that the total route length was already electrified. Further, most of the track consisted of a double time except for 703.90 RKMs and had been identified for provision of a double line. This would provide a double line on the entire route length easing congestion. However, installation of ABS was awaited on 2916.01 RKMs. Out of this, only 274.73 RKMs (9.42 per cent) had been identified for installations of ABS.

- **HDN route No. 5-** The track length of the HDN5 is 2185.53 RKMs. It was seen that the total route length was already electrified and there was no single line section on the entire route. However, ABS had been installed on 243.69 RKMs (11.15 per cent) only and out of remaining 1941.84 RKMs, 478.63 RKMs (24.65 per cent) were identified for ABS.

[12] In ABS, the signals are automated and operate in conjunction with track circuiting or other means of detecting the presence of a train in a block section. When a train enters a block section, the stop signal protecting that block changes automatically to on or the stop aspect. As the train moves ahead out of that block, the signal aspect changes automatically to caution. This is an advanced system in comparison to Absolute Block Working, widely used on Indian Railways for ordinary train routes. In this system, the track is considered to have a series of sections and if a train is occupying track in a section (block section), no other train is allowed to enter that section. Further, no train can enter an empty block section with out first securing permission of the station in advance.

- **HDN 7 route (with 7A)-** The route length of HDN7 (with 7A) is 1679.09 RKMs. The single line sections on this route measuring 614.29 RKMs had been identified for providing double lijne. However, only 382.34 RKMs (22.77 per cent) had been electrified. Out of remaining 1296.75 RKMs, 455.57 RKMs[13] (35.13 per cent) have not been identified for Railway Electrification. Further, installation of ABS was awaited on 1564.61 RKMs, out of which only 65 RKMs (4.15 per cent) had been identified for installation of ABS.

The details of sections not identified for the installation of ABS on these HDN routes are available in **Annexure VII.**

The above analysis indicates that the line capacity augmentation works required for throughput enhancement on the HDN routes were not identified in an integrated manner using a route-wise approach as envisaged in the Blue Print. The gaps left out in the Blue Print were not covered through further deliberations with Zonal Railways. Further, lowest priority was given to installation of ABS.

It was observed that Railway Board had decided (September 2005) that as a general policy, only C routes (sub-urban sections) would be provided with automatic block signalling and no further work of auto-signalling would be taken up as it may clash with an existing technology. The Blue Print had identified limited number of sections consisting of three sections (264.80 RKMs) on HDN2 and three sections (54.67 RKMs) on HDN5 in non-suburban sections for installation of ABS. The work for one section (134.90 RKMS) on HDN2 was frozen by the Railway Board, two works (107.57RKMs) were progressing and three works (57 RKMs) not proposed by the Zonal Railways for inclusion in Annual Preliminary Works Programme for sanction.

The Blue Print emphasised installation of ABS on the HDN routes. Railway Board however, failed to review its policy framed in 2005, after approval of the 'Blue Print' (2007-08). Installation of ABS is important as it leads to increase in throughput on the same track. In fact, a study and research work by a retired Railway Engineer has indicated that provision of ABS is the best interim solution on parts of golden quadrilateral routes as usually more than two trains can be pushed into this system at any stage of time against only one under existing Absolute Block System of working, without loss of speed. This results in practically doubling the track capacity. The system can be provided on single as well as on double line section.[14] Thus, the reasons for Railway Board's policy for restricting installation of Automatic Block Signalling (ABS) to suburban routes only is not clear, especially as installation of ABS leads to increase in throughput on the same track.

Thus, the existing policy decision in regard to non-suburban routes required a fresh review. However, there was no evidence of the same having been conducted especially in relation to HDN routes. This resulted in a sub-optimal approach of excluding a large proportion of the absolute block working sections

[13] (SC Railway- GTL-BAY- 48.54 RKMs and SW Railway- BAY-HPT-407.03 RKMs)
[14] Source- Indian Railway Signal Engineering (volume IV) by Shri Pramod P. Goel, Former DyCSTE/ CORE

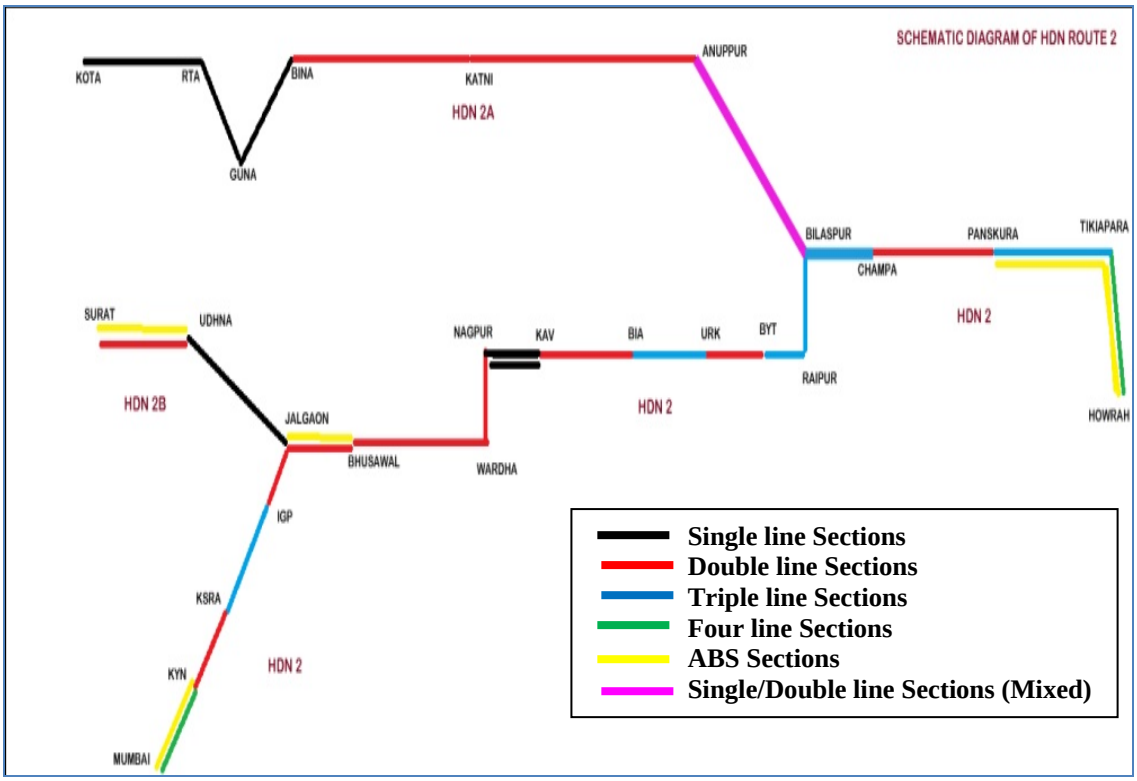
from being automated/continuous auto-signalling. This is likely to have an adverse impact on safety and line capacity.

(ii) Non-elimination of missing links due to slow and varying progress of works

Audit observed that in the sections identified for carrying out different types of line capacity augmentation works, either the works had not been started or those were progressing slowly/ unequal pace (March 2012) resulting in non-elimination of missing links. HDN route wise position is illustrated as under:

HDN route No.2 (with 2A and 2B) – Non-commencement/slow progress of double/ triple line works

HDN route No.2 (with 2A and 2B) consists of Mumbai- Howrah main route (HDN2) and two link routes viz. Bilaspur- Anuppur- Katni-Bina-Kota (HDN2A) and Jalgaon-Surat (HDN2B). The total route length of these routes is 3162.40 RKMs. This route is very important for coal traffic. The schematic diagram of HDN route 2 including 2A and 2B is given below:



From the schematic diagram it is observed that there are large sections where works providing double and third lines were in progress. It was observed that

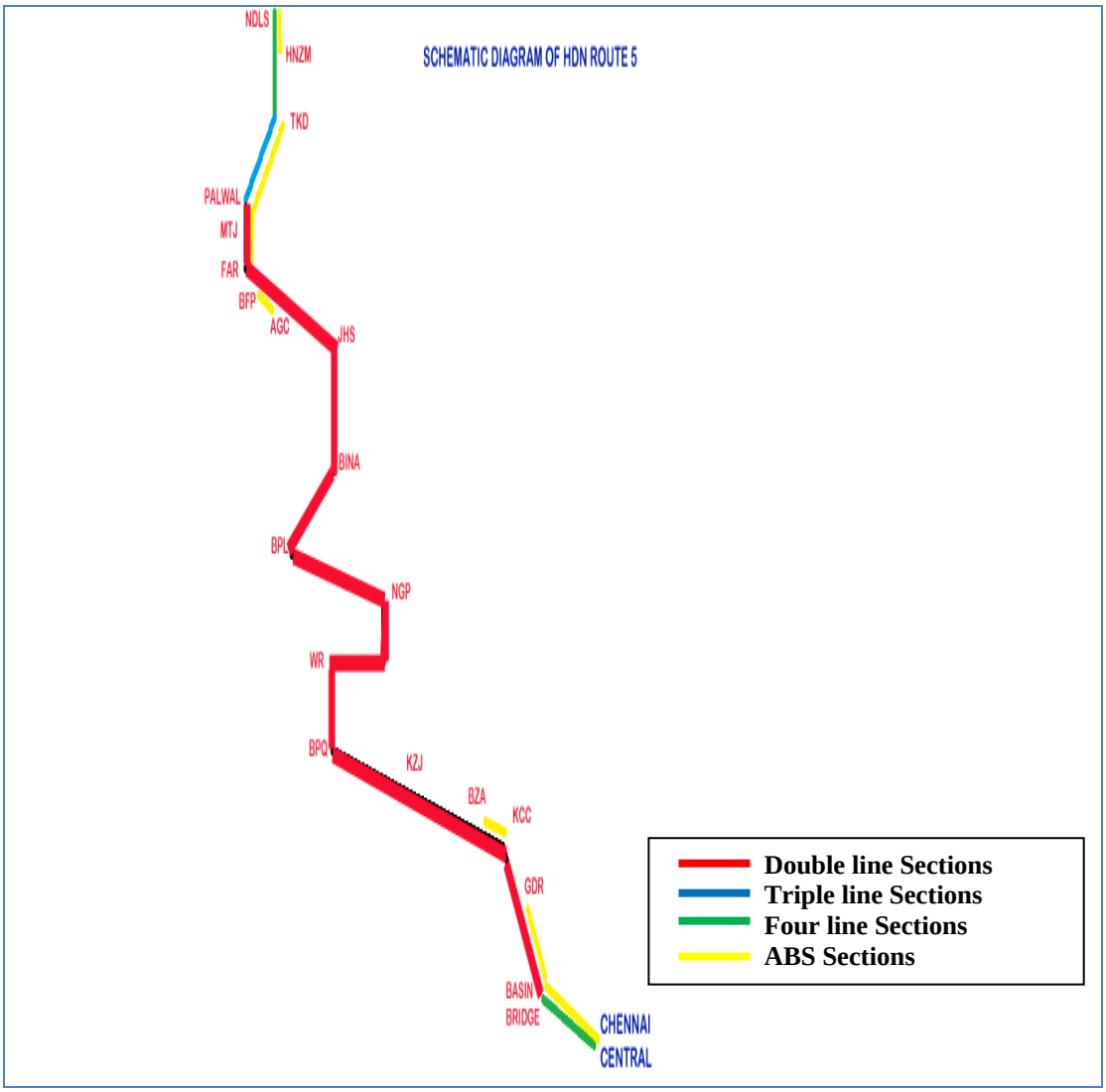
- On WR, the progress of doubling work between Udhana- Jalgaon was 19 per cent only.

- On CR, work for the construction of third line had not been started in 330 Kms long sections viz Kalyan-Kasara-67 Kms, Manmad- Bhusawal- 184 Kms and Wardha- Nagpur-78 Kms).
- On WCR, doubling work in Bina –Kota section (282.60 Kms) had not started and the progress of doubling work in another single line section Guna – Ruthiyal (20.47 Kms) was two percent only.
- On WCR, the work for the construction of third line between Bina- Katni was at initial stage only as Preliminary Engineering cum traffic survey was in progress.
- On SECR, doubling work had progressed in 87.60 RKMs long portion. The progress of Salaka Road- Khongsara work was 39 per cent and of Khodri-Anuppur, progress was 47per cent.
- On SECR, works for the provision of third line in 474.70 RKMs long portion were progressing at uneven pace. Whereas the work in Rajnandgaon–Gondia-Nagpur (234 RKMs) section had not started, the progress in other three portions was Jharsuguda–Champa (151.70 RKMs)- 10 per cent, Bhatapara–Urkura (58.20 RKMs)- 86 per cent and Durg–Rajnandgaon (30.80 RKMs)-10.5 per cent respectively.
- On SECR, Durg-Gondia (134.9 RKMs) and Bhilai- Urkura (29.00 RKMs) were identified for Auto Signaling in the Blue Print. Durg-Gondia work sanctioned in 2008-09 had been frozen in September 2009. Zonal Railway Administration had not proposed the work for Bhilai- Urkura section. However, the work in Gondia-Nagpur section (129.90 RKMs) sanctioned in 2007-08 was still in progress (25 per cent).
- On SER, the works for the provision of third line in 94.10 RKMs long portion were progressing unevenly (Rajakharswan- Sini -15.00 RKMs-35 per cent, Sini-Adityapur-16.00 RKMs-15 per cent, Kharagpur-Panskura -44.70 RKMs-85 per cent and Manoharpur-Goelkara -34.10 RKMs-48 per cent).

It may be seen that the works for providing double lines and triple lines had either not been started or were progressing very slowly. Thus, despite substantial investment, the benefit of this investment would not be made due to lack of prioritisation and synchronisation in implementation.

HDN route No.5 – Slow progress of third line works

HDN route No.5 consists of Delhi-Chennai via Jhansi-Bhopal-Itarasi-Nagpur-Ballarshah. The Delhi- Mathura section falling on this route is also a part of HDN route No3. This common portion has been included in HDN3 in the Blue Print. The HDN route No.5 is important for steel traffic. The total track length of this HDN route is 2185.53 RKMs. The schematic diagram of HDN 5 route is as under:



From the schematic diagram it may be seen that the entire route is at least double line and some portion also have triple/ four line sections. This indicates that that entire route carries very high density traffic. Works to provide third line were being implemented to enhance the line capacity of the route. However, the following was observed:-

- Delhi- Palwal section of NR, a part of HDN3 route has three lines. The work for providing third line in Palwal- Bhuteshwar section (83.40 RKMs) falling on NCR was progressing slowly and the progress was 70 per cent.
- On WCR, sections measuring 230.03 RKMs had been identified for the provision of third line. The work in Bina – Bhopal (143 RKMs) was progressing (45 per cent), work for Budhni- Barkheda (33.00 RKMs) had not yet been commenced and work in remaining two sections viz Bhopal-Barkheda and Budhani- Itarsi (total 54.03 RKMs) were sanctioned in 2012-13 only.
- On SCR, out of three sections (Ballharshah- Kazipet, Kazipet-Vijayawada and Vijayawada-Gudur) identified for provision of third line (total 757.35

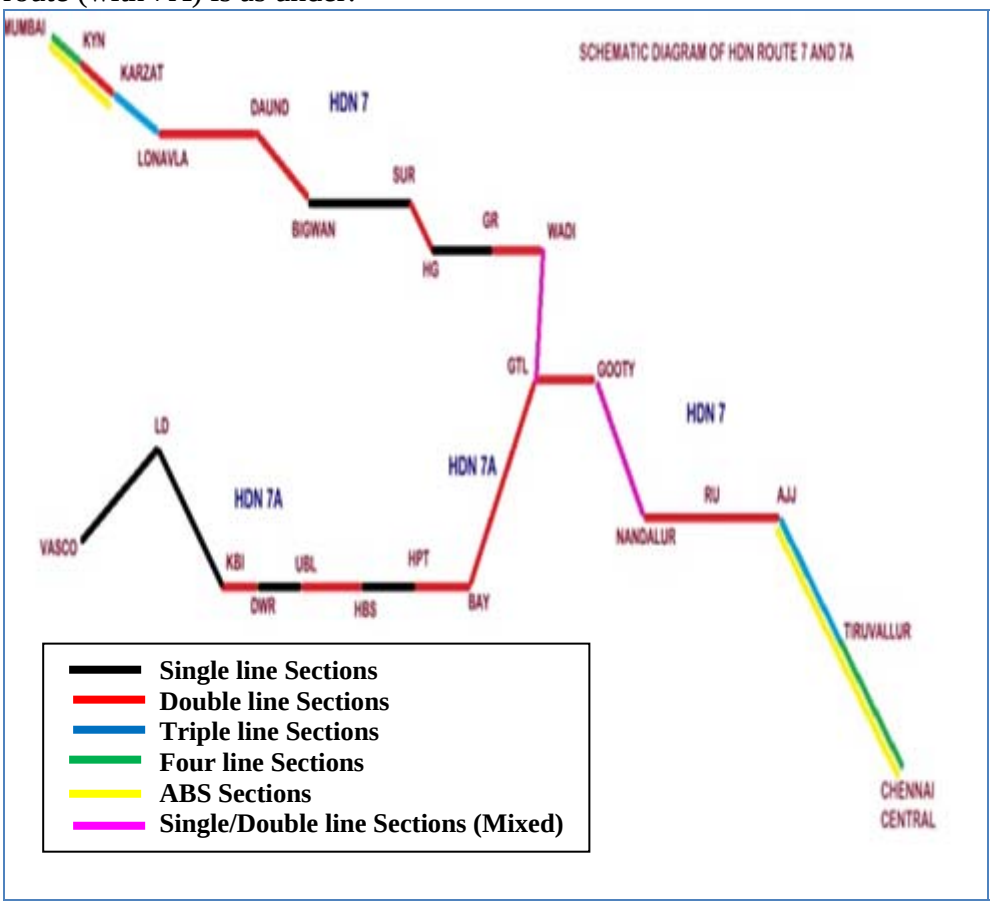
RKMs), work for only 28.84 RKMs long portion (Raghavapuram-Mandmarri-24.47 RKMs and Mancheryal- Peddampethad-4.30 RKMs) had been sanctioned and the progress of the work was 25 per cent only.

- On SR, whereas the progress of work for the provision of third line between Attipattu- Korukupet (17.95 RKMs) was 83 per cent, the work between Chennai Beach- Korukkupet (4.10 RKMs) had not yet been started.
- Three sections measuring 407.76 RKMs had been identified for the provision of ABS in NCR. However, work had not been taken up on any of these sections.

It may be seen that a major portion of double line track has not been considered as yet for the provision of third line and wherever these works had been sanctioned, there were progressing slowly thereby not easing the problems of capacity constraints.

HDN route No.7 (with 7A) – Non-commencement/ slow progress of double line works and Railway Electriciation

HDN route No. 7 (with 7A) consists of Mumbai- Chennai main route (HDN7) and link route Guntakal-Hospet-Hubli-Vasco i.e. iron ore circuit (No.7A).This route is important for iron ore traffic and for providing Port connectivity. The track length of the route is 1679.09 RKMs. The schematic diagram of HDN 7 route (with 7A) is as under:



From the schematic diagram it may be seen that there are many single line segments requiring the provision of double line for capacity augmentation. In addition there were certain patches of mixed sections (single / double line) resulting in bottlenecks along the route. It was observed that:

- On CR, two single line sections viz Bhigawan – Mohal (127 RKMs) and Hotgi- Gulbarga (98 RKMs) had been identified for the provision of double line. However, work had not yet been started in any of the section.
- On SWR, the entire section of Hospet-Vasco (308.15 RKMs) had been sanctioned for the provision of double line. The work has been assigned to RVNL. Zonal Railway has completed patch doubling of 43.85 KMs as their own and actual work was yet to started by the RVNL.
- Seven sections on CR measuring 414.57 RKMs and two adjacent sections on SCR measuring 426.61 RKMs had been identified for Railway Electrification. Though the progress of work in Renigunta-Guntakal section (308 RKMs) of SCR was 48 per cent, the work had not started in remaining section (118.61 RKMs) of SCR and adjacent seven sections of CR.

It may be seen from the above that doubling works were either not started or were progressing very slowly. The Railway Electrification works had also not been started in a major portion of the route. It is pertinent to mention that although HDN7A is an important route as it is associated with iron ore traffic and provides Port connectivity, it has not been identified (March 2012) for Railway Electrification and installation of ABS. Double line track is also not available on the entire link route.

The above analysis conducted in respect of selected HDN routes clearly indicated that the planning process was weak. The Indian Railways had not been able to modify their planning process from a piece-meal sectional approach to an integrated route-wise approach. No prioritisation was carried out of the sanctioned works to focus scarce resources on sections which would remove bottlenecks on the routes or connected important sections for transporting freight. For instance, Port connectivity works and iron ore routes were not given importance. This coupled with large gaps in the identification of creation of minimum requirements of double line, Railway Electrification and Automatic Block Signalling led to very slow augmentation of line capacity on the High Density Network routes.

2.5.1.4 Load bearing capacity

As part of capacity enhancement measures, the XI Plan had also proposed that tracks on iron ore routes would be suitably strengthened for carrying 25 T Axle loads. The planners excluded these works from the purview of the Blue Print as a separate exercise was being done for the purpose.

Audit observed (2012-13) that out of 115 [15] sections covering 7027.03 RKMs, 38 [16] sections spread over 1223.93 RKMs were identified outside of the Blue Print

[15] HDN 2 – 55 Sections (3162.41 RKMs), HDN 3 & 5 – 25 Sections (2185.53 RKMs) and HDN 7 – 35 Sections (1679.09 RKMs)

for strengthening of carrying capacity to 25T Axle Load. However, only three sections involving 42 RKMs were augmented for carrying 25T Axle Load (SER under HDN 2) as on 31 March 2012. Further, out of 15 sections identified on HDN 7 route (SR and SWR) for augmentation of load bearing capacity, condonation of the Commissioner of Railway Safety (CRS) was awaited (March 2012) in respect of seven sections of SR where bridges were not fit to carry 25T Axle Load. The reasons for exclusion of bridges that formed part of sections identified for augmentation process were not on record. In the balance eight sections of SWR though the augmentation works had been completed, CRS sanction was awaited (March 2012).

The above analysis clearly reflects that inadequate efforts were made towards integration of various work components to secure maximum advantage as envisaged in the original strategy.

2.5.1.5 Systemic Capacity Augmentation over feeder routes

Audit studied feeder routes of selected three HDN routes that were prioritized in the Blue Print for systemic capacity augmentation and were not covered in the main HDN route. It was observed that:-

- On HDN 2 and 2A, there were four feeder route sections (53 sub-sections-total length 701.55 RKMs)[17] that required systemic capacity augmentation works. Out of these sub-sections, capacity augmentation works were not identified in six sub-sections measuring 46.12 RKMs.
- Out of ten line capacity augmentation works identified on 47 sub-sections, three works had not yet been started, one work had been completed and remaining six works were in various stages of progress as given below:-

Rly	Section	Name of the work	Year of sanction	Physical progress in %
SER	Dumitra-Champajharan	Dumitra-Champajharan Doubling. (19 Kms)	2007-08	90
SER	Champajharan -Bimalgarh	Champajharan -Bimalgarh Doubling. (21 Kms)	2010-11	10
SER	RNC-MURI	Muri-North outer cabin-Muri doubling (1.4 Kms) of section with provision of 2nd bridge over subernarekha	2008-09	40
SER	THE-RNC	Ranchi-Construction of platform No.4& 5	2008-09	90
SER	THE-RNC	Hatia-Yard remodelling& coach maintenance	2004-05	100 (completed)
WCR	KTE-SGRL	Marwasgram -Joba up-gradation with P.I. & addition loops & sand humps-eight stations.	2009-10	16
WCR	KTE-SGRL	Three new crossing stations at Gajarabahara between Deoragram –	2006-07	60 (crossing stations at Piparya Kalan and

[16] HDN 2 – 21 Sections (664.90 RKMs), HDN 3 & 5 – 2 Sections (20.88 RKMs) and HDN 7 – 15 Sections (538.15 RKMs)

[17] Bondamund- Kiriburu (11 sub-sections total length 88.20 RKMs), Bonamunda- Hatia- Bokaro Steel city (33 sub-sections total length 278.22 RKMs), Dongaposi- Rajkharsawan (8 sub-sections total length 75.00 RKMs) and KTE- SGRL (one sub-section length 260.05RKMs)

		Saraigra, at Kanchanpur between Joba-Dubrikalan and at Pipaariya Kalan. between Khannabanjari- Salhana.		Gajarbahara completed and opened in December 2009 and July 2011 respectively.
WCR	KTE-SGRL	Niwas Raod and Bargawan upgradation of Traffic facilities	2010-11	0 (not started)
WCR	KTE-SGRL	Kahana Bunjari-Beohari- Proposed panel Inter locking with Std III additional loop & isolation	2010-11	0 (not started)
WCR	KTE-SGRL	Sursurai ghat- jhara-Conversion of D class station to B class crossing station	2011-12	0 (not started)

(i) Due to non completion of the doubling of Dumitra– Bimlagarh section through Champajharan, the anticipated annual return of ₹ 29.67crore (29.97 per cent of ₹99 crore for three years) was yet to accrue (March 2012). Similarly, non completion of doubling of Muri-North outer cabin-Muri with provision of 2nd bridge over Subarnarekha has resulted in non-accrual of anticipated annual return ₹ 8.34 crore (48.48 per cent of ₹ 17.22 crore).

(ii) While the work at two crossing stations (Pipariya Kalan and Saraigara stations) was completed and opened for traffic in December 2009 and July 2011 respectively, the work at Kanchanpur station could not be progressed due to non-mutation of Railway land in the name of Railway. As a result, the line capacity could not be augmented and anticipated additional freight revenue of ₹ 24.70 crore could not be earned through coal traffic during April 2010 to March 2012.

(iii) The work of up-gradation of panel interlocking and additional loops with sand humps for simultaneous reception (eight stations) viz Marwasgram, Katangikhurd, Salhana, Mahroi, Vijaysota, Chhateni, Dubrikalan and Joba in Katni- Singrauli section was sanctioned in 2009-10 to be completed by January 2012. The meager physical progress (16 per cent) was on account of non-availability of clear site, non-availability of funds, delay in supply of drawings of buildings etc.

The delayed sanction of the identified line capacity augmentation works on feeder routes of HDN2&2A and /or slow progress of these works resulted in non-enhancement of systemic capacity of feeder routes and denial of anticipated financial benefits.

2.6 Financial Management

2.6.1 Audit analyzed (2012-13) the pattern of fund allotments during the period of the review. Year-wise comparison of Budget Grant (BG) for line capacity augmentation works over HDN routes (excluding New Line works) with that of the anticipated cost thereof revealed that the allotment of BG every year was less than 10 per cent during the entire period. In fact, the share of funding exhibited a declining trend with a slight increase in 2011-12.

(Fig. in crore of Rupee)

	HDN Routes			Percentage (HDN Routes)	
Year	**Anticipated Cost**	**Budget Grant**	**Actual Expenditure**	**Budget Grant on Anticipated Cost**	**Actual Expenditure on Anticipated Cost**
2007-08	10229.65	943.10	971.19	9.22	9.49
2008-09	12943.64	1157.69	1022.30	8.94	7.89
2009-10	15865.97	1179.31	1163.14	7.43	7.33
2010-11	18571.79	1134.32	943.65	6.10	5.08
2011-12	23416.46	1643.56	1139.34	7.02	4.87

This indicated the low priority attached to implementation of works on HDN routes. Further, this state of affairs was much in contrast to the statement of the Minister of Railways that funds should not be allowed to become a constraint for execution of works on HDN routes. Not only were the budget allotments meager, the executing Railways had not been able to fully utilize the same.

2.6.2 A comparison of total Budget Grant (BG) of ten Zonal Railways viz., CR, NCR, NR, SCR, SER, SECR, SR, SWR, WCR and WR related to selected HDN routes and the Actual Expenditure (AE) incurred by these Railways for capacity augmentation works (excluding New Line works) vis-à-vis that on HDN routes of the respective Railways revealed that the share of BG on HDN routes during the review period averaged 34 per cent (approx) while the actual utilisation of funds on HDN works registered an average of 30 per cent of the total expenditure of the Railways as a whole as exhibited in the Table below:

(Figure in crore of ₹)

Year	**Selected Zonal Railways as a whole**		**On HDN Routes**		**Percentage on HDN Routes over that on Selected Zonal Railways as a whole**		**Percentage utilization of Budget Grant on HDN Routes**
	Budget Grant	**Actual Expenditure**	**Budget Grant**	**Actual Expenditure**	**Budget Grant**	**Actual Expenditure**	
2007-08	2911.66	3330.97	943.10	971.19	32.39	29.16	102.98
2008-09	3766.28	3956.93	1157.69	1022.30	30.74	25.84	88.31
2009-10	3671.63	4127.81	1179.31	1163.14	32.12	28.18	98.63
2010-11	3287.28	3351.61	1134.32	943.65	34.51	28.16	83.19
2011-12*	4215.65	2725.19	1643.56	1139.34	38.99	41.80	69.32
Total	**17852.50**	**17492.51**	**6057.98**	**5239.62**	**33.93**	**29.95**	**86.49**

** Includes Budget Outlay under Capital (Bonds) also*

It is clearly evident that the non-HDN works represented the bulk share of total fund allotment (66 per cent). Further, the major share of actual utilization of funds (70 per cent) was accounted also for by the non-HDN segment and the increasing surrender of funds during the period was attributable to HDN segment which rose to nearly 30 per cent during 2011-12. Thus, even the funds made available, however disproportionate in totality, were not only not fully utilized

but surrendered. This undermined the objective of accelerated development of the routes for handling anticipated growth in traffic volumes (70 per cent of freight traffic plied on HDN routes that formed only 25 per cent of rail network).

2.6.3 Against this backdrop, audit conducted a detailed analysis (2012-13) of 154 works out of 162 selected works over selected HDN routes and noticed cases involving surrender of funds, diversion/ irregular diversion of funds and fictitious booking of expenditure as discussed below. The position in respect of remaining eight works could not be analysed as these were entrusted to RVNL to whom Railway Board had allotted funds as lump sum advance for the projects under execution, as a whole, instead of work wise grants.

2.6.3.1 Surrender of funds

Audit observed (2012-13) that a total Budget Grant of ₹2840.10 crore was allotted by the Railway Board for 77 specific works for line capacity augmentation during the review period (2007-08 to 2011-12) that was got reduced to ₹1453.34 crore at Final Grant stage. Against it, the actual expenditure incurred was ₹1727.76 crore and a sum of ₹1112.34 crore was surrendered that amounted to 39 per cent of the Budget Grant. The surrender of allotted funds to such a large extent was mainly attributed to non availability of clear site, delay in finalisation of estimates, plans and drawings etc as detailed below.

S. No	Brief reasons for surrender	No of works	Amount of surrender. (₹in crore)
1	Delay in Land acquisition, law & order problem and non handing over of clear site	14	291.29
2	Delay in finalisation of Estimates & drawings	16	178.09
3	Delay in finalisation of tenders, contracts and discharge of tenders	12	130.31
4	Dropping/freezing of works	9	117.49
5	Delay in supply of materials and non receipt of anticipated debits etc	2	2.75
6	Minor variations	3	1.24
7	Slow progress of works in contracts and due to delay in coordination with CRS in obtaining for removal of slip sidings for ABS work	12	56.38
8	Indecision of Railway in continuing with the work of ABS and to hand over work to RVNL for execution.	2	61.23
9	Works being executed by RVNL/MVRC for which reasons not available	7	273.56
	Total	**77**	**1112.34**

This clearly indicated that the pace of execution of works was out of sync with the provisioning of funds at the planning stage and reflected inadequate co-ordination as between concerned departments of Zonal Railways.

2.6.3.2 Diversion of funds

Audit observed (2012-13) that during the execution of 17 works on selected HDN routes, funds to the extent of ₹ 116.40 crore were diverted to other works. Out of this, only ₹10.81 crore were diverted to other works on HDN routes and the balance i.e. ₹ 105.59 crore on works to non-HDN routes. The details are given in **Annexure VIII.**

(i) Irregular Diversion of funds

On Western Railway, a total sum of ₹ 149.58 crore was booked to Udhna-Jalgaon project during 2010-11 and 2011-12 out of which only ₹ 95.67 crore pertained to the work. The balance amount of ₹53.91 crore (₹20.11 crore during 2010-11 and ₹33.80 crore during 2011-12) was spent on works other than HDN routes without seeking re-appropriation[18].

Similarly, on Northern Railway, out of a total amount of ₹61.15 crore booked during 2009-10 for construction of 4th line between TKD-PWL, only an amount of ₹21.71 crore actually pertained to the work. The entire balance amount of ₹39.44 crore was spent on Open Line works of Ambala and Delhi Divisions constituting irregular diversion of funds.

(ii) Fictitious booking of expenditure

Audit observed (2012-13) that although the work 'Shelvona River side Rail Terminal (under HDN 7A of SWR) had not commenced (March 2012) due to land acquisition problems, there was a fictitious booking of ₹ 0.50 crore under this work during 2011-12 towards expenditure on Earthwork. On highlighting the issue, Railway stated that the expenditure had been booked as per Railway Board's instructions.

Thus, in addition to poor planning, indifferent attitude by the Zonal Railways resulted in surrender of funds and their diversion to purposes other than HDN works.

2.7 Progress of works and cost overrun

2.7.1 Audit conducted a scrutiny of 162 sample works (2012-13) sanctioned for execution on selected HDN routes and observed that ten works had been frozen/ dropped/ proposed for dropping, 45 works were yet to start **(Annexure IX)** and 53 works were in progress **(Annexure X)** as follows:

Percentage of physical progress	No of works
Less than 25%	14
Between 25% and 49%	11
Between 50% and 74%	12
Between75% and 99%	16

[18] Ankleshwar–Rajpipla GC, Surendranagar–Viramgam DL, Akodia–Sujalpur DL, OL works of ADI Divn & Ratlam-Mhow-Khandwa GC

Out of 54 works completed, 33 works were completed with a delay ranging from six to 58 months. **(Annexure XI)** Further, target dates for completion had not been fixed in respect of 37 works.

Audit could not make a financial assessment of non-accrual of anticipated benefits in respect of 93 works as Rate of Return (RoR) and/or the target dates of completion were not available. However, in respect of another 31 works in progress/completed as on 31.3.2012, audit assessed non-accrual of anticipated benefits to the extent of ₹921.17 crore due to various reasons as tabulated below:

Sl No	Reasons in brief	No of works	Amount of non accrual of anticipated benefits. (₹ in crore)	Time overrun (in months)	Ref to SL No of Annexure-VIII
1	Delay in land acquisition.	3	71.37	17 to 36	12,24&26
2	Delay on account of removal of encroachments and clearance of site.	7	126.99	8 & 96	1,10, 14, 15, 19,21 &22
2	Delay in approval of plans & Drawings and changes in lay out	4	221.94	16 to 36	3,7,16&25
3	Delay in supply of permanent way materials by Railways	3	144.82	18 to 24	4,8&9
4	Delay in completion of allied/residual works	3	57.29	1 to 15	28,29&30
5	Slow progress by RVNL	2	174.89	9 and 84	5&13
6	Disturbances to works (Law & Order)	2	81.26	9 and 12	6&17
7	Delay in decision on executing agency, etc	2	15.46	12 and 27	11&31
8	Delay in finalisation of estimates, tenders & contracts	3	6.41	14 and 30	18,20&23
9	Delay in commissioning due to non availability of requisite man power for maintenance	1	12.86	10	27
10	Due to slow progress of works in contracts	1	7.89	7	2
	TOTAL	**31**	**921.17**		

(Annexure XII)

In addition, 56 works suffered cost overrun amounting to ₹1,985.74 crore due to delay in completion of works. **(Annexure XIII)**

2.7.2 Lack of integrated approach in execution of works

While the works are planned by the Railway Administration and Railway Board, these are executed mainly by the construction organisation of the Zonal Railways. Railway Board assigned the execution of some of these works to Rail Vikas Nigam Limited (RVNL) also. Out of 162 works covered in this study, 18 works were assigned to RVNL which included four works that pertained to 42 line capacity augmentation works identified in the Blue Print in respect of three selected HDN routes. Audit scrutiny revealed that the manner of execution of works in various route segments lacked a planned and integrated approach, resulting in uneven progress of works in critical sections. This was also reflected in inadequate co-ordination within the Railway Administrations as well as

between the Zonal Railways and RVNL involved in the execution of works. Some of these cases are discussed below:

2.7.2.1 Doubling works

A review of progress of doubling works being executed on HDN 2A, 7 and 7A revealed the following:

SNo.	HDN	Railways	Progress of works
1	2A	SECR & WCR	Doubling works of Salka Road- Khongsara and Khodri-Anuppur (total length-87.60km), two critical sections identified in the Blue Print, were sanctioned in 2005-06 and 2006-07 respectively. The works had progressed 39% and 47 per cent respectively only (March 2012). However, the doubling work in a nearby critical section Bina-Kota (282.60 RKMs) on WCR was assigned to RVNL in July 2011 and was yet to start (March 2012).
2	7	CR	Out of total Doubling work from Daund to Gulbarga (300.77 RKMs), the work over Sholapur- Hotgi (15.07 RKMs), Daund- Bhigwan (27.68 RKMs), Mohal-Sholapur (33.11 RKMs) sections was completed in July 1999, February 2002 and May 2008 respectively. However, the execution of doubling work of balance 224.91 RKMs (Bhigwan – Mohal-127 RKMs and Hotgi- Gulbarga 97.91 RKMs) transferred to RVNL was yet to be started (March 2012) though the Detailed Estimate for the work had been sanctioned by RVNL in April 2010.
3	7A	SWR	The doubling work of entire Hospet-Vasco section (352kms) was identified in the Blue Print (HDN7A). The work was transferred to RVNL in parts i.e. from Hospet to Thanaighat -201 Kms- in December 2007 and from Thanaighat to Vasco- 151kms-- in October 2010). The doubling of the entire project was included in the Pink Book in 2010-11. RVNL sanctioned the Detailed Estimate for Hospet- Thanaighat in March 2010 and started the process for acquisition of 13 hectares of land in March 2011. The work was in the initial stage of land acquisition (March 2012). In the mean time, SWR has completed as their own the patch doubling in Dharwad - Kambaraganvi and Hubli –Hebsur (total 43.85 RKMs) falling on Hospet-Thanaighat section. No work had been executed on Thanaighat- Vasco section (March 2012).

The progress of doubling works on above important sections indicate that Ministry's decisions to transfer the works of certain segments to RVNL had not proved to be fruitful as RVNL had failed even to commence the works denying the augmentation of line capacity in an integrated manner.

2.7.2.2 Third line works

On HDN2 &2A, works for providing third line were not progressing at even pace on SECR and works on adjacent sections on WCR had not been started. The progress of these works is exhibited below:

	Third line work	Year of sanction	Physical progress	Reasons for slow progress
1	Jharsuguda-Champa (151.70 RKM) -SECR	2009-10	10%	Delay in sanction of Detailed Estimate
2	Bilaspur- Bhatupura (46.40 RKMs)-SECR	1997-98	100%	Completed in 2005-06
2	Bhatpara-Urkura (58.20 RKM)-SECR	1997-98	86%	Transferred to RVNL in March 2003. Slow progress.
3	Drug-Rajnandgaon (30.80 RKM)-SECR	2010-11	10.50 %	Delay in commencement of work due to delayed finalisation of tender.
4	Rajanandgaon-Gondia- Nagpur-(234 RKMs) SECR	-	-	Initial stage of Survey
5	Bina-Katni (WCR)	-	-	Initial stage of Survey

It is evident from the above that there was no integrated approach in the execution of works.

2.7.2.3 Fourth, Fifth and Sixth line works

Delhi- Mathura section of HDN route No.3 forms part of the important entry into the Delhi region and is a major point of congestion. It also forms part of HDN route No.5. On this stretch, three lines have already been provided between Delhi-Palwal[19] and construction for the provision of third line is in progress in further portion [Palwal-Bhuteshwar (Mathura)]. Works for the provision fourth, fifth and sixth lines in identified sections[20] have been sanctioned. There were however, substantial delays in implementation of these works in NR which are discussed below-

- Railway Board sanctioned (2006-07) the work of 4th line between Tughlakabad and Palwal at a cost of ₹ 83 crore and entrusted the work to RVNL for its planning and execution. RVNL sanctioned the detailed estimate (June 2007) for ₹123.90 crore. The work was not commenced and transferred back (April 2008) to NR. Subsequently, the Detailed Estimate were revised to ₹278.92 crore (September 2012) on account of time over-run (₹ 37.08 crore), change in scope of work (including specifications and quantities) and relocation of jhuggies. Audit observed that the reasons for changing the executing agency were not on record. Further, the construction work between Faridabad New town and Bhallabgarh (four Kms) could not be taken up due to non removal of 752 Juggies by the Delhi Division.

[19] Excluding Tilak Bridge-Hazrat Nizamuddin
[20] Tughlakabad-Palwal for fourth line and New Delhi -Tilak Bridge for fifth and sixth lines

- The work to provide 5th & 6th lines between New Delhi and Tilak Bridge on NR (HDN3) was sanctioned for ₹ 39.44 crore (2000-01). The target date of completion was fixed as March 2004. The estimate was revised to ₹53.15 crore (May 2007) to include widening of the RUBs at Tilak Bridge and Shivaji Bridge to accommodate eight tracks and to provide additional platforms at these two stations. The physical progress of the work was 80 per cent (March 2012). The main reasons for delay were non shifting of underground S&T cables and OHE High Masts from work site, delay in handing over of complete site due to delay in exchange of Masjid land/ dismantling of quarters, delay in transfer of land from CPWD, change in drawings in pile foundations, delay in finalization of lay out and GAD of Bridge No.8, non finalization of GAD of RUB at Shivaji Bridge, non-availability of traffic block from DCP/Traffic, Delhi and increase in quantities against various items of works. The estimate has again been revised to ₹140.69 crore and submitted to the Railway Board for approval.

Proposed 5th & 6th lines between New Delhi and Tilak Bridge (NR)

Audit observed that there were substantial delays in the provision of additional lines due to change in decision regarding the implementing agency and scope of work. Further, co-ordination between Railway Board and Railway Administration was poor. Thus the major capacity constraints while entering into Delhi Region could not be eased.

2.7.2.4 Auto Block Signalling

Railway Board sanctioned ABS in very limited stretches. Despite this, implementation of ABS on the sections was delayed due to poor co-ordination between the Board and Railway Administration as discussed below-

- ABS work in Gondia-Nagpur section (129.9 RKM) sanctioned in 2007-08 was progressing (25 per cent) and expenditure to the tune of ₹ 46.20 crore had been incurred. The execution of work was held up for last one year due to indecision as regards continuance of the work. It was noticed that the Railway had a proposal to drop the work in view of operational problems such as stalling of locos due to steep gradient. However, the proposal for dropping the work was yet to be submitted to Railway Board (March 2012).

- The progress of ABS work in Pune –Lonawala section (65 RKMs) on CR over HDN7 (not on class C route) was hampered due to delay in initiating timely action to get the clearance from the Commissioner of Railway safety (CRS) for removal of slip sidings. Since these slip sidings had been existing prior to award of contract for ABS work in 2006, the clearance from the CRS could have been obtained prior to award of contracts. Railway raised this issue with the CRS for the first time in October 2009 only. CRS rejected the proposal for removal of slip sidings. As of March 2012, the physical progress of the entire work was 40 per cent and expenditure booked, ₹19.71 crore. The work was lying incomplete even after 40 months of originally scheduled date of completion.

2.7.2.5 Deficient Planning leading to dropping of works after commencement

Audit observed following cases where line capacity augmentation works had to be dropped due to poor planning;-

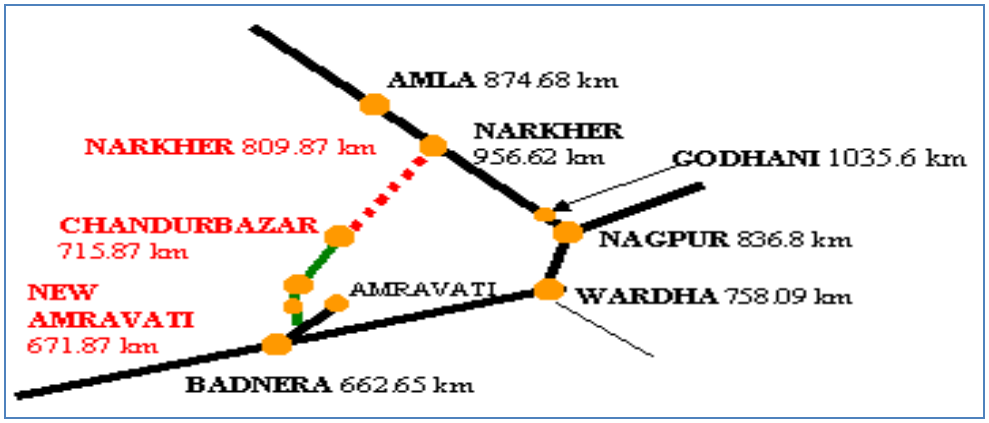
- SWR decided (September 2007) to provide a new crossing station between Koppal and Ginigera stations of Gadag- Hospet Section under Hubli Division (HDN 7A). The provision of crossing station was justified to increase line capacity on this iron ore carrying route. However, the facts that the said crossing station would come up at barely three Kms from the existing station and doubling of entire Hospet (HPT) – Vasco (VSG) section was being taken up were ignored and an expenditure of ₹6.35 crores was incurred. Subsequently, the Railway decided to drop the work (September 2009) on the above grounds which entailed unfruitful expenditure assessed at ₹4.31 crore.
- On this issue being pointed out in Audit (May 2012), Railway Administration stated (June 2012) that the need for having another station so close to existing station, was under review. The works had been put on hold and necessary action to finalise the contract *as is where is basis* was in progress. Further, the earthwork already completed would be utilised for ensuing doubling work. It is clear that the decision to create another crossing station was taken in violation of the Blue print that had provided for the doubling of entire HPT-VSG. Besides, the Zonal Railway were also aware that the doubling had been entrusted to RVNL in December 2007. Hence, the reply was an afterthought and reflected a casual approach.
- In the work "Strengthening of stations on Iron Ore routes by additional loop lines and extension of running lines/ sidings (seven stations) on Hubli (UBL) Division of SWR over HDN 7A", the work at two stations Vasco (VSG) and Consolium (CSM) was proposed to be dropped due to issues related to land acquisition. The work at VSG station was dropped after incurring an infructuous expenditure of ₹0.96 crore. Railway Administration stated (July 2011) that the expenditure was incurred for provision of shunting neck within the available Railway land. Audit, however, observed that the amount was paid to the contractor for making up of bank, excavation in trenches and provision of concrete items and not for linking of shunting neck, as claimed by the Railway Administration.

2.7.2.6 Poor progress of linked projects

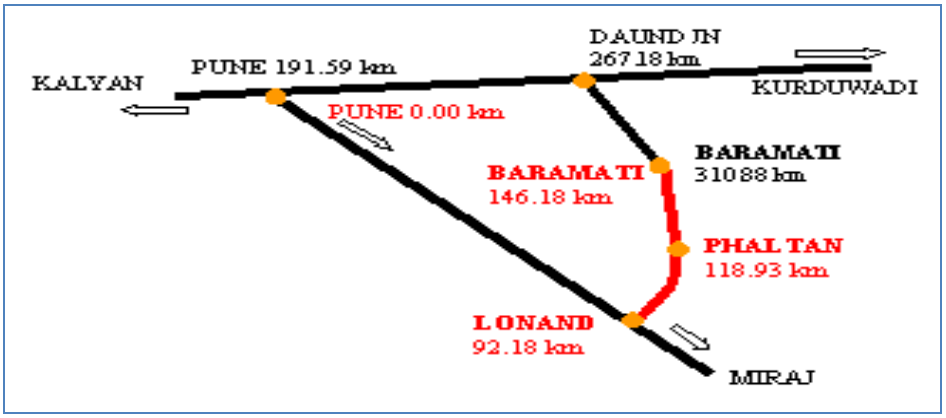
Audit observed following cases where traffic density could not be eased due to poor progress of works linked to main projects:-

- Railway Board had sanctioned (December 1995) the Detailed Estimate of ₹150.66 crore for the construction of a new line Badnera- Amravati- Narkher: (138 KM). This line would link HDN-.2 and HDN-5 and ease the oversaturated traffic on Badnera- Nagpur section on HDN-2 and Amla – Nagpur section on HDN-5. Though the work was targeted for completion within six years i.e by December 2001, it was still incomplete (March 2012).

  Audit observed that in view of insufficient funds, CR took up (July 2002) the work for construction of first 44 Kms line from Amravati to Chandubazar that was completed (February 2006). The completed section (44 Kms) had not yet been commissioned for traffic as CRS inspection had not been carried for want of completion of residual works and also the posting of required maintenance staff. The physical progress of the entire project was 96 per cent (March 2012) and an expenditure of ₹516.26 crore had been incurred.



- Railway Board had sanctioned (2002) construction of a new line between Baramati- Lonand via Phaltan (54 KMs) at a cost of ₹138.48 crore for providing a shorter link (65 KMs) to North South traffic between Daund-Miraj and elimination of congestion of traffic on Daund- Pune section of HDN 7.

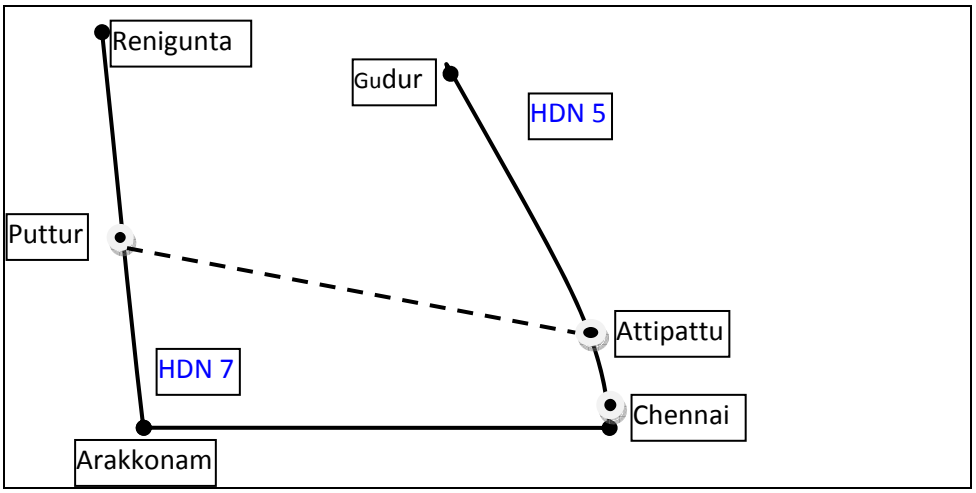


Audit observed that although the work in Lonand- Phaltan section (26.75 KMs in Phase I) taken up for execution had progressed up to 82 per cent

(March 2012) after incurring expenditure of ₹112.83 crore, the project completion was delayed on account of difficulties in resolving the problem of land acquisition between Baramati and Phaltan section (27.25 RKMs).

When the issue regarding non-completion of new link was taken up earlier in Audit (Paragraph No 3.1.3 of Report No CA 11 of 2008-09-Railways), Ministry of Railways stated (December 2009) in the Action Taken Note that completion of Lonand– Baramati alignment was being pursued and efforts were being made to connect the line up to Baramati. However, the land acquisition problem had not yet been resolved (March 2012) and there were no possibilities in the near future for the availability of shorter link for traffic between Daund and Miraj besides elimination of congestion of traffic on HDN 7.

- Construction of a new line between Attipattu and Puttur (HDN7) on SR was included in the Pink Book [21](2008-09). This line was proposed to provide a link between Chennai-Gudur line (HDN-5) and Arakkonam-Renigunta line (HDN-7) and easing density of traffic carried over HDN7 from Chennai Port. Audit observed that the Detailed Estimate for this important new line providing connectivity to two HDN routes was submitted by SR Administration belatedly in February 2011 which was sanctioned by the Railway Board in September 2011. The reasons for the delay in initiating the commencement of project were not available on records.



2.8 Inter-zonal comparisons of rates including RVNL works

As brought out in the preceding paragraphs, lack of integrated approach in planning for execution resulted in fragmented progress of works with cost over-runs. Effective co-ordination of the executing agencies would have promoted a proper environment for cost-effectiveness in project implementation. Further Audit observed that comparative efficiencies could not be assessed in respect of 54 works completed as these were dissimilar works and not comparable. As,

[21] Final Works Programme approved by Railway Board assigning initial budget allotment

such, Audit decided to undertake comparisons of estimates sanctioned for various works, namely doubling, third line, auto-signalling , etc, across the Zones including RVNL using a comparable time-period. Where comparisons involved differences in sites/regions, an allowance of 25 per cent over the lesser variant was allowed. This revealed certain anomalies in rate per route km as discussed below:

- A comparison of per km rate as per sanctioned estimates in respect of construction of third line sanctioned during the same period on RVNL and Railways revealed that per unit rate was higher on RVNL resulting in additional financial liability to the extent of ₹73.43 crore.

Rly	Name of the work being executed by RVNL	Month & Year of sanction of Detailed Estimate	Rate per km (RVNL)	Month & Year of sanction of Detailed Estimate. (Zonal Rly/ Name of the similar work)	Rate per km of similar work as per sanctioned estimate of zonal railway (after increasing by 25%)	Difference in rate per km	Extra Liability (₹)
SER	Goelkera-Manoharpur 3rd line (Route-A) HDN-2	July 2009	9.52	Sep 2009/SCR/ RGPM-MMZ (Triple Line)(Route-A) HDN-5	6.85	2.67	73.43

- A comparison of per km rate as per sanctioned estimates in respect of construction of fourth lines by RVNL was higher as compared to that sanctioned subsequently by RVNL. The extra liability on account of the above worked out to ₹11.09 crore.

Rly	Name of the work being executed by RVNL	Month & Year of sanction of Detailed Estimate	Rate per km as per sanctioned estimate of RVNL	Month & Year of sanction of Detailed Estimate by RVNL for similar work. (Name of the work)	Rate per km of similar work as per sanctioned estimate (after increasing by 25%)	Difference in rate per km	Extra Liability (₹)
SER	Santragachi-Tikiapara 4th line (Route-A) HDN-2	February 2006	8.36	2008-09/SR/ Tiruvallur - Arakkonam -4th line (Route-A) HDN-7	6.38	1.98	11.09

- A comparison of rate per unit for similar works being executed on same/different zones and sanctioned during the same period indicated that rate per unit was higher in 11 works even after adding 25 per cent for different site conditions. The additional financial liability on different Zones worked out to ₹ 87.38 crore. **(Annexure XIV)**

- In the case of four identical works, the rates sanctioned on a Railway were higher in comparison to those sanctioned on the adjacent sections of same or different Railway during subsequent period. The additional financial liability on this account worked out to ₹71.51 crore. **(Annexure XV)**

The above anomalies in rate estimates has highlighted the relevance of setting up proper benchmark estimates for different categories of works that can be adopted across zones with allowances for site conditions.

2.9 Inclusion of stores items in works contracts at higher rates

While works contracts result in savings of procurement costs on account of miscellaneous items, it is also pertinent that when a large number of similar works are taken up, it is reasonable to adopt bulk procurement mode in the interests of economy. In fact, this issue could also have been effectively dealt with by a co-ordination mechanism had once been constituted. On a comparative analysis of rates of identical stores items included in Works Contracts (52 Nos.) with that of Stores Contracts, it was revealed that the Works Contract rates were considerably higher. In 12 cases (with extra liability of ₹5 lakhs and above each), the avoidable additional expenditure due to inclusion of stores items in works contracts worked out to ₹1.69 crore. **(Annexure XVI)**

2.10 Delays in land acquisition

Land is a critical component of a railway project. The status of availability of Railway land for a project is ascertained from the Land Registers being maintained in each Division of the Zonal Railway. Proper and updated Land Registers help the Railway Administration in carrying correct assessment of land requirement for execution of works. As land acquisition is a long lead item, additional land requirements need to be timely assessed and action initiated in co-ordination with the State Government.

Audit observed (2012-13) that additional land requirements for the line capacity augmentation works were necessitated in 22 out of 162 cases (13 per cent). However, in 19 of these cases (SECR-3, CR-5, SWR-6, WCR-1, SR-3 and SCR-1) Railway Administration were not able to assess actual land availability with them for lack of maintenance / updated Land Registers. There were delays in initiation of land acquisition process by the administration in respect of ten selected works which ranged from three months to 36 months. In respect of six cases of completed acquisition the time taken ranged between 12 months and 56 months. **(Annexure XVII)**

2.11 Impact on Capacity Utilisation - Charted Line Capacity and Percentage Utilization

Charted line capacity of a section is the optimum number of trains that could be run on a section in a day after giving allowance for maintenance block and utilisation of line capacity is expressed in terms of percentage of trains with reference to charted capacity. It was a significant objective of capacity augmentation works to improve line utilisation by creating additional capacity on High Density Network.

An analysis of Charted Line Capacity and Percentage Utilization of the 113 sections on HDN 2, 5 & 7 routes for 2011-12 with reference to that of 2007-08 revealed that Line capacity had increased in 60 sections and remained the same in 43 sections. It declined in 10 sections for no logical reasons on record. The percentage utilization had increased in 82 sections, declined in 30 sections and remained the same in one section. Further, increase in percentage utilization in 82 sections despite line capacity enhancement in 60 sections clearly indicated that the works planned fell short of desired levels and /or the data used in the Blue Print was not properly validated.

On comparison of the Charted Line Capacity and Percentage Utilization for 2011-12 with that projected in the Blue Print for 2010-11, it was observed that out of 113 sections, the growth in Line capacity was less than the projected growth in 58 sections and percentage utilization had outstripped the targets in 79 sections. However in 34 sections, growth in charted line capacity exceeded the projected growth with percentage utilisation less in 32 sections. The reasons for non achievement of projected charted line capacity in 58 sections could be attributed to non completion of many line capacity augmentation works. Further the fact that 79 sections had increased percentage utilisation with reference to projections indicated that the Blueprint had not correctly captured the ground data. **(Annexure XVIII)**

2.12 Conclusion

The ambitious objective of Eleventh Five Year Plan (2007-12) to complete the identified capacity creation over HDN routes for meeting mid-term and long term projected growth of both passenger and freight traffic within the plan period remained unfulfilled largely due to lack of commitment towards augmentation and non-adoption of an integrated approach in planning and implementation of the capacity augmentation works. There was lack of effective initiatives at Railway Board level for identification, planning and funding for line capacity augmentation works on HDN routes. Lack of co-ordination between Railway Board, Zonal Railways and RVNL delayed implementation of work and resulted in their uneven progress in various route segments. This resulted in huge time and cost over runs. The overall cost effectiveness was also undermined by substantial rate variations across different zones for the comparable time periods.

2.13 Recommendations

- Railway Board needs to institutionalize an effective system of monitoring and co-ordination under the oversight of Railway Board to look into the implementation of the HDN works by the Zonal Railways and RVNL.
- In order to enhance the line capacity and provide safe operation of trains, Railway Board may reconsider their policy (2005) for installation of Automatic Block Signalling (ABS) on sub-urban sections only.