Chapter 3 – 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.

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

At Zonal level the department is headed by Principal Chief Engineer (PCE) who is assisted by various chief engineers for track, bridge, 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 4-7 Divisions each with an average track length of about 1000 km and staff strength of about 15000 headed overall by 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 total expenditure of the Civil Engineering Department during the year 2010-11 was ₹20182 crore. During the year, apart from regular audit of vouchers and tenders etc., 1156 offices of Civil Engineering including Construction Organization of the Railway were inspected by Audit.

This chapter includes the following three thematic studies conducted across all Zonal Railways :–

- **Commercial Utilization of Surplus Railway Land' in Indian Railways** - Despite the concerns expressed by the PAC, the performance of the Indian Railways in safeguarding its title to land and ensuring proper maintenance of land records continued to remain unsatisfactory. Though in a number of cases Railway land was allowed to be occupied by the PSUs/other Government Department and private parties, Zonal Railways had failed to take effective action to execute license agreements and recover the license fee from the licensees.
- **Civil Engineering Workshops in Indian Railways**- Audit observed that the objectives of setting up Civil Engineering Workshops to help Railways in meeting their demand of essential components required for day to day

maintenance of tracks and manufacture of girders for bridges etc. had not been fully met due to lack of clear strategic direction.

- **Safety works – Level Crossings, Road Over Bridges and Road Under Bridges** - The objective of improving safety in IR by elimination of level crossings had met with limited success largely due to inadequate commitment to implementation of policy that resulted in constant gross under-utilisation of funds both in level crossings and ROB/RUBs. Railways' efforts in co-ordinating with state government for successful completion of ROB/RUBs were inadequate.

  Besides the thematic studies, cases of irregularities have been highlighted:-

  - Avoidable loss of ₹284.20 crore due to delay in completion of bridge
  - Avoidable expenditure of ₹13.64 crore in strengthening of old bridge in lieu of rebuilding

3.1 Commercial Utilization of Surplus Railway Land in Indian Railways

Executive Summary

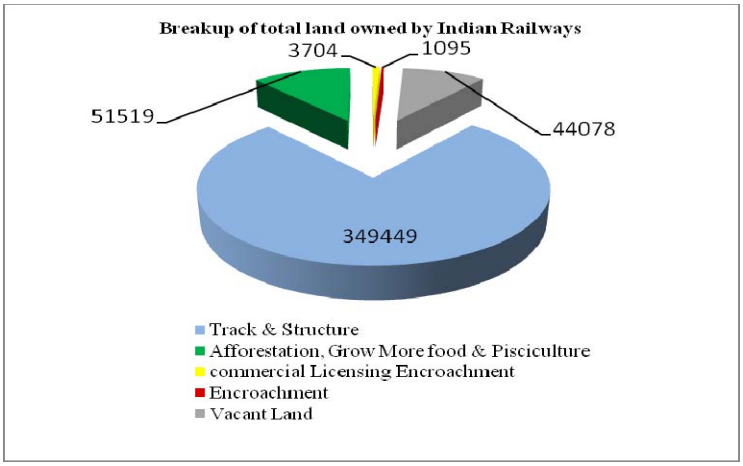
Public Accounts Committee (PAC) had in the recent past deliberated on the issues raised in the performance audit on 'Land Management in Indian Railways' (Report No. 8 of 2008) and observed that mere reiteration of instructions to the Zonal Railways for maintenance of proper records of land and processing of the licensing/ leasing only after the parties had signed the draft lease/ license agreements was not sufficient. The Committee had, therefore, recommended that Railways should set a time frame for executing/ renewal of agreements and ensure that the license fee in respect of land licensed to private parties, departments and Public Sector Undertakings (PSUs) should be calculated on the market value of land and recovered accordingly.

The present study was, therefore, undertaken across the Indian Railway to evaluate the implementation of policy framed by the Railway Board in commercial exploitation of it surplus land as well as recommendations of the PAC.

Audit found that the compliance by the Zonal Authorities in proper maintenance of land records, safeguarding the title of its land and execution of agreements with the licensees continued to be unsatisfactory. As a result an amount of ₹823 crore was outstanding for recovery on account of license fee. Further, the progress of identification of vacant land for commercial exploitation by the Railways and developing the same for commercial use was also tardy as only approximately three percent of the total vacant land had so far been handed over to Rail Land Development Authority (RLDA) set up in 2006.

3.1.1 Introduction

Indian Railways (IR) requires land for laying of tracks, construction of yards, station buildings, platforms, setting of workshops, repair and maintenance facilities and housing colonies for its staff. As on March 2011, Indian Railway's total holding of land was 449827 hectares. The break-up of usage of this land was as follows:



Out of the total land of 449827 hectare, only 3,704 hectare (0.82 per cent) was licensed for commercial purposes including sidings and 44,078 hectare (9.80 per cent) was lying vacant. Though a major portion of the vacant land was meant for Railway's own development works such as doubling, gauge conversion, yard re-modeling and traffic facility works, freight corridors as well as for setting up infrastructural works etc., there was surplus land available for commercial development. The Ninth five year Plan envisaged commercial utilization of vacant Railway land to tap additional revenue from non-tariff measures.

(Annexure XXVI)

3.1.2 Organizational Structure

The responsibility of laying down the policy and framing the rules and regulations with regard to licensing/ leasing of Railway land for commercial purpose, rests with the 'Land Management and Amenities Directorate' of the Railway Board functioning under the overall supervision of the Member Engineering. At the Zonal Railways level, the Principal Chief Engineer functioning under the General Manager is the implementing and coordinating authority for various policies/ orders issued by the Railway Board from time to time. The actual execution of instructions/ directives at Divisional level is ensured by the Senior Divisional Engineer who functions under Divisional Railway Manager.

3.1.3 Audit Objectives

Public Accounts Committee (PAC) had in the recent past deliberated on the issues raised in the performance audit on 'Land Management in Indian Railways' (Report No. 8 of 2008) and observed that mere reiteration of instructions to the Zonal Railways for maintenance of proper records of land and processing of the licensing/ leasing only after the parties had signed the draft lease/ license agreements was not sufficient. The Committee had, therefore, recommended that Railways should set a time frame for executing/ renewal of agreements and ensure that the license fee in respect of land licensed to private parties, departments and Public Sector Undertakings (PSUs) should be calculated on the market value of land and recovered accordingly. They also recommended that all cases of leasing/ licensing, fixation and recovery of license fee be monitored

regularly at Board's level and all other charges be levied wherever applicable on uniform basis.

Audit conducted the review to evaluate the quality of compliance of the policies and regulations issued from time to time in regard to the following:

- Progress on commercial utilization of surplus Railway land
- Execution of agreements in respect of land licensed to PSUs, other Government Departments and private parties.
- Recovery of license/lease charges.
- Safeguard of land records and titles.

3.1.4 Audit scope and methodology

This study was conducted covering the cases of licensing/leasing of Railway land to PSUs, Government departments and other private parties including the cases finalized by Rail Land Development Authority (RLDA) for developing Railway land for commercial use and for development of Multi Functional Complexes (MFCs). The study also included the examination of all the relevant records/documents/information available with the Zonal Railways Headquarters as well as with their Divisional offices. The study covered the period from 2006-07 to 2010-11. Besides, the old disputed cases of licensing involving non-payment/under payment of license fee were also examined.

3.1.5 Audit findings

3.1.5.1 Commercial exploitation of surplus Railway land

Railway Reforms Committee in their report issued in (1982), had recommended that to prevent encroachment on Railway land and to augment Railway's resources, the existing land management organization be strengthened and a separate Railway Land Development Authority (RLDA) should be set up for exploitation and management of valuable Railway land in metropolitan cities/major towns for commercial utilization and other revenue earning activities. Railway Board while accepting the recommendation (1984) had stated that till a suitable organization of management of land was set up, all temporary licensing of land to private individuals not connected with Railway working may be stopped. These instructions were modified in March 1989 to the extent that temporary licensing of land may be permitted for providing shops in areas where adequate shopping facilities nearby Railway colonies were not available. In such cases licensing was to be done by adopting the method of auction or tendering.

In March 2001, Railway Board had issued comprehensive guidelines for identification of surplus Railway land for setting up shopping complex in Railway colonies or at Railway stations. Subsequently Rail Land Development Authority was set up in October 2006 with the objective of undertaking the commercial development of vacant land to generate revenue. In 2009, RLDA was also given the responsibility of developing Multi Functional Complexes (MFCs) through Public Private Partnership (PPP) mode.

Audit noticed that out of total available vacant land of 44078 hectare, Zonal Railways had identified 1549.07 hectare of land for commercial development till

March 2011. This land comprising 138 sites measuring 1526.58 hectare and 137 sites measuring 22.49 hectare were progressively entrusted to RLDA for commercial development and setting up MFCs, respectively. (Table Below)

Detail of plots identified as surplus and handed over to RLDA				
Railway	**Number/area of plots handed over to RLDA for commercial and other purposes**		**Number/area of plots handed over to RLDA for developing MFC**	
	No.	**Area (in hectare)**	**No.**	**Area (in M^2)**
CR	1	0.8	7	13882.95
ECR	2	1.77	4	8225.00
E. Coast	2	1.75	7	9757.10
ER	6	20.71	19	25535.00
METRO	18	4.4455	0	0.00
NCR	3	36.55	4	6979.00
NER	4	72.47	4	7210.00
NFR	27	185.81	10	12239.00
NWR	3	0.93	5	6124.00
NR	14	70.2299	13	28333.30
SCR	18	37.3138	10	11550.00
SECR	5	424.087	4	6231.26
SER	3	2.67	10	32186.00
SR	9	9.0387	18	23397.00
SWR	2	2.72	7	2200.00
WR	21	655.2883	9	13214.00
WCR	0	0	6	17836.75
Total	**138**	**1526.5832**	**137**	**224900.36 or 22.49 ha**

Further status of these sites was as under:

- In respect of 133 plots, action for inviting bids, conducting survey of sites and submission of reports was being initiated.
- Out of five remaining sites, RLDA had already entered into lease with three developers and signed development agreements in respect of three plots of land over East Central (1), North Central (1) and South Western (1) with the developers who were found successful in bidding. An amount of ₹37.04 crore on account of lease charges was realized (March 2011); and
- In respect of two plots one each on Northern and South Central Railways, though the letters of acceptance were issued in November 2010 and April 2007 respectively, the developer agreements were yet to be signed. Lease charges of ₹317.63 crore there of had been realized.

As regards handing over the 137 plots for developing Multi Functional Complexes, so far (March 2011) only three developers had been identified in

respect of Northern, North Central and East Coast Railways and an amount of ₹3.33 crore was realized in respect of two sites of Northern and North Central Railways. In regard to remaining 134 sites (Table below) a majority were under evaluation by RLDA.

S.No.	Proposed Action/Status	No. of sites
1	Letter of Acceptance issued	**2**
2.	Bids being invited	**2**
3.	Land handed over to RITES by RLDA for taking up development	**20**
4.	Land handed over to IRCON by RLDA for development of MFC	**24**
5.	MFC being developed by RVNL	**2**
6.	To be developed by RLDA – evaluation and inspection of sites under process	**84**
	TOTAL	**134**

3.1.5.2 Irregularities in licensing/leasing of railway land

As of March 2011, approximately 3704 hectare of land i.e. less than one percent of total holding of Indian Railways was covered under commercial licensing. This land was in use by various Oil companies, PSUs (CONCOR, IRCTC, CWC, etc.) and private parties for steel yards, private railway sidings etc. As per the existing instructions, Railway land should be licensed after execution of proper agreements and recovery of license fee. Railway Board had also issued directions from time to time for the regulation of fixation of license fee. The Public Accounts Committee of Parliament (November 1982) had also stressed the need for strict compliance of rules regarding licensing of land.

Audit examination of the records available with the Zonal Railway Administrations revealed a general state of weak compliance of the instructions issued by the Railway Board and as a result an amount of ₹823.13 crore was outstanding for recovery on various grounds as discussed in the following paragraphs:

(Annexure XXVII)

Status of execution of agreements

Audit noticed that as on 31 March 2011, out of 30,884 cases of licensing of Railway land, agreements were available only in 9654 (31 per cent) cases. In 21237 cases (69 per cent) Zonal Railways had either not executed the agreements or the same were not available with them. While in Northeast Frontier Railway, agreements were not available/executed in 98 per cent cases, the other major defaulter Railways where agreements were not available/executed in more than 50 per cent cases were South Eastern (87 per cent), East Central (84 per cent), East Coast (64 per cent), Western (66 per cent), South Western (62 per cent), Northern (60 per cent), South Central (60 per cent), North Eastern (57 per cent) and North Central (54 per cent). Audit also observed that though in 73 cases out of a total of 4816, the agreements had become overdue for renewal for more than a year, Zonal Railways had not renewed them (Table below).

Railway	No of cases become due for renewal	No of cases out of Col.2 which were due for more than one year up to two years	No of cases out of Col.2 which were due for more than two year upto three years	No of cases out of Col.2 which were due for more than three year up to 60 years
CR	4	-	-	4
NFR	11	6	-	2
NR	114	2	-	44
SCR	68	-	1	-
SECR	1047	2	-	5
SWR	1	1	-	-
RPU (DLW-BSB)	696	1	-	5
TOTAL		12	1	60

In 743 cases date of expiry of agreements was not available.

(Annexure XXVIII)

Non-recovery/short-recovery of license fee

Railway Board had rationalized the guidelines for commercial licensing of Railway land. As per directives issued in (September 1985), the license fee was to be fixed on fixed percentage of the market value of Railway land as on 1 April 1985 as mentioned in the records of revenue authority. The market value so obtained was to be enhanced by ten per cent every year for subsequent revisions that were to take place after every five years. These orders were to be made effective from 1 April 1986. As these instructions were not implemented partly owing to inordinate delay in obtaining market value of land from revenue authorities and partly due to steep increase in the license fee on account of unrealistic land value adopted, Railway Board revised these instructions (August 1995) and directed the Zonal Railways to implement the same from a retrospective date (1 April 1986). After a gap of ten years (June 2005), Railway Board again clarified that license fee for the period prior to April 1995 would be recovered on the basis of orders of September 1985 and for the period from April 1995 to March 2004 on the basis of orders of August 1995. Thereafter the license fee was to be recovered at the rates notified in March 2004.

The repeated revision and clarifications by Railway Board thus indicated a weak and inconsistent approach that resulted in ineffective implementation across the Zonal Railways. Further analysis of the outstanding license fee revealed as under:

- Out of 30,884 cases of licensees across Indian Railways only 2919 (9.45 per cent) licensees had fully paid their dues.
- None of the 6988 licensees over North Eastern Railway had paid their dues ₹17.57 crore.
- While in Eastern, South Central, South Western and West Central Railways, more than 60 per cent licensees had fully paid their dues, the number of licensees who had paid partial dues was more than 90 per cent in East Coast (97.92 per cent), East Central (97.06 per cent), South Eastern (95.29 per cent) and Railway Production Units (DLW-BSB) (93.90 per cent).

- In Northern Railway, 98 out of 302 licensees had paid their dues only partially and the amount outstanding from them was ₹508.82 crore which constituted 68.82 per cent of total outstanding of the Indian Railways on this account.

The reasons for non-payment of license fees by the licensees were attributed to disputed areas dues recoverable, pending court cases, non-availability of records, non-execution of agreements, delay in preferring license fee bills and in their effective pursuance.

The above factors also contributed to non-raising of bills in respect of another 356 licensees.

Under billing of license fee

As per Railway Board's instructions of April 2004, the minimum license fee in respect of commercial plots should be ₹1000 per annum per 100 sqm or part thereof. Test check of records, however, revealed that these instructions were not followed which led to under billing and consequent short recovery of license fees of ₹2.95 crore. (Table below)

Sl.. No.	Name of Railway	Period	No. of licensee	Amount of short recovery (₹in crore)
1.	CR	2004-05 to 2009-10	10	0.64
2.	ECoR		210	0.30
3.	WR		67	2.05
Total			**287**	**2.95**

Non-depositing of earnings received from renting of vacant grounds, community hall and sports grounds etc. in Railways account

Indian Railway provides club houses for the exclusive use of its officers, other structures for the benefit of other Railway staff and where convenient, Railway premises are also provided to Consumer Co-operative Societies, Staff Welfare Organizations payment of nominal rent.

In terms of Railway Board's order(March 1987), temporary licensing of Railway land for conducting exhibitions, melas, carnivals, circus shows and such other cultural activities including temporary shops on festive occasions was permitted for three months with the specific approval of General Managers of Zonal Railways. The recovery of license fee was to be fixed at 20 per cent of the market value of the land. In April 2004, Divisional Railway Managers were also permitted to grant permission for temporary licensing of Railway land to hold non-commercial functions up to a maximum of three days. As per instructions of the Railway Board (October 2006), Club/Institute were permitted to grant permission for use of Railway premises to private individuals for private purposes and not for commercial interests/gains.

Audit scrutiny revealed that Zonal Railways had entrusted the management of vacant grounds, community halls, sports ground etc. to the Railway Club Management, Railway Women's Welfare Organizations and Railway Sports Institutes. Though these clubs/institutes/welfare organizations were renting these premises to private bodies for holding functions such as marriages, carnivals,

commercial shows and sports events, the earnings from such events were retained by the organizers. Audit observed that out of total of ₹ 8.95 crore earned by the institutes during 2006-07 to 2010-11, only an amount of earnings (₹0.45 crore) were deposited by the club/institutes of Central, East Central, North Eastern, Northeast Frontier, South Central, and West Central Railways.

(Annexure XXIX)

Use of land by the licensees for the purpose other than that for which it was licensed

As per extant instructions, Railway land should neither be used for the purpose other than that for which it was licensed nor sub leased to any other party without prior permission of the Railways. Scrutiny of the records relating to licensing of land revealed that on North Western, Northeast Frontier and Southern Railways Railway land was sub-leased to third parties by the licensees as given below:

- Land measuring 11241M^2 was made over (1990) to Oil and Natural Gas Commission for laying of pipeline without execution of proper agreement. Audit noticed that after the transportation of the crude oil was stopped, ONGC had handed over this land (March 1996) to Bharat Petroleum Corporation Ltd without the knowledge of the Zonal Railway. When the matter was reported (Para 4.3.3 of Report No.6 of 2006), Railway Board had stated that fresh instructions had been issued in January 2005 to ensure that no land be handed over without execution of proper agreement. Railway had neither recovered the licence fee (₹4.30 crore) nor taken any action to retrieve their land.
- Railway land measuring 57996.6 square feet (5388.06 M^2) was leased to Railwaymen's Consumer Cooperative Association Limited (RCCAL), Ajmer on payment of nominal licence fee of ₹182 per annum. Railway Administration noticed (1989) that the RCCAL had subleased part of this land to private parties. Though the matter was brought to the notice of Railway Board, they merely directed the Zonal Railway to enter into fresh agreement. Audit noticed that Zonal Railway continued to prefer bills at the rates agreed in 1925 without compliance of the instructions issued by Railway Board in 1985 and further revised in 1995. Though Zonal Railway had terminated the lease agreement in August 2006 and asked the Association to vacate the land, the party instead of vacating the land had sought intervention from court. Thus the indifferent approach of the Railway to safeguard its valuable assets, not only resulted in non-recovery of legitimate license fee but the retrieval of own land was also in doubt.
- A piece of land measuring 2 Acre (8097 M^2) was leased to a private individual under Grow More Food scheme in 1971-72. Though the party concerned had opened a restaurant since February 2011, Railway Administration had neither taken action to take back the land nor revised the lease agreement for fixation of license fee as per actual use of the land.

(Annexure XXX)

Targets for earnings from commercial exploitation of Railways vacant land

Railway Board fixes the targets for 'sundry earnings' every year for each Zonal Railway. These also include the targets for earnings from commercial exploitation of Railway land. Audit examined the performance in terms of average of actual earning realized via-a-vis average target fixed for the 5 year period (2006-07 to 2010-11) (Table below).

Railway	Target fixed for earnings (₹ in crore) (average of five years 2006-07 to 2010-11)	Actual earnings (₹ in crore)	Percentage achieved
NR	112.00	145.19	129.63
WR	41.95	43.56	103.84
E Coast	21.00	24.78	118.00
SECR	10.30	11.48	111.46
CR	49.20	25.95	52.74
ECR	0.21	0.18	85.71
ER	24.20	15.83	65.41
NER	21.60	21.16	97.96
NWR	42.50	38.58	91.75
NFR	24.60	25.74	104.63
SCR	0.34	0.33	97.06
SER	24.33	23.57	97.62
RPU (DLW)	0.39	0.23	58.97
SWR	Not Fixed	192.06	
SR	Not Fixed	7.30	
NCR	Not Fixed	21.24	
WCR	Not Fixed	69.36	

While Northern, Western, East Coast and South East Central Railways had exceeded their targets, the five Zonal Railways had fallen short by more than 15 percent. In four Zonal Railway viz. South Western, Southern, North Central and West Central targets for earnings from commercial licensing were not fixed and as such their performance could not be assessed. The reasons for shortfall were not made available to audit.

3.1.5.3 Custody of Railway land

As per para 1004 of the Indian Railway Code for Engineering Department, Railway Administration is responsible for preserving unimpaired title of its land and keep the same free from encroachments. Audit noticed that Zonal Railways and field offices responsible for upkeep of safe custody of its land free from encroachments by maintaining proper records had not performed their duties diligently as discussed in the ensuing paragraphs.

Maintenance of Land Records

Rules provide that basic land records such as Land Record register, Land Boundary Verification register and Encroachment Inspection registers should be maintained in the office of the Chief Engineers, Divisional/Executive Engineers etc of Zonal Railways. Railway Board had directed all Zonal Railway (December 1982) to ensure that up-to-date land plans were available in the Divisional Offices and copies of the same should also be made available to the

field inspectors. Moreover, field inspectors were required to inspect their land regularly to guard against encroachment. Where necessary, boundary walls were to be constructed.

Audit noticed that while basic land records were not being maintained in East Coast and Eastern Railways, in, East Central, North Eastern, North Western, Northeast Frontier, Northern, South Central, South East Central, South Western, Southern, West Central (Except for Bhopal Division) and Western Railway records were maintained only at the sub-divisional level. In Central Railway, 13 Land Record Registers were maintained at Headquarters and 124 Land Boundary Verification Register were maintained at divisional level. The position regarding maintenance of records could not be ascertained in respect of North Central, South Eastern and Railway Production Units and Metro Railways as the same were not produced before audit.

The lack of care and diligence towards maintenance of basis records of title was injurious to Railway's interests resulting in disputed claims, encroachments, non/ short recovery of license fee, non-preferment of bills, non-up-gradation of license agreements, etc.

Further, Zonal Railways should have Land Plans of all the lands in their possession duly authenticated by the respective State Revenue Authorities. Audit Scrutiny of records revealed that no proper action had been taken by the Zonal Railways to get the land plans authenticated from State Revenue Authorities. However, in NR alone, out of 5232 land plans, 4013 land plans (76 per cent) had been got authenticated. Failure to verify the land title resulted in disputed claims with third parties on encroached land in a number of cases.

3.1.6 Conclusion

Despite the concerns expressed by the PAC, the performance of the Indian Railways in safeguarding its title to land and ensuring proper maintenance of land records continued to remain unsatisfactory. Though in a number of cases Railway land was allowed to be occupied by the PSUs/other Government Department and private parties, Zonal Railways had failed to take effective action to execute license agreements and recover the license fee from the licensees. In addition, the surplus land identified for commercial exploitation and vested with RLDA by and large remained vacant due to slow progress in planning.

Recommendations

- *PAC's recommendation (Report No. 16 of 2009-10) to evolve a staggered time frame for execution of agreements with licensees, maintenance of proper and accurate records of land needs to be acted upon on priority. The Zonal authorities also need to initiate a special drive to recover outstanding license fees as per the Railway Board's directives.*

The matter was brought to the notice of Railway Board (December 2011); their reply had not been received (January 2012).

3.2 Civil Engineering Workshops in Indian Railways

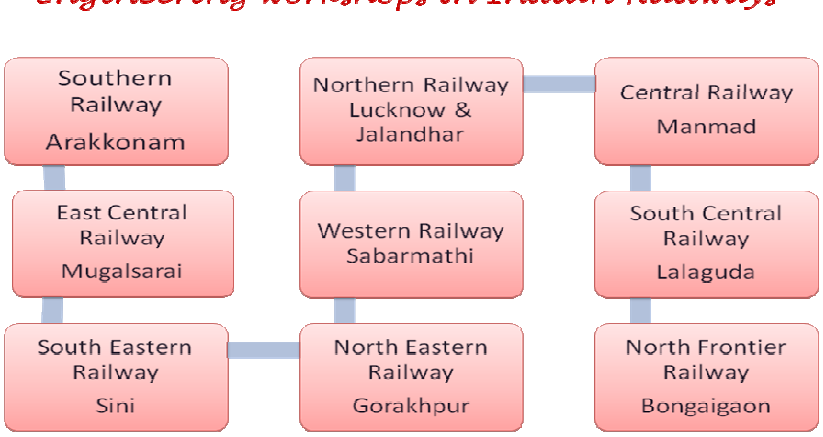
Executive Summary

Civil Engineering Workshops (CEWs) manufacture bridge girders, track components, Platform shelters, foot over bridges and various components to meet the internal demands of Indian Railways. There are ten CEWs on Indian Railways functioning since long. The XI Five year Plan had envisaged a critical role for the workshops considering the anticipated increased demand for fabricated steel structures for strengthening existing bridges to make them fit for running of heavier axle load trains and construction of new bridges on the proposed Dedicated Freight Corridors.

Audit reviewed the performance of all the ten CEWs to assess whether these were equipped to meet the challenge. Audit observed that modernization efforts were meagre and CEWs were being run with old machines and were in need of technological up-gradation. Production planning of the workshops was generally deficient resulting in underutilization of capacity and uneconomical operations. The unit costs of manufacture of Girders, Glued Joints etc were on the higher side when compared to the cost of the same from trade. Inter-workshop cost comparisons revealed large inter-se variations, however, lack of data/records on costing and effective cost control measures hampered the analysis of performance efficiency.

3.2.1 Introduction

The Civil Engineering Workshops (CEWs) manufacture and supply track components, bridge girders and various other items such as Platform Shelters, Push/Motor Trolleys, Lifting Barrier Gates, Gate Locks, etc. There are ten Civil Engineering Workshops on Indian Railways.



The report of the Working Group on Railway Programmes for eleventh five year plan (2007-2012), envisaged a major increase in the requirement of fabricated steel structures on account of rebuilding/ re-girdering of many existing bridges to make them fit for running of heavier axle load trains and construction of new bridges on the proposed Dedicated Freight Corridors. As a result, the magnitude

of the steel fabrication works to be undertaken by the CEWs was to increase substantially.

3.2.2 General profile of the workshops

Most of the CEWs on Indian Railways are very old and require technology and equipment up-gradation, as no major modernization efforts were implemented during the last 30- 40 years.

Workshop	Year of setting up
Arakkonam (SR)	1900
Manmad (CR)	1906
Sini (SER)	1923
Mughalsarai (ECR)	1929
Gorakhpur (NER)	1947
Jallandhar (NR)	1949
Bongaigaon (NFR)	1950
Lucknow (NR)	1955
Sabarmati (WR)	1958
Lallaguda (SCR)	1964

3.2.2.1 Average out turn

As the product mix of each Workshop varies, the outturn of each Workshop is evaluated based on equated unit (EU) with reference to the labour cost of production of one metric tonne of standard riveted plate girder. The EU thus arrived at is adopted for all the items fabricated in the Workshop for assessing the out turn.

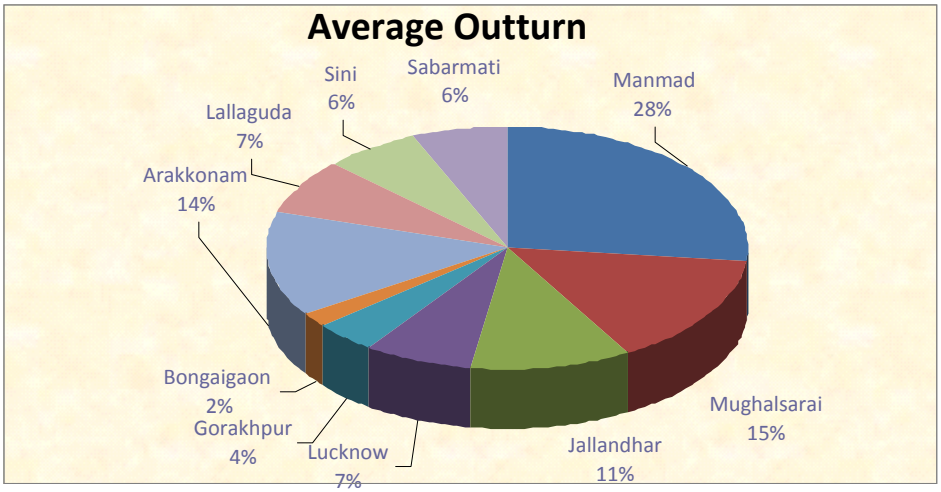
Open web girder

Shallow type girder

Switch Expansion Joint

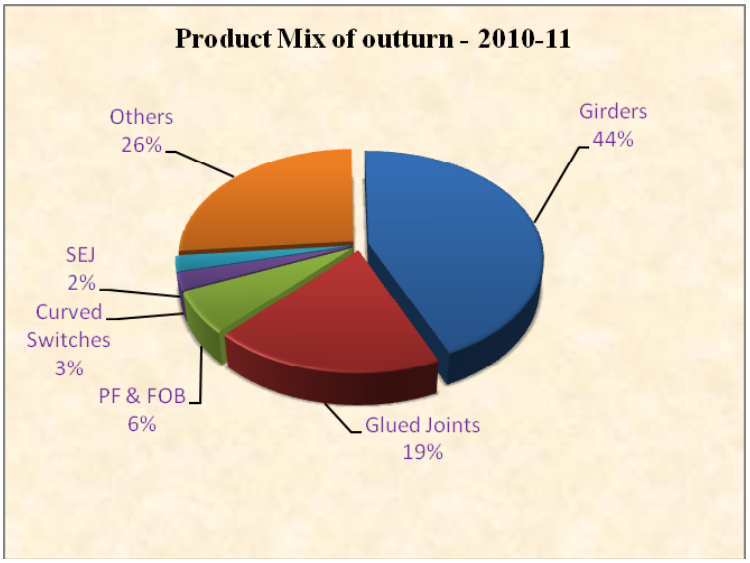
Glued Joint

The average outturn in terms of EUs of all the CEWs during 2007-08 to 2010-11 revealed significant variations, with Manmad workshop registering the maximum outturn (28 per cent) and Bongaigon at the minimum of the scale (two per cent).



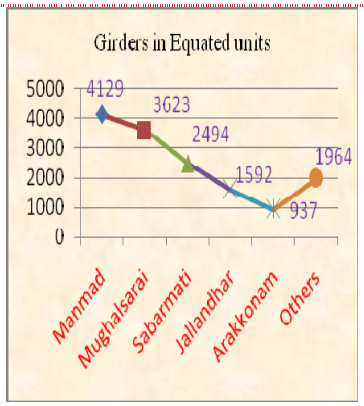
3.2.2.2 Product mix

The major products fabricated by the workshops were accounted for by girders (44 per cent) and glued joints (19 per cent). In addition, all the workshops manufactured Platform shelters, and foot over bridges.

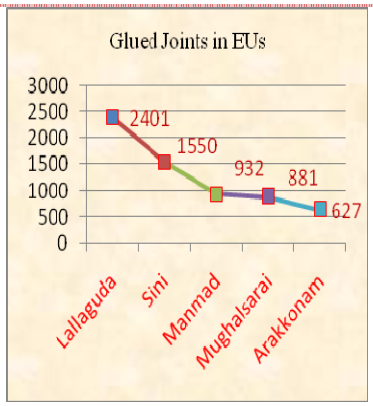


(* S E J – Switch Expansion Joints)

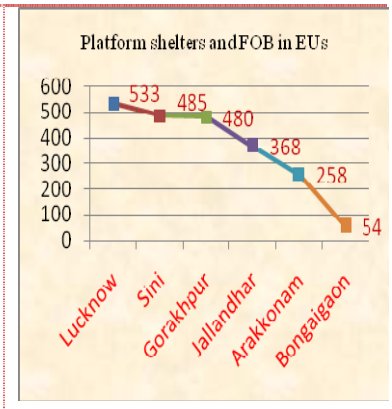
The outturn of major items viz. Girders, Glued Joints, Platform Shelters and Foot Over Bridges in all the Workshops is shown in the graph given below. It was observed that while Manmad and Mughalsarai accounted for higher production of Girders, the Lallaguda and Lucknow produced the highest quantity of Glued Joints and Platform Shelters respectively.



Girders in EU



Glued Joints 52 Kgs in EUs



Platform Shelters and FOB in EUs

3.2.3 Audit Objectives

Audit conducted a study of the working of CEWs with a view to

- Derive a reasonable assurance that CEWs are suitably equipped to meet the growing challenges/ increasing demands as envisaged by the Working Group on Railway Programmes for the eleventh Five Year Plan (2007-12).
- Assess the overall efficiency in manpower and machinery use in manufacture.
- Cost efficiencies of workshops in selected items manufactured inter se and vis-à-vis trade.

3.2.4 Audit Coverage

Audit covered the manufacturing activities of all the ten CEWs. The records available at Zonal /Divisional Headquarters /Workshops were examined for 2007-08 to 2010-11. Physical inspections of Workshops were also carried out.

3.2.5 Audit findings

3.2.5.1 Modernization of Civil Engineering Workshops

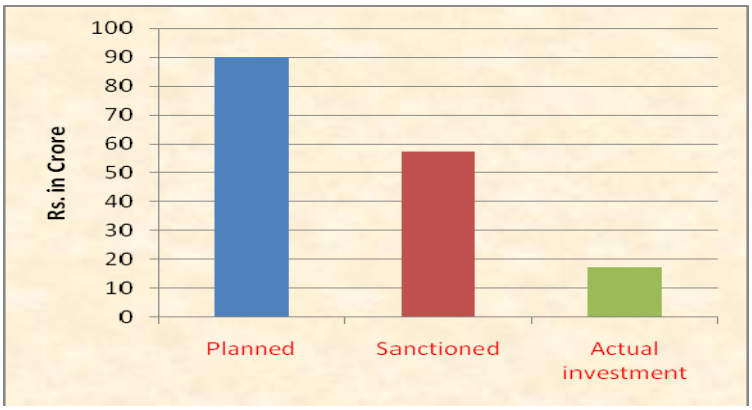
The Civil Engineering Workshops set up over more than 5 decades ago, were functioning with very old machines and required technology up-gradation. Audit observed that in all workshops, the average age profile of machines in stock ranged from 22 to 47 years (Table below) against the expected average codal life of 15 years.

Railway	Workshops	No. of machines	Average age	Range
CR	Manmad	198	25	2 months to 82 years
ECR	Mughalsarai	187	19.4	1 to 55 years
NR	Jallandhar	292	20	3 to 75 years
NR	Lucknow	55	29	4 to 51 years
NER	Gorakhpur	35	24	1 year to 56 years
NFR	Bongaigaon	19	47	2 to 87 years
SR	Arakkonam	292	33	5 to 90 years
SCR	Lallaguda	32	22	1 year to 47 years
SER	Sini	261	39	1 to 87 years
WR	Sabarmati	247	24	2 to 63 years

Almost all workshops had machines aged more than 50 years. It was estimated in 1993 itself that each CEW would be required to invest funds to the tune of ₹40 to ₹50 crore towards modernization during the next five years. Although the IXth Five Year Plan had anticipated substantial requirement for steel fabrication, a modest allocation of ₹.90 crore was earmarked for executing up-gradation works in the XI Plan. Subsequently, a seminar of CWM/CWE held in Pune in 2009 had recommended a comprehensive modernization plan to meet the anticipated demand for steel fabrication assessed at 30,000 MT as against current production level of 10,000 MT per annum. However, as of June 2011, no plan for modernization of the workshops had been prepared as envisaged.

Efforts for Modernization

A study of the efforts made by the Indian Railways (IR) to modernize the CEWs revealed that as against the Plan allocation of ₹90 crore, works worth ₹57.16 crore were sanctioned for carrying out augmentation works and procurement of machinery. However, only a sum of. ₹17.32 crore had been incurred for acquiring the new machines and augmentation of existing capacity during the period 2007-08 to 2011-12 (up to September 2011).



Procurement of Machines for Modernisation

Further, as against the sanctioned amount of ₹36.32 crore for the procurement of new machinery, only ₹10.87 crore were actually spent. Out of the bulk of the sanctioned amount for Arakkonam and Manmad Workshops i.e. ₹ 23.55 crore, only ₹9.00 crore were incurred by these two Workshops (Table below).

Summary position of Plant and Machinery procured in Engineering Workshops during 11th plan period

₹ in crore

Railway	Workshop	Latest sanctioned cost	Expenditure sanctioned during					Total
			2007-08	2008-09	2009-10	2010-11	2011-12	
CR	Manmad	0	0	0	0.73	3.26	0	3.99
ECR	Mughalsarai	0	0	0	0	0	0	0
NR	Jallandhar	0.84	0.02	0	0	0.30	0.52	0.84
	Lucknow							
NER	Gorakhpur	0.46	0.05	0.13	0.15	0.13	0	0.46
NFR	Bongaigaon	0	0	0	0	0	0	0
SR	Arakkonam	12.87	0	1.89	0.20	2.91	0	5.00
SCR	Lallaguda	0.19	0	0	0	0	0	0
SER	Sini	0.77	0	0	0.05	0.07	0	0.12
WR	Sabarmati	10.68	0	0.11	0.02	0.32	0	0.45
TOTAL		**36.32**	**0.07**	**2.13**	**1.15**	**6.99**	**0.52**	**10.86**

No new machinery was procured in Mughalsarai, Bongaigaon and Lallaguda Workshops. Jallandhar, Lucknow, Sini & Gorakhpur workshops spent less than ₹one crore during the period 2007-08 to 2011-12 for procurement of new machinery. Moreover, 31 machines sanctioned (Table below) on out of turn basis in four Workshops during 2006-07 to 2009-10 had not been procured owing to lapse of funds, delay in placing indents and finalizing indents/placing purchase orders. As a result, the up-gradation of equipments as envisaged in eleventh plan had been delayed.

Railway	Workshop	No. of machines
Central	Manmad	6
Southern	Arakkonam	19
South Eastern	Sini	1
Western	Sabarmati	5
Total		31

Execution of Augmentation works

As against the total sum of ₹20.84 crore sanctioned for the execution of augmentation works, only an amount of ₹6.45 crore was actually spent (Table below). No augmentation work was undertaken in Mughalsarai, Sini and Sabarmati Workshops. Investment on augmentation work was less than ₹ one crore in Jallandhar, Lucknow, Gorakhpur and Lalaguda Workshops.

₹ in crore

S. No.	Railway	Workshop	Latest sanctioned cost	Expenditure sanctioned during					Total
				2007-08	2008-09	2009-10	2010-11	2011-12	
1	CR	Manmad	6.30	0	0.10	1.59	0.13	0	1.82
2	ECR	Mughalsarai	0	0	0	0	0	0	0
3	NR	Jallandhar	0.91	0	0	0.20	0.10	0	0.30
4		Lucknow							
5	NER	Gorakhpur	0.48	0	0	0	0.41	0	0.41
6	NFR	Bongaigaon	6.36	0	0.22	0.50	0.43	0	1.15
7	SR	Arakkonam	4.81	0	0.34	1.13	0.80	0	2.27
8	SCR	Lallaguda	1.07	0	0	0.50	0	0	0.50
9	SER	Sini	0.91	0	0	0	0	0	0
10	WR	Sabarmati	0	0	0	0	0	0	0
Total			**20.84**	**0**	**0.66**	**3.92**	**1.87**	**0**	**6.45**

It was further noticed that:

- A work for augmentation/improvement of engineering workshop, Arakkonam was included in the works programme of 2007-08 at an estimated cost of ₹4.81 crore. Audit noticed that out of total outlay, ₹4.78 crore were meant for works such as laying of CC road, provisions of toilets, meeting room, ladies rest room, re-roofing, drains, canteen, visitor hall, hostel accommodation, lawn and provision for entrance architectural arrangements which in no way, were relevant to augmentation of capacity of the workshop. Workshop authorities had already spent ₹2.27 crore on these works.
- Augmentation work for steel bridge girder fabrication capacity of Manmad Workshop was included in pink book (2008-09) at a cost of ₹4.97 crore. However, the pace of the work was not satisfactory as only ₹ 0.59 crore was spent (Up to March 2011).

Audit also noticed that a proposal for the modernization of Arakkonam Workshop at a cost of ₹23 crore was made in December 2009 to enhance the

production capacity of the Workshop in respect of bridge girders from 50 tonne to 100 tonne per month. The proposal had not yet been sanctioned.

It was evident that the efforts to augment the production capacity of CEWs had been patchy thus far and the challenge to meet the increased demand for steel fabrication had not been effectively addressed.

3.2.5.2 Installed capacity and Production planning

Capacity of a Production Workshop determines the optimum level of production. The installed capacity of the Workshop is determined after taking into account the imbalances in different machines/ equipment in various departments/ shops/ production cost centre in the Unit/ Plant, man power and number of shifts. Determination of installed capacity is essential to help the management:

- to identify production bottleneck, imbalances, idle capacity and prepare measures for efficient use of resources
- to assess the optimum level of operations
- to allocate, apportion and absorb the costs of operations.

A key factor of production plan of a workshop is, therefore, its installed capacity that determines the optimum production levels.

Determination of installed capacity

Audit scrutiny revealed that data on installed capacity was either not available or had not been reassessed at regular intervals. It was found that in respect of four Workshops viz. Lallaguda, Sabarmati, Sini and Bongaigaon, installed capacity had never been determined. Based on Audit observations, the installed capacity of the Lallaguda Workshop was, however, fixed with effect from August 2011. In respect of five Workshops, the installed capacity had not been reassessed for a long time viz. Manmad (assessed in 1992), Gorakhpur (assessed in 1952), Lucknow, Jallandhar (assessed a decade back) and Mughalsarai (not known)**.**

Injudicious reduction of installed capacity

Audit noticed that the installed capacity of Arakkonam workshop was injudiciously reduced from 594 MT per tonne per month to 518 MT per tonne per month in 2003, citing reduced manpower and change in the demand as reasons. Though Railway Board had directed (November 2009) the workshop authorities to increase the installed capacity to meet the additional demand of steel structures, the Workshop authorities had not complied with the orders of the Board stating that the installed capacity could not be increased in the absence of additional infrastructural facilities. Audit also observed that instead of taking action for providing the required facilities, the installed capacity was further reduced to 360 MT per month without assigning any reasons and without the concurrence of the Associate Finance. The injudicious reduction of installed capacity resulted in loss of production capacity to the extent of ₹ 25.67 crore during the period 2007-08 to 2010-11.

Under-utilization of capacity

Although the Manmad Workshop of the Central Railway is the biggest CEW on Indian Railways with the estimated capacity of 13783.92 EUs per annum, there

was under-utilization of capacity during the last two years. In the year 2010-11, capacity utilization was below 50 per cent. The average utilization during the period 2007-08 to 2010-11 was 72 per cent. The reason cited for the reduced utilization was delay in augmentation of steel bridge girder fabrication capacity to suit change in design from riveted to welded structural fabrication during 2007-08. This change in design required relocation of man power to structural yard and design and development of machines to suit the new technology.

While the average utilization in two workshops over Northern Railway during the review period was over hundred per cent, the same was between 56 cent and 93 per cent in other four workshops viz. Gorakhpur (93 per cent), Mughalsarai (89 per cent), Arakkonam (80 per cent) and Bongaigaon (56 per cent). The total loss of production on account of idle capacity was estimated at ₹134 crore.

In respect of remaining three Workshops, data on installed capacity was not available and the extent of utilization of capacity could not be assessed.

(Annexures XXXI & XXXII)

The common reasons for under utilization of installed capacity attributed by the management were power failure, breakdown of machines and non-availability of raw materials etc.

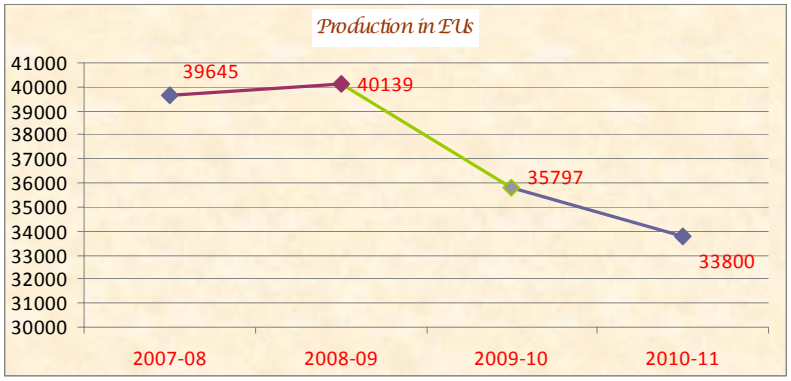
Production Planning

As mentioned above, the lack of proper assessment of installed capacity also impacted on demand assessment as evident from analysis of targets fixed and actual achievements during 2007-08 to 2010-11.

Year	Target	Achievement	Shortfall/ excess
2007-08	42597	39645	-2951
2008-09	43984	40139	-3845
2009-10	38818	35797	-3021
2010-11	41003	33800	-7204

- the total target set was not achieved in any of the years during the review period
- overall production was on declining trend

Production in Equated Units



- Outturn in Gorakhpur Workshop alone was on the increasing trend.
- The outturn was uneven in Sini, Lallaguda and Mughalsarai.
- The out turn of major contributors i.e. Manmad, Mughalsarai, and Arakkonam had reflected consistent decline, with the steepest trend occurring in respect of Manmad- from a production level of 13,582 EUs to 6486 EUs during the period. The targets were also scaled down year on year except in the case of Manmad whereby it was scaled up to 10,000 EUs in 2010-11 as compared to the previous year but the actual achievement fell below the level of the previous year (2009-10).
- During 2010-11, most of the workshops performed below the target levels with the exception of Lallaguda and Sabarmati.

(Annexure XXXIII)

The issue of production constraints was discussed during the Chief Works Managers/ Chief Works Engineers Seminar (2009) wherein it was observed that work orders were not being given by Railways to the Workshops due to time reliability problems. The Workshops could deliver finished products only 15 to 20 months after receipt of order due to long lead for procurement of raw materials and manufacture of finished products by the shops. As a remedy, it was proposed to hold production schedule meeting every half year to assess the demand and decide the production schedule for that half year. However, production schedule meetings were not held and effective follow-up steps were not taken.

It was thus evident that the shortfall in requirements was being made good through sourcing from trade in the absence of a well-planned production strategy for the workshops. The succeeding paragraphs bring out that the lack of production planning affected the performance of the workshops adversely in terms of persisting backlog of work orders and weak inventory management of both finished products as well as raw materials.

Pending Work Orders

Audit noticed that 815 work orders valuing ₹418.60 crore were not complied with for over six months as on 31st March 2011. Out of these, 328, 190, and 77 work orders were pending at Manmad, Arakkonam and Gorakhpur Workshops.

Range of pendency	Number of work orders pending
Six months to one year	102
One year to two years	134
Two years to three years	130
Three years to four years	156
Over four years	293

The oldest work order (1997) was shown as pending in Manmad Workshop. It was observed that the accumulation was mainly due to absence of a system of revalidation of work orders pending for long periods and reassessment of pending demand with reference to actual requirement. As a result, it was not ascertainable whether the pending demands were still persisting with the consignees.

Analysis of a sample of 90 pending work-orders by audit revealed that the inability of the workshops to meet the demand had not affected the production plans of the manufacturing units and therefore in all probability the work orders were outdated and needed to be reassessed. **(Annexure XXXIV)**

Non- despatch of finished products.

An analysis of the pattern of production and dispatch of finished products by Engineering Workshops indicated that finished products worth ₹52.95 crore, ₹71.36 crore, ₹132.05 crore and ₹159.18 crore were lying at Shop floors awaiting despatches at the end of March 2008, 2009, 2010 and 2011 respectively (Table below).

Railway	Workshops	Value of finished products not dispatched (₹ in crore)			
		2007-08	2008-09	2009-10	2010-11
CR	Manmad	7.17	11.14	34.33	39.93
ECR	Mughalsarai	11.85	13.04	31.41	55.75
NR	Jallandhar	19.5	17.32	18.54	13.22
NR	Lucknow	2.75	8.5	15.69	12.5
NER	Gorakhpur	3.6	9.24	15.62	16.93
NFR	Bongaigaon	3.05	6.69	7.98	11.14
SR	Arakkonam	1.1	1.62	2.46	2.45
SCR	Lallaguda	3.93	3.81	6.02	7.26
Total		**52.95**	**71.36**	**132.05**	**159.18**

The analysis further revealed that:

- The finished products valuing ₹125.83 crore were pending for despatch in four Workshops as on 31 March 2011 (Mughalsarai-₹55.75 crore, Manmad- ₹39.93 crore, Gorakhpur- ₹16.93 crore and Jallandhar-₹13.22 crore)
- Fabricated products such as Platform shelters, Foot over bridge, Foundry items etc. worth ₹2.46 crore had been lying in Arakkonam Workshop premises for over two years.
- In Gorakhpur Workshop, the finished products worth ₹1.02 crore were lying in the shop premises due to cancellation of the demand by the consignees and of this, Foot Over bridge costing Rs ₹0.63 crore had been lying since February 2006.
- In Sabarmati Workshop, semi- finished open web girder worth ₹0.34 crore manufactured for Mumbai Rail Vikas Corporation Limited (MRVCL) was lying as the work order had been cancelled subsequently.
- In Manmad Workshop, girders valuing ₹0.85 crore manufactured for use by Northern Railway had been lying since 2006.

It was observed that the consignees did not lift the finished materials despite reminders. This indicated that failure to revalidate the work order duly reassessing the demand had in all probability led to manufacture of products for which there was actually no current demand.

3.2.5.3 Inventory management

Proper inventory management is an essential aspect of production planning that involves timely planning of procurement of raw material required for manufacture. Proper inventory forecasting based on anticipated requirements reduces costs and increases efficiency in delivery. A review of inventory management practices prevailing in the CEWs of Indian Railways revealed the following:-

Inadequate inventory management

In four workshops (Gorakhpur, Lallaguda, Bongaigaon and Sini) materials were procured only on receipt of work orders. The system of assessing annual consumption requirement of items, re-order levels and economic order quantity was found to be non-existent. The out-turn of the workshops was hampered (with the exception of Lallaguda and Sabarmati workshops) due to deficient supply of silicon, pig-iron, limestone and cast iron. In Gorakhpur workshop, production in concrete shop was held up due to non-availability of special grade cement. Loss on account of idling of labour amounted to ₹3.75 crore.

Inter-workshop cost comparisons

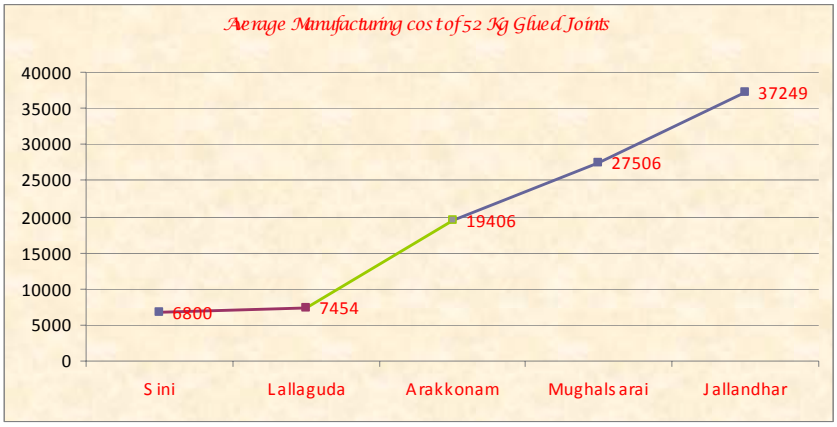
The workshops did not maintain cost sheets in respect of each job/activity as prescribed in the Railway Manual and it was found that there was no system of cost-control with pre-determined rates. No analysis had been conducted on product costs as between different workshops or efforts made to identify core competencies of each workshop.

On the basis of production out-turn and expenses booked, audit encountered wide variations in production costs of selected items studied. For instance-

- A comparison of the average manufacturing cost of glued joints among various Workshops revealed that the cost of manufacture of 52 kg glued joint was the lowest in Sini Workshop (₹6,800) and highest in Jallandhar Workshop (₹37,249).

(Annexure XXXV)

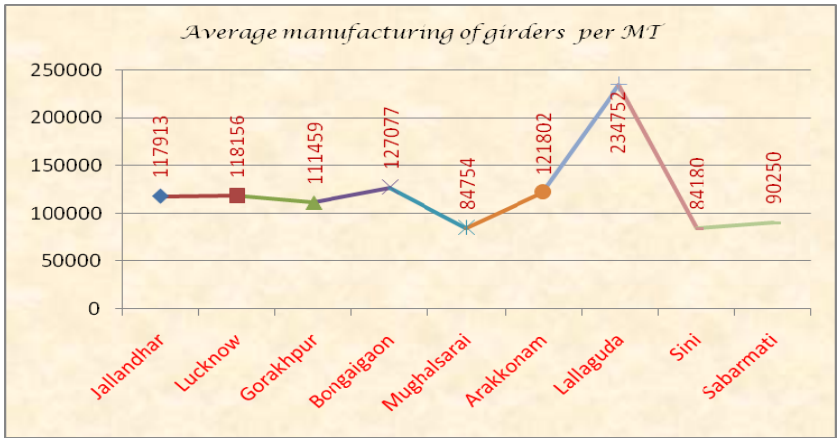
Average manufacturing cost of 52 Kg Glued Joints



- Another comparison of the average manufacturing cost of girders in nine Workshops (excluding Manmad Workshop) revealed that the average cost of manufacturing per MT of girder was lowest in Sini workshop (₹84180 per MT) and was highest in Lallaguda workshop (₹ 234752 per MT).

(Annexure XXXVI)

Average manufacturing cost of girders per MT



The major reason for high manufacturing cost, in general, was attributable to the very high direct cost of labour and on cost allocations. These on costs represented general on-costs inclusive of charges shared by more than one establishment, shop on costs denoting expenditure not attributable to a specific product and proforma on costs mainly comprising supervisory establishment expenditure.

Though none of the workshops had kept the costing data for each item produced, Audit made an attempt to identify the broad reasons for huge variation in costs of similar items among the workshops. The following table depicts the comparative analysis of average production cost of girders and glued joints as between Lallaguda, Jallandhar and Mughalsarai:

Variation in cost of same product among the workshops(2010-11)								
Name of workshop	**Unit**	**Direct Cost**		**On cost**		**Percentage of oncost**		**Total cost of product**
		Labour	**Stores**	**Labour**	**Stores**	**Labour**	**Stores**	
Welded Girders								
Lallaguda	MT	117205	27599	83455	6933	71.20	25.12	235192
Jallandhar	MT	52239	38436	22596	4642	43.26	12.08	117913
Glued Joints								
Jallandhar	No	15179	22070	7321	2221	48.23	10.06	46791
Mughalsarai	No	3805	23765	7990	266	209.99	1.12	35826

The analysis revealed that –

- While the direct labour cost for manufacture of girders at Jallandhar was ₹52239 PMT, the same was ₹117205 at Lallaguda, more than 2.24 times hihger.

- Similarly there was large variation in direct cost of material and the percentage of on costs levied to arrive at the end product cost. While the total on cost at Jallandhar was 55 per cent, the same at Lallaguda was 96 per cent.

As a result while the cost per MT of girders produced at Jallandhar was ₹ 117913/- the same at Lallaguda was ₹235192 i.e. almost double.

In respect of Glued joints also there was a huge cost variation at Jallandhar as compared to Mughalsarai as under:

- While the direct labour cost at Mughalsarai was only₹3805 per unit, the same at Jallandhar was ₹15179 i.e. almost four times higher.
- Despite the fact that Mughalsarai had levied 211 per cent on cost as compared to 58 per cent by Jallandhar, the end product cost at Jallandhar was higher by almost 25 per cent.

Manufacturing cost versus trade cost

Disproportionate direct labour costs and higher indirect cost levied as on costs coupled with outdated machines reflected in uneconomical costs as was evident from the comparative anlaysis of trade costs in respect of selected items as discussed below:

- Comparison of the manufacturing cost of glued joints and switches with those of cost of procurement from trade revealed that the cost of manufacturing in Railway owned workshop was three to five times more than the cost of same items when procured from trade. The extra cost of manufacturing glued joints and switches vis-à-vis the trade cost was assessed as ₹45.60 crore.

(Annexure XXXVII)

- The comparison of manufacturing cost of girders in Railway workshops at Jallandhar, Lucknow, Bongaigaon & Gorakhpur with that of prevailing trade cost also revealed that manufacturing cost in Railway owned workshops was higher by seven per cent in Sini (2009-10) and by three times in Lallaguda (2010-11). In other workshops also, the manufacturing cost of girders was more by 20 – 92 per cent when compared with the trade cost. The extra cost of manufacturing girders vis-à-vis the cost was assessed as ₹25.77 crore.
- By adopting the trade cost of Gorakhpur workshop for Mughalsarai, Arakkonam, Lallaguda, Sini & Sabarmati, the extra manufacturing cost for girders was assessed as ₹50.37 crore.

(**Annexure XXXVIII)**

- Audit observed that manufacture of foot over bridge was costlier than the trade cost in Gorakhpur Workshop. Extra expenditure on this account worked out to ₹3.10 crore.

3.2.5.4 Manpower productivity & Staff utilization

Man power productivity in Workshop is measured by a productivity index called average equated unit per man per month. The bench mark for productivity as fixed by the Railway Board is one equated unit (EU) per man per month. As on

31st March 2011, there were 5256 men in position in ten CEWs. A study of manpower productivity trends and incentive payments (Table below) etc revealed significant cost inefficiencies across workshops.

Railway	Workshop	Manpower as on 31st March 2011	Man power productivity			
			2007-08	2008-09	2009-10	2010-11
CR	Manmad	952	1.22	1.14	0.75	0.65
ECR	Mughalsarai	589	1.16	1.19	1.065	1.08
NR	Jallandhar	464	1.2	1.4	1.3	1
NR	Lucknow	462	1.01	1.13	1.14	1
NER	Gorakhpur	366		0.49	0.536	0.603
NFR	Bongaigaon	231	0.54	0.53	0.59	0.52
SR	Arakkonam	893	0.799	0.871	0.851	0.774
SCR	Lallaguda	218	1.03	1.37	1.1	1.33
SER	Sini	453	0.58	0.39	0.84	0.97
WR	Sabarmati	628	0.87	0.92	0.74	0.68
		5256				
Note : Bench mark for productivity as fixed by Railway Board is one equated unit per man per month						

Audit analyzed the productivity index of individual Workshops during the review period and observed that:-

- man power productivity was above the bench mark level in four Workshops (Mughalsarai, Lallaguda, Jallandhar and Lucknow)
- man power productivity was below the bench mark level in five Workshops (Bongaigaon, Sabarmati, Gorakhpur, Sini and Arakkonam
- man power productivity in Manmad Workshop declined from 1.22 (2007-08) to 0.65 (2010-11). The reason for the decline was attributed to changes in design of girder and lack of upgraded technology and machines.
- average equated unit per man per month in Sabarmati Workshop also came down to 0.68 in 2010-11 from 0.92 in 2008-09.

Though Planning Efficiency Branch (PEB) of respective Zonal Railways had conducted work studies(a tool used to assess the manpower requirements) in respect of Arakkonam, Bongaigaon, Lallaguda and Sabarmati workshops with the object of enhancing labour efficiency through establishment of independent norms, no such efforts were made in respect of Manmad, Sini, Mughalsarai and Gorakhpur Workshops.

Audit reviewed the action taken on the reports of work studies and noticed that the recommendations made by PEB were not implemented and excess posts (Table below)were operated with added financial implications.

Workshop	Particulars	2007-08	2008-09	2009-10	2010-11
Arakkonam (SR)	No. direct workers as on 31st March	837	692	664	641
	No. of EIWs	144	142	250	252
	% of EIWs to DWs	17.2	20.52	37.65	39.31
	Excess % over the norm of 15%	2.2	5.52	22.65	24.31
	No. of excess posts	18	38	150	156
(Source: PCDO , Half yearly Review of Incentive Performance by Accounts Office & Para 431 of Mechanical Code)					
Cost of excess operation of Essential Indirect Workers =		Average hours per month*hourly rate*no of posts* no of months			
		78192000	Say ₹ 7.82 crore		

- Excess posts numbering 241, 218,161 and 124 were operated in Arakkonam Workshop during 2007-08 to 2010-11 respectively. In addition, audit found that there was operation of 18, 38,150 and 156 indirect workers in excess of the prescribed norm of 15 per cent or less of the actual strength of direct workers during 2007-08 to 2010-11 respectively resulting in extra expenditure of ₹7.82 crore during the review period.
- In Jallandhar and Lucknow Workshops, two and 12 posts respectively were operated in excess of the requirement. Operation of excess posts had resulted in incurrence of avoidable extra expenditure of ₹15.56 crore during the review period,
- The work study Report (2005-06) of Sabarmati Workshop had identified 258 surplus posts. Cost of operation of the excess posts was assessed as ₹5.24 crore. Another work study Report (2007-08) carried out for assessing the work load of ministerial staff in Sabarmati Workshop recommended surrender of 17 vacant posts. The posts were yet to be surrendered.
- Based on the yard-stick prescribed in a work study (2004), the requirement of staff in Bongaigaon Workshop was reassessed in Audit and it was observed that 97 posts of skilled workers had been operated in excess of the requirement since 2003. Excess operation of posts had resulted in incurrence of extra expenditure to the tune of ₹10.23 crore during the review period
- In Lallaguda Workshop, a work study was conducted during 2009-10 and 35 vacant posts were identified as surplus with monetary value of ₹ 0.87 crore per annum.
- While there was under-utilisation of labour potential, it was also observed that OTA amounting to ₹21.73 crore was paid during the review period for all the Workshops and Sabarmati Workshop had accounted for 37 per cent of total OTA paid. Further, OTA paid in Sabarmati Workshop increased from ₹1.64 crore in 2007-08 to ₹2.15 crore in 2010-11 and payment of ₹2.58 crore during 2009-10 was the highest among all the CEWs during the review period that contrasted with the paradoxical situation of excess operation of posts as already mentioned above.

It was also observed that in Manmad workshop, the OTA payment had decreased from ₹0.71 crore in 2007-08 to ₹0.17 crore in 2010-11, but outturn also decreased from 13582 MT to 6486 MT.

In Mughalsarai Workshop, though the out-turn had not shown appreciable increase except during 2008-09, the payment of OTA increased from ₹0.80 crore in 2007-08 to ₹2.37 crore in 2009-10 and ₹1.98 crore in 2010-11.

It was noticed that system of payment of incentive bonus was prevalent only in Arakkonam Workshop. The incentive paid increased from ₹0.07 crore in 2008-09 to ₹1.27 crore in 2010-11, even though the outturn declined to 4993 equated units during 2010-11 from 5917 during 2007-08. **(Annexure XXXVII)**

3.2.5.5 Idling of Machinery and Stores

Audit observed that none of the workshops had prepared the load charts as required in terms of Para 827 of Indian Railway Code for Mechanical Department. As a result, they were not in a position to ascertain the actual requirement of Machinery and plants.

Thirty one machines costing ₹0.62 crore (Table below) had been idling in four Workshops (Mughalsarai, Lucknow, Arakkonam and Lallaguda) for over five years owing to obsolescence, want of load, want of spare parts, non erection and being in a state of repair.

Railway	Workshop	No. of machines idling	Value in crore	Reasons
ECR	Mughalsarai	13	0.19	Under process of condemnation
NR	Lucknow	9	0.12	Load not available
SR	Arakkonam	6	0.12	Load not available
SCR	Lallaguda	3	0.19	Under process of condemnation
Total		**31**	**0.62**	

As many as 125 worn out and condemned machines were lying in seven Workshops due to delay in completion of survey/auction (Table below).

Railway	Workshop	No. of machines	Reasons
CR	Manmad	7	Delay in handing over of condemed machines to Stores Department for further disposal
ECR	Mughalsarai	2	Survey completed but final disposal yet to be done
NR	Lucknow	2	Surveyed but not auctioned
NFR	Bongaigaon	6	Surveyed but not auctioned
SR	Arakkonam	16	Included in auction catelouge but not yet disposed off
SER	Sini	61	Surveyed but not auctioned
WR	Sabarmati	31	Survey completed but final disposal yet to be done. A condemned Rail re-profiling plant costing ₹5.84 crore is idling for over twenty years.
Total		**125**	

- In Sini workshop alone, 61 machines were idling for years in 'dismantled and beyond repair' condition. In Sabarmati workshop, 31 condemned machines and at Arakkonam Workshop 16 worn out machines were awaiting disposal. A condemned Rail re-profiling plant costing ₹5.84 crore had been idling for over 20 years in Sabarmati Workshop.
- It was observed that inactive items of stores valuing ₹1.83 crore had been lying idle for a period ranging from one year to twelve years and the value of over stock as on 31st March 2011 was ₹0.37 crore in five Workshops.

(Annexures XXXVIII & XXXIX)

- In Sabarmati Workshop, raw material worth ₹2.24 crore was lying on the shop floors for over two years as custody stores. Scrap material worth ₹0.40 crore had also been lying since February 2008

3.2.5.6 Weak internal controls

Effective internal controls are key to ensuing efficiency in the management of resources to achieve organizational objectives by controlling performance with pre-determined goals/ standards/norms. Assessment of compliance of internal controls, procedures and practices followed by CEWs revealed a very unsatisfactory level of performace. It was noticed that-

- None of the Workshops maintained idle time card of labour showing the time lost due to power failure, machine breakdown, lack of material etc as prescribed (paragraph 429 of Indian Railway code for Mechanical Department). Frequent power cuts affected production in Manmad, Sabarmati, Arakkonam and Lucknow Workshops. Loss on account of idling of manpower due to power failure was assessed as ₹10.54 crore.
- Reconciliation between Gate Attendance Cards and Time Sheets was not done as required (paragraph 505 and 519 of Indian Railway Code for Mechanical Department) in Gorakhpur, Manmad and Arakkonam Workshops
- No system was in place to record labour allocation utilization, idle hours on account of machine break down, power failure, lack of materials etc.
- There was no control over defective casting and wastage of materials due to non-maintenance of records.
- Work order register and statement of completed work orders was also not being prepared in all the Workshops except Mughalsarai, Lallaguda, Lucknow & Jallandhar Workshops.
- Managerial control statements as laid down in Para 1346 of Indian railway code for Mechanical department were not being generated in all the CEWs except Lallaguda and Mughalsarai Workshops.
- Audit reviewed the WMS balances of all the CEWs for the years 2009-10 and 2010-11. These are suspense balances representing the cost of products in process and finished products awaiting acceptance from consignees and have implications in terms of dividend payments to General Revenues. As per the prescribed norm, these should be maintained within six per cent of the WMS credits.

- Audit observed that while in four CEWs (Jallandhar, Lucknow, Manmad and Sabarmati), the WMS balances were within the prescribed limit, in other Workshops, they were in excess of the prescribed limit. The total excess WMS balance was ₹37.35 crore during 2009-10 (Bongaigaon-₹2.04 crore, Lallaguda- ₹2.78 crore, Sini- ₹13.96 crore, Arakkonam- ₹5.70 crore, Gorakhpur- ₹6.74 crore and Mughalsarai- ₹6.13 crore) and ₹47.39 crore in 2010-11 (Mughalsarai- ₹6.47 crore, Gorakhpur- ₹8.87 crore, Lallaguda- ₹6.25 crore, Sini- ₹17.99 crore, Arakkonam- ₹ 2.71 crore and Bongaigaon- ₹ 5.09 crore). The excess maintenance of WMS balances over and above the Railway Board's norms led to avoidable payment of dividend to the tune of ₹2.24 crore and ₹2.85 crore during the years 2009-10 and 2010-11 respectively.

It was also observed that no review of balances as envisaged in Para 1224 of Mechanical code was conducted in Sabarmati, Gorakhpur, Mughalsarai, Lallaguda, Bongaigaon, Manmad and Arakkonam Workshops for submission to FA&CAO. In Sini Workshop, balance in WMS Account was revised monthly and put up to FA&CAO yearly. The system of maintenance of year-wise and cause-wise balances was not in place to expedite their clearance.

(Annexure XL)

3.2.6 Conclusion

Audit observed that the objectives of setting up Civil Engineering Workshops to help Railways in meeting their demand of essential components required for day to day maintenance of tracks and manufacture of girders for bridges etc. had not been fully met due to lack of clear strategic direction. Efforts to upgrade the bridge workshop infrastructure were tardy and had not kept pace with the demands of expanding requirements of IR for building up capacity. The workshops, functioning with outdated Machinery and Plants need to be revitalized by appropriate up-gradation of technology and skills for achieving cost effectiveness. More importantly, the workshops need a clear roadmap for attaining desirable level of excellence through careful exploitation of core competencies.

Recommendations

- *IR needs to undertake, on priority, capacity planning assessment of each workshop to facilitate desired production as per demand. A comprehensive modernization Plan to upgrade machines and technology needs to be implemented within a fixed time-frame.*
- *As there are significant cost differences for the same product among the workshops, IR needs to institute proper costing mechanism and cost control measures to ensure their compliance across workshops. Attempts may be made to explore product specialization keeping the core competencies of individual workshop to achieve cost effectiveness.*

The matter was brought to the notice of Railway Board (December 2011); their reply had not been received (January 2012).

3.3 Safety works – Level Crossings, Road Over Bridges and Road Under Bridges

Executive Summary

Level crossings at railroad intersections present a significant risk of accidents. In Indian Railways, 992 lives were lost in level crossing accidents during the period from 2006-07 to 2010-11. There were 33,957 level crossings out of which 16,463 were unmanned over Indian Railways as on 1st April 2010. LCs are being manned based on various criteria such as TVU exceeding 6000 units per day, restricted visibility, frequent occurrence of accidents, etc. Railways adopt a general criterion of 1 lakh TVUs per day for provision of ROB/ RUB on cost sharing basis with State Governments (50:50). For enhancement of safety standards at manned LCs various instructions were issued by Railway Board from time to time for interlocking of LCs, Provision of Lifting Barriers (LB) and Telephones, etc. Instructions were also issued by Railway Board (RB) for elimination of LCs by construction of ROBs/RUBs/Limited Use Subways/Limited Height Subways (LUS/LHS) and closure of one of the LCs where two or more LCs exist in close proximity. For financing the up gradations of LCs and execution of ROB/RUB works, a dedicated fund namely "Railway Safety Fund (RSF)" was created in April 2001 with allocation from Central Road Fund.

Audit studied the implementation of policy in respect of these safety works covering the period from 2006-07 to 2010-11. The earlier Audit findings (Audit Report No.9 of 2005) and the recommendations of Standing Committee on Railways from time to time were also kept in view.

The study revealed gross under utilisation of funds from Railway Safety Fund since inception in April 2002. During 2006-07 to 2010-11, Budget allotments were less than 45 per cent of available fund while in 60 per cent of works, 80 per cent funds allotted were surrendered. There were 1490 Level Crossings (630 LCs having more than 6000 TVUs and 860 LCs in Rajdhani routes) remaining unmanned. Safety enhancement devices in eligible cases were not provided, in 1880 LCs (lifting barriers), 815 LCs (interlocking) and 555 LCs (telephones). ROB/RUB were yet to be sanctioned in cases of 1076 eligible LCs. Out of 665 sanctioned ROB/RUB works, in 375 ROB/RUBs, works were yet to be commenced though 108 of them were sanctioned prior to 2005-06 that included sanctions accorded more than two decades earlier. There was a cost-over-run of ₹885.56 crore in revision of estimates in 171 case. Zonal Railways had taken up 298 works valued ₹4886.16 crore without completion of preliminary works such as finalisation of General Arrangement of Drawings, detailed estimate, etc, that also required concurrence from the state government concerned and the works remained in a state of incompletion. The Zonal Railways in a majority of cases had not compiled with the requirement of annual prioritisation of works jointly with the state government. Due to continued manning of LCs in respect of 338 works belatedly completed and in progress, there was avoidable expenditure of ₹68.95 crore jeopardising safety. Though ROBs were opened for traffic, 60 LCs were also being simultaneously maintained compromising safety with avoidable

expenditure of ₹27.76 crore on operation. Besides Railways' share of cost to be recovered in such cases (₹124.33 crore in 25 cases alone for which information is available) was not claimed. The overall implementation of safety works at level crossings was hampered by inadequate commitment leading to poor planning, deficiencies in internal co-ordination and in particular weak liaison with state government.

3.3.1 Introduction

A level crossing occurs where a railway line is intersected by a road or path on one level, without recourse to a bridge or tunnel. Level crossing presents a significant risk of collision between trains and road vehicles. Accidents at level crossing constitute more than 40 per cent of all major (Consequential) accidents on Indian Railways and the death toll is the highest in this category. There were 33,957 level crossings over Indian Railways as on 1st April 2010 out of which nearly 17,000 were unmanned.

As per the existing policy, provision of Level Crossing (LC) is made in consultation with the State Government at the time of laying a new line or within 10 years from the date of its commissioning to traffic. Thereafter, any accommodation work such as LC can be provided at a suitable location on 'Deposit Terms' basis, if such a proposal is sponsored by the State Government/Local Bodies duly agreeing to bear the initial cost of construction of the LC and one time capitalized cost of recurring maintenance and operational charges. Further, as per the current policy of Railways, no new unmanned LC is permitted on existing lines.

After this 10 year period, the Railways share the cost (50 per cent excluding the cost of the land and structures thereon) of construction of Road Over Bridges (ROBs)/Road Under Bridges (RUBs) in replacement of busy LCs to ensure safety of the public travelling by road and rail and also to improve the efficiency of the Railway operations. The Railways adopt a general criterion of minimum traffic density of one lakh Train Vehicle Units (TVU) per day (the product of the number of trains and number of road vehicles passing the level crossings per day) for provision of ROBs/ RUBs. The traffic density condition is relaxed in cases of suburban sections with high frequency of train services and near stations where detentions to road traffic are high due to Railway operations.

The Railway Board have issued instructions from time to time for elimination of LCs by construction of sub-ways, closure of LCs and for enhancing safety through provisioning of interlocking, lifting barriers and telephones, etc.

3.3.2 Audit objective and scope

Audit had carried out a previous study on the subject- "Construction and maintenance of ROB/RUB on Southern and South Western Railway" and had made certain recommendations on slow pace of execution of works (Audit Report No.9 of 2005).

The issue of safety enhancement works at LCs had also been a matter of debate by the Standing Committees in the recent past which had made certain

recommendations as regards funding and accelerating the progress of the construction of ROB/RUBs.

Audit had noted that the Budget Speech of MOR (2009-10) had underscored the importance of safety concern and indicated approval of manning of around 3000 LCs during the year.

Given the above context, it was decided to revisit the subject covering all Zonal Railways to evaluate and follow-up in regard to

- Efficiency in funds utilization including financing
- Efficiency in terms of works planning and execution
- Impact on safety

For this purpose, allocations and expenditure under Plan Heads 29 and 30 dealing with Road Safety Works for LCs and ROB/RUBs were dealt with. The period of study covered 2006-07 to 2010-11.

3.3.3 Audit Criteria and Sampling

The rules and provisions contained in the Indian Railway Code for Engineering Department, Indian Railway Permanent Way Manual and the guidelines & instructions issued by the RB from time to time governing LC works and the works in respect of the construction and maintenance of ROBs/ RUBs/LUSs, Reports on the LC accidents formed the basis of audit assessments. The Reports of Standing Committee on Railways related to the subject and action taken on Audit Report on the subject were also kept in view.

The records relating to construction of ROBs/RUBs available with Zonal Railway Administration and Construction Organisation were reviewed with reference to the policy circulars issued by Railway Board. In respect of LC works and LUS works, the relevant records with Zonal Railway Administration and Open line (Divisions)/Construction organisation were examined.

3.3.4 Audit Methodology

The records relating to construction of all the 665 ROB/RUBs which were in progress as on 31st March 2011, 196 works which were completed during 2006-07 to 2010-11 and works pertaining to 1228 LCs identified for provision of LUS/LHS were reviewed across all the Zones with reference to policy circulars issued by Railway Board.

3.3.5 Audit findings

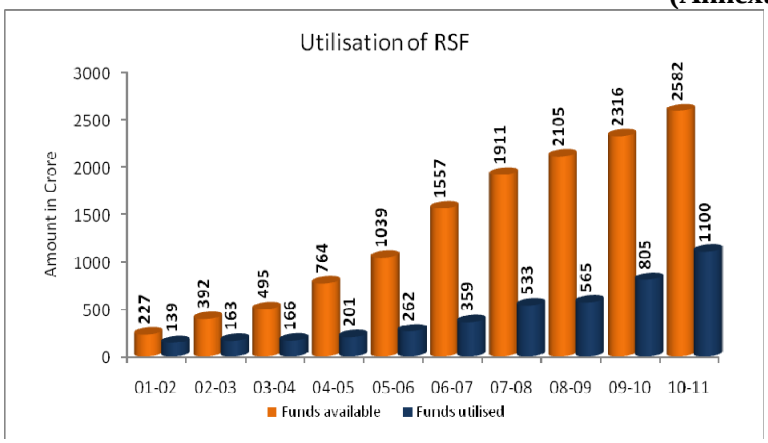
3.3.5.1 Financial Management

(i) Gross under utilization of Railway Safety Fund

The LC works and ROB/RUB works are being financed mainly from Railway Safety Fund (RSF) and Capital. RSF was created on 1.4.2001 for financing works related to manning of unmanned LCs and for construction of ROBs/RUBs at busy LCs. This fund is financed through receipts from Central Road Fund collected from levy of cess of ₹1 per litre on Diesel and Petrol. The Railways get

12.5 per cent of the entire petrol cess and 6.25 per cent of the entire diesel cess and the entire amount is allocated under Road Safety Works. During the period from 2001-02 (year of inception) to 2010-11, an amount of ₹6711.95 Crore was made available under RSF. Out of this, only ₹4294.58 Crore (64 per cent) was utilized, leaving ₹2417.37 crore (36 per cent) unutilized as on 31st March 2011. ***Audit also observed that the utilization with reference to the funds available (accretion plus cumulative balances) was in the range of 23 to 43 per cent barring the first year 2001-02 (61 per cent).***

(Annexure XLI)



[Source: Indian Railways Appropriation Accounts 2008-09 Part-II]

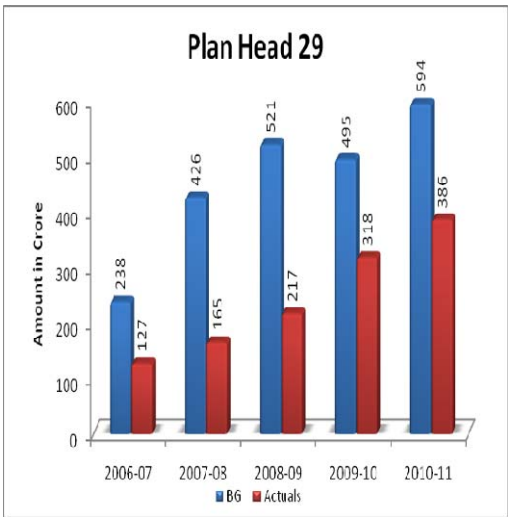
(ii) Budget allotments

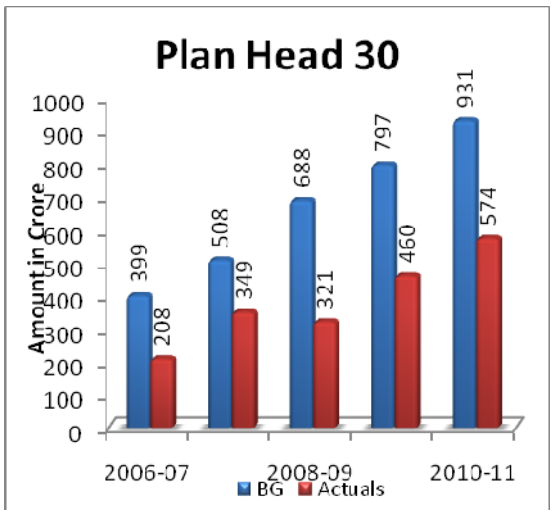
A review of pattern of Budget allotments made from 2006-07 to 2010-11 for the LC up gradation works and ROB/RUBs revealed that these were less than 45 per cent of the fund available under RSF. ***Though sufficient funds were available and there were large number of ROB/RUB works pending (665) as on 31 Mar 2011, the actual budget allocations reflected low priority due to inadequate commitment by the Railways.***

(iii) Utilization of funds allotted

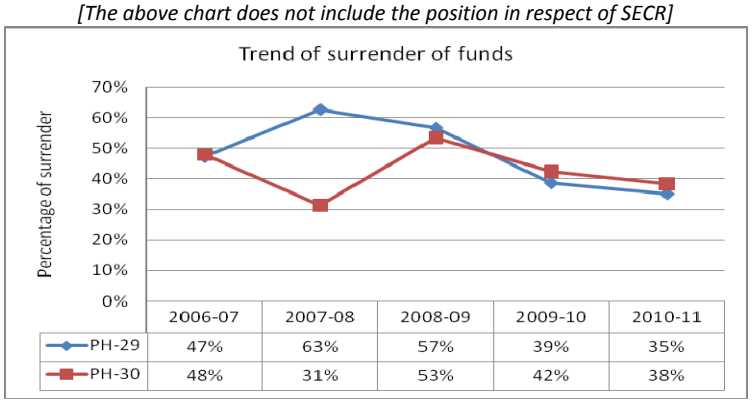
Audit reviewed the Budget allotment of funds under Road Safety Fund against PHs 29 and 30 (of all zones except SECR) and their utilisation and observed the following:

During the review period, the funds allotted were grossly underutilised. The surrender of funds was 48 per cent on an average under PH 29 and 43 per cent under PH 30. The surrender under PH 29 was as high as 57 per cent and 63 per cent in the years 2007-08 and 2008-09. The surrender under PH 30 was as high as 53 per cent and 48 per cent in 2008-09 and 2006-07.The last two years viz., 2009-10 & 2010-11 reflected slightly lower level of surrenders (39 per cent and 35 per cent under PH 29 and 42 per cent and 38 per cent under PH 30 respectively).





[The above chart does not include the position in respect of SECR]



	2006-07	2007-08	2008-09	2009-10	2010-11
PH-29	47%	63%	57%	39%	35%
PH-30	48%	31%	53%	42%	38%

Detailed analysis of the utilisation of funds by the various Zonal Railways during the review period revealed the following:

The total surrender of funds ranged from 13 (SCR) to 71 (SWR) per cent under PH-29 and 29 (SR) to 73 (ECoR) per cent under PH-30.

- Under PH 29, only ER had utilised the entire amount allotted during 2006-07 to 2010-11. In 10 Zones, more than 50 per cent of the funds allotted were surrendered.

Only ER had utilized the entire funds
NFR, NR, SCR, WR surrendered less than 50 per cent
CR, ECOR, ECR, NCR, NER, NWR, SER, SR, SWR, WCR surrendered more than 50 per cent

Only NR had utilized the entire funds
NFR, NWR, SCR, SR, WR surrendered less than 50 per cent
CR, ECOR, ECR, ER, NCR, NER, SER, SWR, WCR surrendered more than 50 per cent

- Under PH 30, only NR had utilised the entire amount allotted during 2006-07 to 2010-11. In 9 Zones, more than 50 per cent of the funds allotted were surrendered

- Audit observed that in 60 per cent of works of ROB/RUB, 80 per cent of the funds provided were surrendered, as shown below:

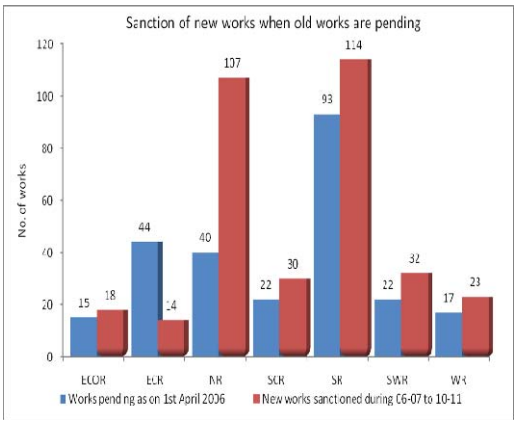
Year	No. of ROBs/ RUBs for which funds were allotted	No. of cases where more than 80 Per cent funds were surrendered
2006-07	399	291 (73 per cent)
2007-08	535	317 (59 per cent)
2008-09	598	385 (64 per cent)
2009-10	740	477 (64 per cent)
2010-11	870	519 (60 per cent)

[The above figures does not include the position in respect of NER and SER]

- In 11 Zones (CR, ER, ECR, ECoR, NCR, NR, SCR, SR, SWR, WCR, WR), in more than 50 per cent of the cases, there was huge surrender (more than 80 per cent) of funds for various reasons. Non-completion of pre-requisites and consequent surrender of considerable funds were reflected poor work management

Major reasons for surrender of funds
- *Non-finalization of GAD*
- *Problems in land acquisition*
- *Delay in finalisation of tender*
- *Poor progress of work by contractor*
- *Delay attributable to State Govt.*

- Audit compared the status of ROB/RUBs sanctioned during the review period (2006-07 to 2010-11) with that pending as on 1st April 2006. In 7 Zones, though 253 ROB/RUBs remained incomplete as on 1st April 2006, 338 new ROB/RUBs were sanctioned during the review period and funds were provided each year by the Railways. Major portion of these provisions were also surrendered, which clearly indicated lack of commitment on the part of the Railway administration in undertaking completion of these works.



The persisting disturbing trend of gross under-utilization of funds since the RSF was created indicated that systemic deficiencies and co-ordination issues had not been effectively addressed. Railways had contended in their reply to the Standing Committee in their reports (5th Report December 2004, 7th Report February 2005, etc) and Audit in their Report (9 of 2005) that under-utilization of funds was due to State Governments not fulfilling their commitment for construction of approach works. While this may be partially valid, it was also a fact that the Railways had been tardy in executing works of up gradation of level crossings despite full availability of funds due to delays in planning, finalization of tenders, etc as highlighted in the Boxes.

As regards cost-sharing of ROB/RUB works with the state Governments, Audit noticed that Railways were not effective in pursuing a case with the Planning Commission for increased budgetary support from the Planning Commission, given the unsatisfactory record of utilization of existing funds. The Standing Committee had recommended in their 5TH Report (presented to 14th Lok Sabha) in December 2004 that Railways should consider utilizing the entire diesel cess for construction of approach works. The Railways had however not acted upon the recommendation that was again reiterated in 2009 by the Standing Committee (4th Report to 15th Lok Sabha).

Unlike other Railway projects, funds were not a constraint for execution of Road safety works. With better co-ordination with State Government, the ROB/RUB works already sanctioned and taken up could have been expedited and funds effectively utilized. Huge surrender of funds, thus, indicated low priority being accorded to safety works.

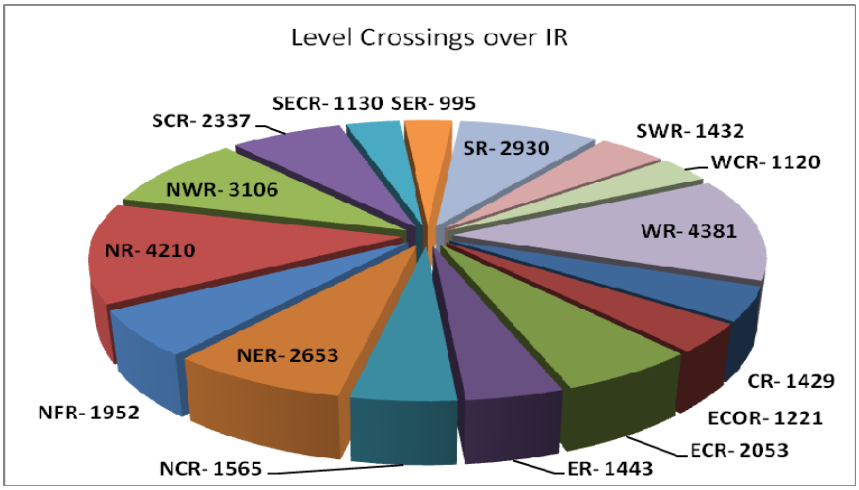
3.3.5.2 Planning of safety works

(i) Level Crossing works

The following are the criteria and priority for manning of unmanned LCs:

- Category I – Clear visibility LCs with TVUs > 6000 and road vehicles > 180
- Category II – Restricted visibility LCs with TVUs > 6000 and road vehicles >120
- Category III – Restricted visibility LCs with TVUs between 3000-6000
- No manning of unmanned LCs if motor vehicles do not ply regularly.
- If any unmanned LC was involved in more than three accidents in the last three years, it should be manned immediately irrespective of its Category.

There were 33,957 LCs over IR as on 1st April 2010.

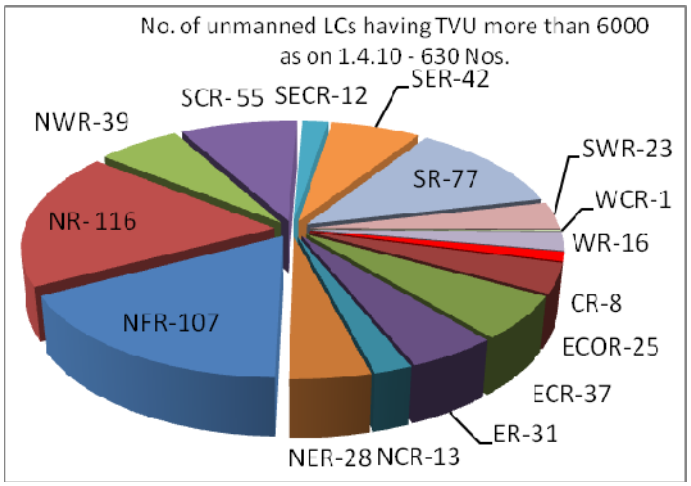


Out of these, 17,494 LCs (52 per cent) were manned and 16,463 LCs (48 per cent) unmanned. Audit analysed the zone wise position of unmanned LCs and observed that in 9 Zones, the percentage of unmanned LCs to total LCs was more than 50 per cent.

Out of 33,957 LCs, 21,096 LCs (62 per cent) had less than 6000 TVUs out out of which 5263 LCs were manned on various other criteria such as restricted visibility, involved in accidents. Another 12,861 LCs had more than 6000 TVUs.

Less than 50 per cent of the LCs were unmanned in SCR(48), SR(39), CR(37), NR(37), ER(35), NCR(34), WCR(23)
More than 50 per cent of the LCs were unmanned in SER(70), NER(60), SECR(55.3), NFR(59), WR(58), ECoR(57), NWR(54), SWR(53), ECR(50)

Another 12,861 LCs had more than 6000 TVUs and were required to be manned as per the laid down criteria. Out of these, 12231 LCs were manned as on 1st April 2010 and 630 remained unmanned. In SR, SCR, NWR, NR and NFR, the LCs could not be manned due to shortage of manpower, want of CRS sanction, delay in sanction of estimate, want of infrastructure (Telephone, electricity).



(ii) Master Plan for elimination of unmananed LC gates

As per instructions (May 2010) of RB, each Zonal Railway has to prepare a Master Plan for elimination of unmanned LCs within a period of five years. Further, all unmanned LCs, which qualify for manning but cannot be eliminated through construction of LUS/LHS/ROB/RUB, shall be manned during the year 2010-11.

Audit observed that, though Zonal Railways had prepared Master Plan for elimination of unmanned LCs by manning or through construction of LUS/LHS/ROB/RUB, a test check in 15 Zonal Railways (CR, ECOR, ECR, ER, NCR, NER, NFR, NR, NWR, SCR, SECR, SR, SWR, WCR, WR) revealed that except CR and WR, none of the Zonal Railways had achieved the target set for the year 2010-11.

(iii) Priority in manning

As per Indian Railway Permanent Way Manual (Advance Correction Slip No.100 dated 21.06.2006), train route wise priority is to be followed for manning of unmanned LCs i.e. 'A' route followed by 'B', 'C', 'D' 'D Spl.', E and 'E Spl.'. Further all unmanned LCs on Rajdhani & Shatabdi routes should be manned on priority. Audit observed the following:

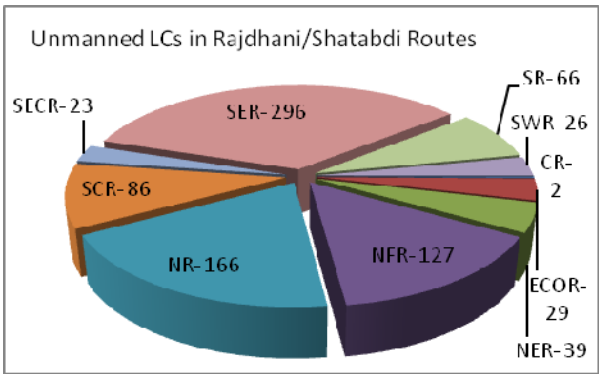
- All LCs qualified for manning under "A", "B" and "C" categories had been manned in CR, WCR and WR.
- Out of a total of 7,845 LCs for all Zones in Routes A, B and C, 1,521 LCs were unmanned. Of these, 353 LCs qualified for manning but were yet to be manned.(Table below)

Details of level crossings in 'A', 'B' and 'C' routes as on 1st April 2010					
Railway	Route	Total LCs	Manned LCs	Unmanned LCs	No. of Unmanned LCs qualified for Manning but yet to be Manned
All Zones	A	2406	2232	174	47
	B	4861	3639	1222	291
	C	578	453	125	15
	Total	7845	6324	1521	353

- Forty seven LCs out of 353 falling under 'A' category route (4 Zones), where a number of important trains like Rajdhani, Shatabdi, Superfast/Mail/ Express trains were run, were yet to be manned.

- *All LCs in 'A' Route manned in CR, ER, NCR, NR, WCR, WR*
- *All LCs in 'B' Route manned in CR, WR*
- *All LCs in 'C' Route manned in , ECR, NR, SR*
- *LCs due for manning in 'A' Route – SCR(26), SER(10), SECR(8), ECR(3)*
- *LCs due for manning in 'C' (Suburban) Route – ER(15)*

- In 10 Zonal Railways, 860 LCs in Rajdhani/ Shatabti routes remained unmanned. From the above, it was clear that prioritisation in manning in some Railways was not carried out as per the order prescribed (as 'B' & 'C' routes had been manned without completing 'A' routes). Besides, the level of compliance in regard to the Rajdhani/ Shatabdi routes over 10 Zonal Railways indicated need for better control over prioritisation of manning.



The Standing Committee in their 27th Report (2006-07) & 14th Report submitted to Lok Sabha in October 2008 recommended expeditious action for provision of man power for manning LCs. While the overall manning of unmanned level crossings with more than 6000 TVUs was 95 per cent, given the sizable number of LCs (15833) yet to be manned, better prioritization keeping in view the prescribed criteria, manpower constraints and lead time required for filling in the posts of gatekeepers, would help enhance safety.

(iv) Safety improvement works at LCs

Railway Board had issued various instructions to improve the safety standards at manned Level Crossings. RB had stipulated that LCs with more than 25000 TVUs (revised to 20000 vide RB's letter dated 11.10.2010) and in suburban sections have to be interlocked with the station signals. Audit observed

SWR(2) and WCR(2) have the least no. of non-interlocked LCs.
In CR, ECoR, ECR, NCR, NER, NFR, SCR, SECR, SR, WR the no. of non-interlocked LCs is in the range of 18 to 69.
NR(304) and NWR(103) have the highest no. of non-interlocked LCs.

- That out of 7,399 requiring interlocking, 6,141 LCs were interlocked and work was in progress at 456 LCs. In respect of 815 LCs, the work of interlocking was yet to be sanctioned/taken up. **(Annexure XLII)**

➢ *LB provided at all manned LCs in CR, ECoR, NCR, NFR, SCR, SER, SWR, WCR*
➢ *LCs yet to be provided with LB - WR(737), NR(380), ECR(119), SR(117), ER(104), NER(102), NWR(5), SECR(316)*

- In addition to the above, manned LCs are required to be provided with Lifting Barriers (LB) in a phased manner. Out of 15,635 manned LCs identified, LB had been provided in all the manned LCs in 8 Zones. In the remaining 8 Zones, 1880 LCs were being provided with LB in a phased manner.

(Annexure XLIII)

Telephone has been provided at all manned LCs in CR, ECoR, NCR, NER, NFR, SECR, SR, WCR, WR
Telephone is yet to be provided at 555 LCs –, NWR(204), NR(125), SCR(69), SWR(57), ER(49), ECR(46), SER(5)

- All manned LCs are to be provided with Telephone communication from the gate lodge and to be linked with the Asst. Station Master of the serving station. Audit observed that in 9 Zones, telephones had been provided in all the manned LCs. Telephones were to be provided at 555 manned LCs in 7 Zones.

(Annexure XLIII)

- Seventeen LCs were identified for provision of Foot Over Bridges (NR-14, SR-2, WCR-1) during the review period out of which only one LC (NR) had been provided with FOB. In SR, agency had been engaged for provision of FOB and in NR, no action had been taken for providing FOB in remaining 13 LCs.

(Annexure XLIII)

(v) Planning of ROB/RUB

Railways adopt a general criterion of one lakh TVU per day for provision of ROB/ RUB on cost sharing basis. The traffic density is relaxed in respect of (i) suburban sections with high frequency of train services and (ii) LCs near stations where detentions to road traffic are high due to shunting operations, etc. However, in view of the pressing demands from Public and requests from elected representatives, RB (May 2008) issued instructions for prioritising the sanction of new ROB/RUB stipulating LCs with TVUs of more than three lakh on Main

Trunk and important category A, B, C, D Railway routes and important National/State/District Roads shall be given preference. Every year, a list shall be drawn up between the Railways and the State Governments of all sanctioned ROB/RUB works in lieu of LCs and the locations with highest TVU shall be taken up first and in the order of preference. This yearly exercise of drawing up of priority list shall also enable the State Government and the Railways to jointly focus on the works to be taken up.

TVU in 95 LCs (10 Zones) had exceeded 10 Lakh but not provided with ROB/RUB

Audit examined the position over IR and observed that in 2,195 LCs, the TVU per day had exceeded one lakh as on 1st April 2010 and thus qualified for provision of ROB/RUB. Out of these, two LCs in NR were still unmanned.

Audit test checked the position prevailing at 1,674 LCs in 14 Zones (except NR, SECR) and found that construction of ROB/RUB was in progress at 196 locations. At 313 locations, ROB/RUB works had been sanctioned but not yet taken up till 31st March 2011. Another 1,076 LCs, though qualified were yet to be identified for provision of ROB/RUB. In the remaining 89 locations, ROB/RUBs had been provided. (Table Below)

Level Crossings having TVU more than one lakh as on 31st March 2011

Railway	TVU	No. of manned LCs	No. of ROB/RUBs in progress	No. of LCs where ROB/RUBs sanctioned but not taken up	No. of LCs where ROB/RUB is yet to be sanctioned
All Railways	1 to 3 lakhs	1270	127	224	867
	3 to 10 lakhs	327	49	70	185
	More than 10 lakhs	74	20	19	24
	Total	1671	196	313	1076
	Note:				
	Out of 1674 manned LCs, ROB/RUB work had been completed in 89 LCs{1674-(196+313+1076)}				

On the matter of coordination with State Government and prioritisation of ROB/RUB work based on TVU, Audit observed the following:

- In SR, ER and NFR, the yearly exercise of drawing up priority list was being done regularly with the co-ordination of State Governments. Similar exercise was not being done in NR, SCR, NCR, NWR and NER,WR &ECOR.
- In WCR, test check of records revealed that proposals were submitted to State Government (48 works). However, as of March 2011, only one proposal was considered by the State Government for construction.

Thus, in spite of availability of sufficient funds for construction of ROB/RUBs, due to lack of proper commitment and effective coordination between Railways and the State Governments, Road Safety works were not given due importance

and 133 LCs with even more than 3 lakh TUV, for which priority had to be given were yet to be identified for provision of ROB/RUB.

Railway	No. of manned LCs (TVU > 3 lakhs)	No. of LCs where ROB/RUB is yet to be sanctioned
SR	61	7
SCR	14	5
SWR	12	7
NCR	53	25
ER	54	23
CR	54	43
NFR	16	12
NWR	23	16

The above analysis highlighted the need for a stronger and effective co-ordination mechanism between Railways and State Governments for ensuring common prioritization of works for faster completion of ROB/RUB works.

(vi) Unjustified ROB/RUBs

In SR, three LCs were identified for replacement with ROB/RUB on the grounds that these LCs had crossed the TVU limit of one lakh. However, as per records, the TVU in respect of these LCs range from 30,624 to 62,473 only. The total estimated cost of these three ROB/RUBs was ₹44.79 crore. Out of these, two works were yet to be taken up and one work was in progress.

The decision of the Railway Administration in sanctioning ROB/RUB at these locations was not justified in as much as 86 LCs which had already crossed one lakh TVU were yet to be identified for ROB/RUB.

3.3.5.3 Execution of works

In most of the cases, the Bridge portion over Railway Track is executed by Railways and the approach road by State Government. Ideally both these works should be completed simultaneously so that ROB could be opened for traffic and the LC closed at the earliest with minimum cost of idling of investment. The status of works sanctioned during 1986-87 to 2010-11 is given in Table below:

	Number of Road over bridges/Road under bridges (Works sanction 1986-87 to 2010-11)								
Railway	**Railway portion completed state portion in progress**	**Railway portion completed state portion not taken up**	**Railway portion in progress state portion not taken up**	**Railway portion in progress state portion completed**	**Railway portion not taken up, state portion completed**	**Railway portion not taken up, state portion in progress**	**Work in progress both by Railway and State**	**Works not taken up both by Railway and State Govt.**	**Total**
CR	1						5	12	18
ECOR	2		1				6	15	24
ECR	2						11	32	45
NCR	1		16				21	14	52
NWR	6		1				6	1	14
SCR	9	1	6				18	35	69
SR	5	1	9				33	122	170
WR	5	1	2					21	29
ER		1	3				1	22	27
NR		2		11	1	1	27	60	102
SER		1	1				5	9	16
SWR		1					42	11	54
NER						1	5	12	18
SECR							7	7	14
WCR							11	2	13
Total	**31**	**8**	**39**	**11**	**1**	**2**	**198**	**375**	**665**

(i) Delay in commencement and execution of works.

- During the review period of 2006-07 to 2010-11, 196 works were completed by both Railways and State Governments. As on 31-03-2011, there were 665 sanctioned ROB/RUB works. Out of which 108 works were sanctioned during the period 1991-92 to 2005-06

- Works at 375 locations had not been taken up by both Railways and State Government. The maximum number of cases pending commencement was in Tamil Nadu (78) followed by Uttar Pradesh (49).

- Bridge and approach works had not been taken up in TN-76 (SR), UP-49 (NCR-14, NER-9, NR-26), AP-38 (SCR-33, ECoR-5), Bihar-31(ECR-28, NER-3), WB-30 (ER-22, SER-8)

- In 198 locations, works were in progress by both Railways and State Government. Out of which 65 works were sanctioned during 1993-94 to 2005-06 Large number of works were still in progress in Karnataka-42(SWR), UP-31 (NCR-19, NER-5, NR-7), TN-30(SR), AP-18(SCR)

ROB work at LC.No.57-B (Rewari) sanctioned in 2003-04, still in progress (NWR)

(ii) Non co-ordinated progress of works

Audit analyzed the physical progress of bridge portion and approach road portion of these ROB/RUBs executed by Railways and State Government respectively and observed the following:

- In 8 works, Railway portions were completed but State Government portions had not been taken up Out of above, five works were sanctioned during the period 1999-00 to 2005-06
- In 31 works, Railway portions were completed. However, the works of approach road by State Government were still in progress. Out of which 10 works were sanctioned during the period 1986-87 to 2005-06.
- In respect of 39 works, Railway portion was in progress but approach road work had not been taken up by the State Government concerned. Out of which eight of these works were sanctioned during the period 1995-96 to 2005-06. Approach work had not been taken up by UP-15(NCR), AP-6(SCR), TN-6(SR).
- In respect of 11 works, State Government had completed the approach road work but Railway portion (NR) was yet to be completed.
- In respect of one ROB sanctioned in 1997-98 (NR), approach road work had been completed by Punjab Government. But the Railway portion had not yet been taken up.

Damoria Bridge, Jallandhar (NR) – Sanctioned in 1997-98, approach portion completed, bridge portion not taken up.

- At two locations (UP), approach road work by State Government was in progress but execution of bridge proper by Railways (NER, NR) was not yet taken up.

The above analysis indicated that there was abnormal delay in commencement of sanctioned works and completion of works that were commenced. Further, in quite a number of cases, there was lack of co-ordianted progress of work by Railways and State Government resulting in unnecessary blockage of funds invested by either Railways or State Governments, as the case may be and non realization of objective of closure of level crossings. Some of the causes of the delays in commencement of works and execution of works and their financial implications are discussed in subsequent paragraphs.

(iii) Delay in execution (Bridge portion)

ROB/RUB works are to be completed within a period of 18 to 24 months of their administrative sanction. Audit reviewed the works in progress as on 31st March 2011 (665) and those completed (196) during the review period to assess whether the works were completed within the stipulated time of 24 months from the date of sanction. Audit found that 338 works were either completed belatedly or yet to be completed (two years after sanction) as indicated in the Table below.

Delay range	No. of cases
Less than 2 years	166
2 to 5 years	62
5 to 8 years	91
8 to 12 years	15
More than 12 years	4

In respect of 4 works - one each in NFR, SER, SCR and WR, the delay in execution of works was 156, 180, 216 and 264 months respectively. The causes of delays were as follows:

- Delay in finalization of GAD.
- Delay in approval and issue of drawings and designs
- Delay in sanction of estimate/material modification
- Delay in making available the site
- Delay in the execution of approach road works by State Govt.
- Delay in diversion of road traffic
- Delay in shifting Water pipe line, signal cables, telephone cables etc.
- Operation of additional/new items during execution of work
- Delay in finalization and award of contracts
- Delay by the contractor in completion of work

(Annexure XLIV)

Poor planning and internal co-ordination within the Zonal Railways and ineffective co-ordination with State Governments resulted in considerable delays in execution/completion jeopardizing safety. This had resulted in avoidable expenditure of ₹68.95 crore approximately (Annexure XL) towards

continued cost of manning these LCs. In particular, non-completion of preliminaries before taking up the works for execution was a chief factor contributing to avoidable delays.

(iv) Non-completion of preliminaries before taking up the works for execution:

As per instructions contained in Para 703 of the Indian Railway code for the Engineering department and RB's orders on the subject, preliminary works such as sanction of detailed estimate, finalization of plans and drawings, finalization of initial and recurring costs, acquisition of land, commitment to close the LCs from State Government etc. have to be completed before taking up the works for execution. Further, RB (October 1991) issued instructions that prior to inclusion of bridge works in Annual Works Programme, Railway should ensure that all preliminary and associated works should be completed.

Audit examined the position and observed that 298 works (Table below) estimated to cost ₹4912.04 crore were taken up without completion of preliminary works and an amount of ₹602.06 crore had already been incurred on these works till 31st March 2011.

ROB/RUB works undertaken without completion of Preliminaries				
Railway	**Total no. of works**	**Estimated Cost (₹ in crore)**	**Expenditure booked till 31/03/2011 (₹ in crore)**	**Details of Preliminary works not completed**
1	2	3	4	5
ECR	12	410.83	202.23	Land not made available by State Govt. Alignment not fixed by State Govt. GAD not approved by State Govt. GAD not approved by Railway, Diversion or shifting of LC gate, Non-approval of structural drawing, Non-receipt of approach estimate from State Govt. Combined estimate not prepared by Railway, Detailed estimate not vetted by Finance. Acceptance of detailed estimate by State Govt. pending, Detailed estimate not sanctioned by Railway, Shifting of underground utilities (cables, telephone lines, etc.) OHE lines, etc.
ER	2	27.69	6.47	
NCR	2	47.97	0.05	
NFR	3	114.88	16.25	
NR	49	1098.48	274.38	
SCR	35	765.64	4.22	
SECR	6	34.96	2.01	
SR	157	2031.86	60.90	
SWR	19	213.80	0.04	
WCR	11	146.62	29.77	
WR	2	19.31	5.74	
Total	**298**	**4912.04**	**602.06**	

The inadequacies in a majority of cases pertained to non-finalisation of General Arrangement Drawings (GAD), non-preparation of Original/Detailed Estimate etc.

Delay on the part of the Railway administration in finalising the preliminary works was a clear indication of ineffective internal control. This had not only delayed the execution of safety projects but also resulted in delay in achievement of the Railway's main objective of elimination of LCs and caused significant increase in the cost of works as can be seen from the subsequent para. Besides, though the issue was highlighted in the earlier Audit Report (2004-05), there was little improvement in works planning.

(v) Upward revision of estimated cost of the project due to delay in preparation of Detailed estimate

RB (June 2008) issued detailed guidelines for preparation of estimates and stressed on the need for realistic planning for works taking due care stated that planning for works had to be done with due care to avoid expensive modifications in scope of works and cost estimates. Further, instructions were also issued in December 2010 for fixing accountability to control wide variations between abstract estimates and detailed estimates on account of lapses in planning and execution of construction of ROB/RUBs.

Audit reviewed the position of Detailed Estimate in respect of 286 ROBs/RUBs sanctioned during 2006-07 to 2010-11(14 Zonal Railways) and found that only in respect of 179 cases, Detailed Estimates were prepared. In all the 179 cases, there was time over run in preparation of Detailed Estimate. Out of these, in 147 cases, there was cost revision as detailed below:

Range of time over run	No. of cases
Less than 12 months	35
12 to 24 months	50
25 to 36 months	24
37 to 48 months	30
More than 48 months	8

Further analysis of cost revision in respect of cases where time over run was more than 36 months revealed that in 3 cases, the cost revision was more than ₹10 Crore (SR-2, WCR-1) and in 8 (SR-7, SCR-1) cases, the same was between ₹5 to ₹10 Crore. The highest cost revision happened in a work in SCR (from ₹20 crore to ₹57.51 crore) and the delay in preparation of detailed estimate in this case was 36 months. The upward revision of cost in 147 cases amounted to ₹2494.81 crore - an increase of ₹712.89 crore from ₹1781.92 crore.

The main reasons attributed to the delay in the sanction of detailed estimate were the delay in obtaining concurrence for the plan from the State Government authorities and the internal delays within the Railways.

Similarly, in 71 works sanctioned prior to 2006-07, Detailed Estimates were prepared only in respect of 36 cases and all of them belatedly. Out of these, there was cost revision in 25 cases as detailed below:

Range of time over run	No. of cases
Less than 3 years	10
3 to 7 years	12
More than 7 years	3

There was no cost revision in the remaining 11 cases.

Zone-wise analysis of cost revision in respect of cases where time over run was more than seven years revealed that in two cases, the cost revision was more than ₹10 crore (ER-1, SER-1). In respect of one work pertaining to SER, the time over run was 220 months involving increase in cost from ₹0.99 crore to ₹1.99 (over 100 per cent). The total cost revision in these 25 cases was from ₹239.71 crore to

₹ 413.04 crore. The highest cost revision happened in SCR, involving cost of ₹21.77 crore with delay of 72 months in preparation of detailed estimate.

(Annexure XLV)

Improper planning, lack of prioritization, ineffective co-ordination with State Governments resulted in delay in commencement of work and in its completion with consequential cost escalation by ₹ 885.56 core.

(vi) Non-recovery of the cost of Extra road width

As Road authorities desired that the cost of construction of entire 12.0 meters width of the Bridge proper should be shared on 50:50 basis, RB had issued instructions (March 2010) revising the admissibility of road width for 2 lane and 4 lane bridges on cost sharing basis.

Audit observed that the cost of additional width in respect of 14 ROBs (ER-2, SECR-5, SCR-7) was borne by the State Government. However, in NR, the cost of additional width (ranging between 4.5 m to 7.5 m) of the bridge portion of 4 ROBs (constructed one each at Malout, Narela and two at Bathinda) amounting to ₹12.81 crore (after adjusting ₹2.04 crore payable to State Government) was yet to be realized from the Government of Punjab.

(Annexure XLVI)

(vii) Non-closure of LC even after commissioning of ROB/RUB

There should be an agreement between the Railways and the sponsoring authorities to the effect that if the existing LC is required to be kept open after the ROB/ RUB is opened to traffic, the entire expenditure incurred by the Railway Administration for the construction of ROB/RUB and its approaches shall be borne by the road authorities and reimbursed to the Railways. The Ministry had assured (May 2009) that all out efforts would be made to follow the Rules where ever feasible in response to A.R.(Report No.9 2005).

Audit examined the cases of non-closure of LCs and observed that there had been insignificant progress as brought out below:

ROB in lieu of LC No. 1B at Nagda (WR) commissioned in April '99

LC No.1B at Nagda (WR) not closed even after commissioning of ROB

- 60 LCs were not closed even after commissioning of ROB/RUB (NR-12, SECR-11, SCR-8, NER-7) for reasons such as public agitation, dispute on

cost sharing, want of FOB and non-receipt of permission from local authorities.

- Out of the above, 24 ROB/RUBs (SCR-6, NER-4, WCR-4, ECoR-3, SECR-3, ER-1, NFR-1, NR-1, WR-1) were commissioned prior to the year 2000.
- In respect of 33 works, MOUs were in place (SECR-8, NER-7, WCR-5, SCR-3, SR-3, WR-3, WR-2, NFR-1, SWR-1)
- In respect of 22 ROB/RUBs, agreement did not exist (NR-12, ECoR-3, ECR-2, ER-1, NFR-1, SCR-3).
- Details of MOU in respect of 5 ROB/RUBs were not available (SCR-2, SECR-3)

Non-closure of LCs had not only defeated the very purpose of provision of ROB some of which were completed more than two decades ago but also resulted in avoidable and continued manning of LCs at a cost of ₹27.76 crore. Further, Railways had not made any claim for reimbursement of Railways' share of cost amounting to ₹124.33 crore (in respect of 25 ROB/RUBs alone) so far.

(Annexure XLVII)

(viii) Non-drawal of Completion Report (CR)

In terms of Para 1701 of the Railway Code for Engineering Department, a maximum period of three years is provided for the drawal of completion report after the date of completion of the ROB/RUB. During 2006-07 to 2010-11, 196 ROB/RUBs were completed. Audit analyzed 21 ROB/RUBs completed during 2006-07 for which Completion Certificates were due. It was found that, completion report had been drawn only for 1 ROB/RUB. Audit noticed cost over run in seven out of 21 works. It was ₹5.06 Crore & ₹3.85cr in respect of one work each in ECR and ER respectively and less than ₹ one crore in the remaining five works.

Though this matter was taken up earlier (Audit Report2004-05) with Ministry of Railways, reply had yet not been received (January 2012**).**

Non-drawal of completion reports further hampered the settlement of accounts and recovery of Railway dues from the State Government/parties concerned.

(Annexure XLVIII)

(ix) ROB/RUB works entrusted to Single agency

In terms of Para 1816 of IR Code for Engineering Department, the portion of the work within Railway limits (Bridge proper) is required to be constructed by the Railways and road approaches are required to be constructed by road authorities. With a view to expediting construction of ROB/RUBs already sanctioned, RB decided (October 2009) to assign the work of construction of the entire ROB/RUB (approaches and bridge portion) falling in the States of Tamilnadu, West Bengal, Karnataka, Gujarat and Uttar Pradesh to a single agency.

Over SR, no work was so far handed over to a single agency in respect of works executed in Tamil Nadu. In Kerala, 20 ROB/RUB works were handed over to a single agency viz., Roads and Bridges Development Corporation of Kerala

Limited (RBDCK) without obtaining prior sanction of the RB. The anticipated advantages of handing over the work to a single agency were stated as:

- early completion, i.e., the works were expected to be completed by 12 months; and
- economy in overheads and construction costs.

RB, while according post facto conditional ratification to the above proposal, had taken a serious note of the action of SR in approaching the RB after handing over the works to a single agency (RBDCK).

Out of 20 works handed over, four ROB/RUB works sanctioned during 2000-01 and 2001-02 were still pending as on 31st March 2011. Out of these, two works were yet to be taken up due to non-finalisation of estimate and land acquisition process.

The issue of execution of 20 ROB/RUB works by Road and Bridges Development Corporation (RBDCK) was included in the Audit Report Construction and Maintenance of ROB/RUBs in Southern and South Western Railways". Railway administration, in their reply, attributed the delay in completion of works to general reasons like want of clearance from many agencies/departments, delay in imposition of speed restrictions, etc. The reply provided no indication of remedial action for ensuring better co-ordination for early completion of work.

Similarly, in ER, the entire work of construction of two ROBs was awarded to two different agencies. ROB work at Kalubathan was awarded to Konkan Railway Company Limited (KRCL) in April 2003 at a cost of ₹11.44 crore and the work was completed on 31.03.2008. The other ROB at Barriyarpur was awarded to IRCON during September, 2005 at a cost of ₹38.64 crore which was approximately 214 per cent above the sanctioned cost of ₹12.32 crore. ***Although these works were awarded to single agencies at a higher cost for speedy execution of the work, yet the objective of entrusting the entire work of construction of ROB/RUB to single agency for speedy completion remained unfulfilled.***

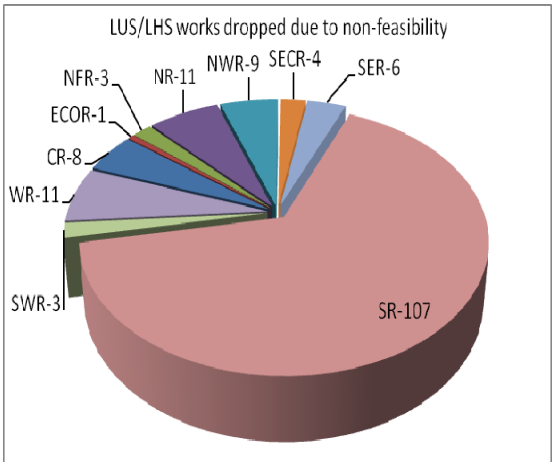
(x) Construction of "Limited Use/Limited Height Subways" (LUS/LHS) in replacement of LCs

Some of the Zonal Railways had proposed elimination of unmanned/manned LCs by construction of 'LUS' at locations where the traffic consists of light vehicles, two wheelers, etc. Based on this, RB (November 2006) issued instructions to Zonal Railways to identify such unmanned/manned LCs, which could be eliminated by construction of LUS/LHS.

Audit reviewed the position prevailing in Zonal Railways with regard to the provision of LUS/LHS on the basis of the RB's instructions referred to above and observed as under:

- At 1228 locations, provision of LHS/LUS (NR-127, NWR-138, SCR-142, SECR-113, SR-218, SWR-135) had been identified.

- At 195 locations (SCR-60, SWR-41, WCR-34), LUS/LHS had been provided and LCs closed
- At 20 locations (SWR-12, ECor-4, NER- 3, NR–1)), works were completed but LCs were not closed due to various reasons such as Public agitation, State Government not giving permission, etc.
- At 163 locations (SR-107, NR-11, WR-11, NWR-9, CR-8), works were dropped due to non-feasibility on account of one or more of the following reasons:
  - Height of embankment not adequate to provide subway
  - Water stagnation
  - Seepage prone locations
  - Flood threat during monsoon



Cast RCC boxes for LUS lying idle at unmanned LC No.4 in CGL-AJJ Sn.(SR)

Water stagnation at an incomplete LUS site near LC No.189 in VM-TPJ Sn.(SR)

When the matter of dropping of work due to incorrect identification of LUS was taken up with Southern Railway by Audit in January 2010, Railway Administration, in (October and November 2010), had stated that:

- The LUS/LHS works were taken up for the first time
- Based on the experience gained at few locations, wherever provision of LUS/LHS was not feasible, the same was dropped.
- Public objected to the provision of LUS/LHS due to their limited utility

Railway Administration's remarks were found unsatisfactory for the following reasons:

- The selection of the site should have been done after satisfying the conditions prescribed.

- Contract should have been awarded after conducting the soil test and site investigations
- Being a safety work, the Railway Administration should have vigorously pursued the matter with the State Government for execution of LUS/LHS works.

Railway	LCs identified	LCs closed
SECR	17	17
SWR	24	24
WCR	13	13
SCR	39	29
SER	8	4
NWR	16	3
CR	12	4
NFR	27	8
ECR	7	2
NER	16	2
SR	8	1
ECOR	4	0
NR	250	0

Non-provision of LUS/LHS at identified locations/incorrect identification of sites for provision of LUS/LHS and consequential dropping of these works also kept away Railway's objective of elimination of as many LCs as possible.

(Annexure XLIX)

(xi) Closure of LCs in close proximity

RB stipulated (2009) closure of one LC where two or more LCs exist in close proximity (within one kilometer) even though proper approach road connecting the LCs is not available. Link roads can be provided on Railways' expense within Railway boundary, if warranted.

Audit observed that over IR, only 441 LCs were identified during 2009-10 and 2010-11 for closure by providing parallel link road to the nearest LC. Out of these, 111 LCs were closed and works in respect of other LCs were at various stages.

Even though there were 16,463 unmanned LCs over IRs (Mar 2011), only 441 LCs were identified for closure. We test checked the position in SR and found that apart from 8 pairs of LCs identified, 42 pairs of LCs situated in close proximity were not identified.

Thus, Railway administration had not put in sufficient efforts to improve safety by identifying and eliminating LCs in close proximity in co-operation with local civil authorities.

(xii) Maintenance of ROB/RUB

In terms of Para 117 to be read with Para 1107 (14) of the Indian Railway Bridge Manual, Senior Section Engineer should inspect every bridge including ROBs/RUBs in his section once a year. Audit examined the details of inspection carried out in 12 Zonal Railways and found that in 8 Zonal Railways {SR, SCR, SWR, WR, ECoR, NR, NCR, NWR (Bikaner and Jaipur Division only)}, there were no arrears in inspection of ROB/RUBs. In 4 Zonal Railways [CR-207 (excluding Nagpur division), NER -1, SEC -8, WCR-93], the inspections were not carried out as per schedule. In NFR, regular inspection was done only in 2 out of 5 divisions.

Non-adherence to the schedule of inspections reflects ineffective monitoring of the safety of the bridges.

3.3.5.4 Impact on Safety

LC accidents not only dominate in terms of frequency, but also can have severe consequences involving injuries and fatalities to railway passengers and road users.

Gradual manning of LCs, construction of ROBs/RUBs (ROBs/RUBs) and intensive public awareness campaigns has reduced the incidence of accidents at manned level crossings: however, the number of incidences continued to be of a high order involving negligence on the part of mainly road users(Table below). For its part, the IR has an obligation to take effective measures under its control to contain the accidents.

Accident at unmanned LC No.7 in TVC – NCJ Sn. (SR) on 11.10.08

During the period from 2006-07 to 2010-11, 62 accidents had occurred at manned LCs and 427 at unmanned LCs claiming 992 lives. Audit conducted an analysis of the causes of the accidents and the progress in implementation of policy in regard to the subject LCs.

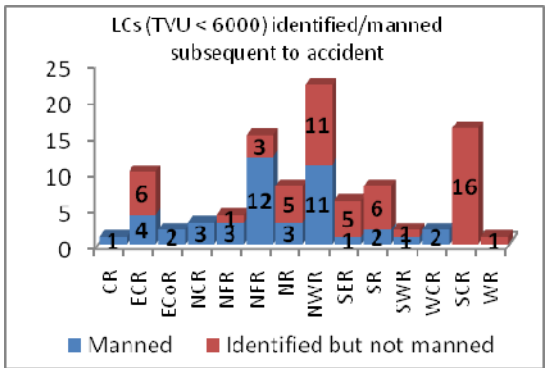
Year	No. of accidents		Fatalities			
	Manned LCs	Unmanned LCs	Manned LCs		Unmanned LCs	
			Rail Passengers	Road Users	Rail Passengers	Road Users
2006-07	12	83	0	13	38	150
2007-08	17	81	1	29	17	163
2008-09	11	87	0	26	1	148
2009-10	13	100	0	16	53	164
2010-11	9	76	0	21	0	152
Total	**62**	**427**	**1**	**105**	**109**	**777**

- Out of 62 accidents, 33 occurred at Manned LCs in NR alone as the gateman operated signal without permission or Asstt. Station Master failed to inform gateman or due to overshooting of signal by driver of the train. Out of these, at two LCs, accidents occurred three times and at one LC, accidents occurred twice. Four manned LCs in NR were identified for provision of ROB/RUB after accidents during 2006-11. However, the proposals were still under consideration.
- Out of 427 accidents at unmanned LCs, 271 accidents occurred at five Zones (NER – 46, NF – 31, NR – 119, NWR – 39 and WR -36) claiming 106 Rail passengers and 490 Road users.

- In respect of 85 unmanned LCs which already qualified for Manning as per the TVU criterion (exceeded 6000 TVU) audit observed that -
  - Out of 85 LCs, 33 were manned subsequent to accident,
  - The balance 52 LCs was yet to be manned. Out of these, TVUs of three LCs in NR had exceeded one lakh.
  - In NR, the TVU of the 10 LCs, where accidents had occurred, had exceeded one lakh. Though these LCs qualified for provision of ROB/RUB, manning had been done only subsequent to occurrence of accidents.
  - Accidents occurred twice at four LCs in four Zonal Railways (NFR, NWR, SCR, SR)

These facts clearly indicated that greater degree of compliance of preventive approach was required to reduce and avoid mishaps. **[Annexure L (a)]**

- Audit also observed that 100 UMLCs with less than 6000 TVUs were identified for manning subsequent to accident. Out of these, manning had been completed only in respect of 45 LCs.



- As per RB's instructions, if any unmanned LC got involved in more than three accidents in the last three years, it should be manned immediately irrespective of its category. In NR, at three UMLCs, accidents occurred thrice during the review period claiming four lives. However, these three LCs had not yet been identified for manning.
- Accidents occurred twice in 18 UMLCs (NR-10, NFR-2, WR-1, WCR-1, SWR-1, SR-1, NCR-1, ECR-1) with less than 6000 TVUs (not qualified for manning). Out of these, 3 LCs (NFR-2, WCR-1) had been manned and work was in progress at one LC (SR). Though RB had issued instructions (November 2006) for elimination of LCs by provision of LUS/LHS in accident vulnerable locations for increasing safety, no action had been initiated by the Railway administration in this regard.

[Annexure L (b)]

3.3.6 Conclusion

The objective of improving safety in IR by elimination of level crossings had met with limited success largely due to inadequate commitment to implementation of policy that resulted in constant gross under-utilisation of funds both in level crossings and ROB/RUBs. Railways' efforts in co-ordinating with state government for successful completion of ROB/RUBs have been inadequate. Railways thus need to adopt and ensure a pro-completion approach by rigorous prioritisation in planning and monitoring of all LC/ROB/RUBs works per se and

work towards a common agreed plan with the concerned State Governments so that closure of level crossings is achieved within an agreed time-frame.

Recommendation

- *Taking into account the large number of accidents involving loss of human lives and the detention to trains and road vehicles at level crossings, Railways should chalk out a common programme to maximize the completion of ROBs in close co-ordination with State Government and fully avail the fund made available for the purpose.*
- *As the continued operation of LC even after provision and commissioning of ROB/RUB infringes safety, stringent rules which should be binding on the State Governments should be framed.*
- *Internal controls may be streamlined to ensure proper identification of location and assessment of scope of works for timely preparation of estimates and finalisation of tenders with greater accountability in cases of lapses.*
- *Unmanned LCs where accident had occurred and already qualified for manning should be given priority in provision of Manning.*

The matter was brought to the notice of Railway Board (December 2011); their reply had not been received (January 2012).

3.4 East Central Railway: Delay in building the new rail bridge over River Sone

Delay in sanctioning and completing the new rail bridge work over River Sone resulted in heavy detention of Goods trains leading to avoidable revenue loss of ₹284.20 crore

Sonenagar (SEB)-Mughalsarai (MGS) section (124 KM) is a vital corridor for movement of coal, other minerals and goods from Bengal - Bihar -Jharkhand fields to North India and is a part of the Grand Chord (Mugalsarai –Asansol) on the Delhi- Howrah route. This is a Broad Guage double line section. In between station Dehri-on-Sone (DOS) – Sonenagar there is a major Rail Bridge over River Sone. Railway Board in January 1990 decided to replace this Bridge built in 1898 with a new Bridge with provision for four lines substructure and 2 line super structures on age-cum-condition basis. Meanwhile, to cater to the increasing traffic load it was planned to lay an additional line between SEB-MGS which necessitated a 3 line Bridge over River Sone.

Then Eastern Railway requested Railway Board to sanction the new Sone bridge at an estimated cost of ₹125.63 crore in 1991-92 based on techno-economic survey carried out by them in January 1990 and further investigation carried out by M/s Stup Consultance thereafter. Railway Board in November, 1992 directed that the work of construction of new Sone Bridge with three lines should progress simultaneously and synchronize with the work of third line. This was imperative because absence of the third line between DOS and SEB would result in erosion of line capacity of the section from the envisaged 83 paths to 72 paths. It was expected that if both works were not completed by 1995-96, the peak demand on the section would outstrip the capacity and create congestion with consequential adverse effects.

Meanwhile Railway Board sanctioned the construction of 3rd line between DOS and MGS(excluding the bridge work) in 1990-91 and the work was progressively completed and opened for traffic between 1997-2002 at a cost of ₹262.24 crore. However, the Bridge work was neither sanctioned nor progressed simultaneously. The administrative sanction for the bridge-work was accorded only in 1997-98 and sanction for detailed estimates of ₹248.64 crore in December 1999. The contract was awarded to M/s AFCONS infrastructure Ltd. in April 2003 with scheduled date of completion as April, 2007.

The progress of work was inordinately delayed as the approved design & drawings were supplied to the contractor in piecemeal during execution of work, the last being in February, 2006 i.e. 35 months after the award of contract. The contractor, however, failed to complete the work within the extended period of contract (December 2009) on account of sharp increase in price of raw materials. As such, the contract was ultimately foreclosed in July 2009 without any financial liability. After a lapse of 18 months, Railway Administration awarded (May 2011) the left over work to the same contractor for ₹26.78 crore with scheduled date of completion as November 2011. The work was expected to be completed in December 2011 and opening of the section expected in April 2012 after completion of related miscellaneous work. As such the Bridge work which

ought to have been completed by 2002 along with the 3rd line was commenced in 2003 and was yet to be completed (September 2011).

Though an expenditure of ₹ 528.10 crore was incurred on third line and Bridge works together till April 2011, full benefit expected from the project could not be realized due to the abnormal delay in sanctioning and completing the work of the new Bridge. A sample study carried out by Audit on detention of Goods trains at SEB in the months of January and April 2011 revealed that the average detention of each train (34 trains per day) towards MGS was 66 minutes. The revenue loss on this account alone for the period from January 2003 to April 2011 was about ₹284.20 crore. If the detention in reverse direction was taken into account, the loss would be double. The loss will further mount till the opening of the third line between DOS and SEB.

When the matter was taken up with East Central Railway (May 2011), in reply (September 2011) they admitted the facts partially and attributed some of the detention of Goods train at SEB to OHE failure, S&T failure etc. This was unacceptable as the principal cause of detention was the non availability of path and other causes were sporadic and negligible. The delay in construction work of the Bridge was attributed to time taken to finalize the design through consultant M/s. Stup and its approval by RDSO. As M/s Stup was involved in the project from the year 1990, the long delay (nearly three years) in finalization of the design was unwarranted.

Thus the delay in sanctioning and completing the new rail bridge work over River Sone had resulted in heavy detention of trains leading to avoidable revenue loss of ₹ 284.20 crore.

The matter was brought to the notice of Railway Board (October 2011); their reply had not been received (January 2012).

3.5 South Central Railway: Injudicious retention of an old bridge by strengthening sub-structures

Railway's injudicious decision to strengthen an old bridge instead of rebuilding a new bridge resulted in avoidable expenditure of ₹13.64 crore

Bridge No.1017 across river Tungabhadra on Wadi – Guntakal section constructed in 1889 served more than the stipulated life of 100 years. The bridge consisted of 36 spans of steel girders confined to deeper portion of the river and 44 spans of arch spans on either side approaches.

Railway Board had taken a policy decision to replace old steel girders of bridges as they were considered unsafe due to presence of sulphur and phosphorus in excess of the permissible limits rendering them brittle. Accordingly, the Railway Administration proposed to rebuild this bridge on permanent diversion on the downstream side at 15 m from the centre line to the existing track. The work was included in the Preliminary Works Programme (2002-03) and sanctioned under State Railway Safety Fund (Green Book–2004-05). Accordingly, detailed estimates for ₹24.69 crore were prepared and vetted by Finance in June 2004.

Meanwhile, the Chief Engineer (Construction) decided (2003) to explore the possibility of strengthening the substructure and foundation of the bridge. Two experts i.e. Director, Transport Infrastructure, National Academy of Construction, Hyderabad and Professor, IIT, Bombay inspected the bridge in February and March 2003 respectively and recommended the strengthening of sub-structure and closure of all arch spans, leaving one to two openings for road passage. However, the Professor, IIT, Bombay observed that a proper hydrological study was required for framing up the recommendations.

The Chief Bridge Engineer (CBE) decided to recommend (November 2004) to the Railway Board strengthening and replacement of the superstructure at an estimated cost of ₹13.56 crore as against the originally approved cost of ₹24.69 crore for rebuilding the bridge, after consultation of the experts' opinion and the flood data available for the 26 years (1973-1999).

Railway Board further sought the advice of the RDSO (December 2004) who opined (January 2005) that there were chances of very abnormal flood discharge in case the rain fall was heavy necessitating the opening of gates of the dam and that the dam authorities may be consulted. The dam authorities basing their opinion on past records of rainfall and flash floods and the recommendations of the Dam Safety Review Committee conveyed (May 2005) that closure of arch spans of the bridge might not be feasible.

The Deputy Chief Engineer, Construction considered the recommendations of the experts and opined (August 2005) that in view of the fact that the cost of strengthening of sub-structure was almost equal to the cost of new sub-structure, it would be better to go for complete rebuilding of the bridge. However, the work sanction (estimated cost ₹24.74 crore) was accorded (November 2005) for retaining the sub-structure of the existing bridge and taking up the construction of second bridge on the same sub-structure besides retention of 36 central spans for waterway and closure of the arch spans except those required for Road Under Bridge (RUB) and canals. The arch spans were closed at a cost of ₹1.01 crore.

When the work was nearing completion, there were unprecedented rains (October 2009) in the catchment area of Tungabhadra river. Due to the closure of 40 arch spans of the bridge, the flood water level had reached rail level. As a result, some of the Pre-Stressed Concrete (PSC) decks of the bridge under construction on the upstream moved laterally and three decks infringed the existing track. Railway revised the cost of work to ₹34.47 crore to facilitate the execution of required restoration works besides opening of already closed arches. A subsidiary agreement for ₹9.94 crore was entered into with the contractor. Railway also spent a sum of ₹2.69 crore for immediate restoration on track due to damages due to flood. The injudicious decision of Railway Administration to close the arch portion of the bridge thus resulted in avoidable expenditure of ₹13.64 crore.

When the matter was taken up (May 2011) with the Railway Administration, they stated (July 2011) that the work of strengthening rather than rebuilding was taken after deliberations with the CBE who had considered the opinion of experts and Tungabhadra dam authorities and consulted with the Railway Board and RDSO. The loss was unavoidable on account of the unprecedented floods. The reply was not acceptable. Railway Administration failed to consider the impact of heavy

flood discharge in case of heavy rainfall and to properly evaluate the case of complete rebuilding the bridge vis-à-vis its strengthening. Further, prior to taking ultimate decision to strengthen the sub-structure of existing bridge and close the arches portion, neither a proper Hydrological study as advised by one of the experts was undertaken nor the opinion of Tungabhadra Dam Authorities against closure of the arch portion of the bridge was duly communicated to the Railway Board / RDSO. Further, the Railway Administration was left with an old bridge structure with attendant risks and weaknesses even after investment of ₹34.47 crore.

The matter was brought to the notice of Railway Board (November 2011); their reply had not been received (January 2012)