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Government of India
Ministry of Railways
Railway Board

REPORT

OF

THE WORKING GROUP

ON

RAILWAY PROGRAMMES

FOR

THE ELEVENTH FIVE YEAR PLAN

(2007 – 2012)

FOREWORD

One could not ask for a more optimistic setting as we prepare to go into the Eleventh Five Year Plan. The economy is on a high growth trajectory and has been clocking more than 8 per cent annual growth for the last four years. The growth in railway traffic - both freight and passenger - has been exceeding the GDP growth rate. The outlook for the future is bright and opportunities for growth are abundant. But the challenges are equally formidable, although admittedly, challenges of growth are always preferable to challenges of maintaining *status quo*.

The Railways have exceeded most of the targets set for the Tenth Five Year Plan. The terminal year of the Plan has seen a record level of over 728 Million Tonnes of originating freight traffic, 6.24 billion of originating passengers, an enviable operating ratio of 78.7 percent and a cash surplus before dividend of over Rs 20,000 crores. Efficiency improvements and a customer-focused approach have been major drivers of the growth. It is difficult for capacity enhancement to keep pace with the growth in traffic due to the gestation lags. Most of the major traffic-carrying routes are under severe strain. A number of initiatives have already been launched to redress the situation; these need to be sustained and greatly expanded in both scale and scope during the Eleventh Five Year Plan. In addition, there is a need to identify infrastructural weaknesses that, if left unaddressed, could derail the momentum of growth. This document has attempted to address the issue and set out a plan to prepare the Indian Railways to transform into a truly World Class Railway system.

It has been our attempt to cover all the Terms of Reference comprehensively, starting from traffic projections to infrastructural requirements and organizational issues. I am sure that Planning Commission would find the inputs useful while preparing the Eleventh Five Year Plan for the country.

(J.P.BATRA)
(Chairman, Railway Board &
Ex-Officio Principal Secretary to the Government of India)
Chairman, Working Group

COMPOSITION OF THE WORKING GROUP ON RAILWAYS PROGRAMMES AND TERMS OF REFERENCE

The Working Group for formulation of the Railway Programmes for the Eleventh Five Year Plan (2007-2012) was constituted under the chairmanship of Chairman, Railway Board vide Planning Commission's order No.18/9/2005-Tpt dated 24.03.2006. A copy of the order containing the composition of the Group and Terms of Reference is at Annexure-I. Subsequently, Shri. Shri Prakash, Adviser (Infrastructure), Ministry of Railways was nominated as the Convener of the Working Group in place of Shri A.K.Suri, Additional Member (Planning). Additional Member (Planning) was, however, retained as a member of the Working Group. The Working Group met on 09.05.2006 and Sub Groups were constituted to deliberate and make recommendations on key issues such as Business Strategy, Passenger Business, Pricing, Costing, Tariff Policy and Social Burden, Infrastructure Policy and Safety. A list of the various Sub Groups is at Annexure-II.

The second meeting of the Working Group was held on 28.12.2006 to discuss the inputs received from various Sub Groups. Subsequently, the approach to the Eleventh Five Year Plan was discussed with the General Managers of the Zonal Railways. Suggestions received from them have been considered and appropriately incorporated in the Report.

SECTION I: INTRODUCTION

CHAPTER ONE: REVIEW OF TENTH FIVE YEAR PLAN

Objectives

The key objectives of Tenth Five Year Plan were:

- ***Business***
  - Regain the lost market share in freight and passenger business through a business and user friendly approach and financial discipline.
- ***Capacity Enhancement***
  - Strengthen the High Density Network through capacity enhancing investments under the ambit of *National Rail Vikas Yojana (NRVY)* and completion of sanctioned rail projects
- ***Infrastructure and Technology***
  - Utilize Information Technology for better customer interface
  - Improve safety of operations by replacement of over aged assets financed by the Special Railway Safety Fund
  - Improve efficiency, throughput and average speed of trains through technological upgradation
  - Reduce the energy bill by direct purchase of power from central generating agencies and joint ventures for setting up power plants
- ***Resource Mobilisation***
  - Mobilize additional resources through private-public participation in railway projects

A review of the performance of Railways during the Tenth Five Year Plan would indicate that these objectives have been achieved and even exceeded in some cases. A brief summary of the performance follows.

Freight Traffic

The Tenth Plan had envisaged that by the terminal year of the Plan, the freight traffic of the Railways would reach a level of 624 Million Tonnes of originating traffic and 396 Billion Tonne Kms of transportation output. The actual achievement is likely to be 726 Million Tonnes and 479 BTKMs. The net increment in traffic during the Plan is of the order of more than 230 Million Tonnes over the terminal year of Ninth Five Year Plan – an achievement without precedent in the history of Indian Railways. The year-wise loading and freight movement is shown in Table 1.1 below. A disaggregated commodity-wise analysis of the growth is at Table 1.2.

Table 1.1 Freight Performance during Tenth Plan

Year	Originating loading (Million Ton)	Annual Growth Rate (per cent)	Freight Output (Billion NTKM)	Annual Growth Rate (per cent)
2001-02	492.5	-	333.23	-
2002-03	518.7	5.32	353.19	5.60
2003-04	557.4	7.36	381.24	7.94
2004-05	602.1	8.02	411.28	7.88
2005-06	666.5	10.70	441.76	7.41
2006-07 (RE)	726.0	8.93	476.77	7.92
Average growth rate	-	8.1	-	7.4

Table 1.2 Commodity-wise Analysis (Figures in Million Tonnes)

	2001-02	**2006-07 (BE)**	**Incremental loading**	**Per cent Change (2001-02 - 2006-07)**
Coal	229.69	310.00	80.31	35.0
Ore to Steel Plants	39.35	62.00	22.65	57.6
Ore - Export	15.72	52.00	36.28	230.8
Cement	44.04	65.00	20.96	47.6
POL	35.62	33.00	2.62 (-)	7.4(-)
Foodgrains	32.82	46.00	13.18	40.2
Fertilizers.	27.20	36.00	8.80	32.4
Iron & Steel	14.50	19.00	4.50	31.0
Others	53.56	103.00	49.44	92.3
Total	**492.5**	**726.00**	**233.5**	**47.4**

This remarkable achievement in freight loading and movement was the result of a market-focused strategy aimed at capturing large volumes of traffic along with efficient utilization of assets and resources resulting in reduction in unit costs despite rising input costs, providing a unique competitive advantage. Major factors that contributed to this achievement included the decision to use the carrying capacity of the wagons optimally by increasing the loadability of the wagons on selected routes up to 15 per cent, the realignment of tariff to the competitive conditions in the market and incentives for loading in the lean season and the empty flow direction. Incremental loading has come across the board from all commodity groups barring the expected decline in petroleum products. Major increases were seen in coal, iron ore for export and steel plants, cement and other commodities (which include containers). The Railways' share in respect of commodities such as cement and steel has increased despite stiff competition from road. While such performance merits well-deserved appreciation, signs of strain are clearly visible on many of the busy trunk routes of the Railways. The good performance in other

commodities including container movement suggests the potential for a strategic shift in the future towards more containerized movement, as against bulk. Sustaining the growth momentum requires consolidation of the position in commodities where Railways already enjoy predominance and finding new growth platforms in other commodities.

Passenger Traffic

Projections for the terminal year of the Tenth Plan indicated that the Railways would carry 5686 million originating passengers and achieve 593 billion passenger kms (PKMs). As in the case of freight traffic, actual achievements in 2006-07 of 6242 Million Passengers and 700 Billion PKMs would surpass this projection by a wide margin. The year-wise growth in traffic is given in Table1.3 below. A segment-wise analysis of the growth is shown in Table1.4**.**

Table 1.3 Passenger Performance during the Tenth Plan

Year	Originating Passengers(million)	Annual Growth Rate (per cent)	Passenger KMs(Billion)	Annual Growth Rate (per cent)
2001-02	5093	-	490.9	-
2002-03	4971	2.4(-)	515.0	4.9
2003-04	5112	2.8	541.2	5.1
2004-05	5378	5.2	575.7	6.4
2005-06	5832	8.4	615.6	6.9
2006-07 (RE)	6242	7.0	699.7	13.7
Average growth rate		4.2	-	7.4

As shown in these tables, passenger traffic (PKMs) have grown at a fast clip during the Plan – the average growth rate of over 7 per cent (against the targeted rate of 5.3 per cent) stands in sharp contrast to the historical growth rate of 3-4 per cent. The growth has come from both suburban and non suburban categories, more from the latter. Within the non suburban category, second class sleeper and AC three tier have exhibited higher growth rates. There has been a decline in AC two tier, mainly on account of competition from low cost airlines. The passenger business faces long term competitive threats from airlines, luxury buses, personalized transport and improved public transport. Since different passenger segments vary in behavioral and elasticity traits, a differentiated approach needs to be applied to each.

Table 1.4 Segment-wise Analysis of Passenger Traffic

	Passengers 2001-02 (millions)	Passengers 2005-06 (millions)	Difference Passenger (millions)	Percent Change	PKM 2001-02	PKM 2005-06	Difference PKM	Percent Change
Suburban								
1st Class	177	195.9	18.9	10.7	5320	6460	1140	21.4
2nd Class	2821.9	3133.3	311.4	11.0	87548	99959	12411	14.2
Total	2998.9	3329.2	330.3	11.0	92868	106419	13551	14.6
Non Suburban								
1 AC	0.8	1.1	0.3	37.5	750	568	182(-)	24.3(-)
AC 2T	12.7	12	0.7(-)	5.5(-)	9908	8135	1770(-)	17.9(-)
AC 3 T	12.9	20.6	7.7	59.7	11022	12704	1682	15.3
1st Class.	6.6	6.2	0.4(-)	6.1(-)	1950	1905	45(-)	2.3(-)
AC Chair	7.8	9.4	1.6	20.5	4208	4199	9(-)	0.2(-)
Sleeper								
M/E	156.1	177.2	21.1	13.5	117304	120092	2788	2.4
ORDY.	4.5	5.8	1.3	28.9	1739	1854	115	6.6
2nd Class								
M/E	335.1	485	149.9	44.7	117137	170556	53419	45.6
ORDY	1557.3	1678	120.7	7.8	136602	189112	52510	38.4
Total	2093.8	2395.3	301.5	14.4	400620	509125	108505	27.1
G.Total	5092.7	5724.5	631.8	12.4	493488	615544	122056	24.7

Asset Utilisation

As already stated, improved asset utilization has played a major role in the performance of the Railways during the Tenth Five Year Plan. A comparison of the major efficiency indices in 2001-02 (the terminal year of the Ninth Five Year Plan) and 2005-06 (the fourth year of the Tenth Five Year Plan) illustrates this point (Table 1.5)

As can be seen, wagon utilization, wagon turn-round, engine utilization and manpower productivity have exhibited dramatic improvement during the Tenth Plan period. A number of factors such as improvement of payload per train and terminal improvement to facilitate engine-on-load handling and round the clock operations underpin such results. The contribution of efficiency improvement to reduction in unit cost and the revitalization of the fortunes of Railways have been of enormous significance. A particularly gratifying feature of the improvement is that it is a part of a continuing steady trend (Table 1.6).

Table 1.5 Asset Utilization – A comparison

Efficiency Index	**Year**	
	2001-02	2005-06
Wagon Utilization		
NTKM/ Wagon/ Day (BG)	2223	2872
Wagon Km./ wagon / Day (BG)	192	211
Wagon Turn-round (in days)(BG)	7.2	6.1
Track Utilisation		
NTKM/ Route km (million)	7.38	9.05
Pass. Km./ Route Km (million)	10.13	12.2
NTKM/Engine Day Online (Goods-BG)		
Diesel	167,163	279,066
Electric	311,061	465,375
Manpower Productivity		
NTKM/ Employee (million)	0.23	0.33
PKM/ Employee (million)	0.34	0.47

Table 1.6 Trend of Asset Utilisation during the Tenth Five Year Plan

Efficiency Index	Year			
	2002-03	2003-04	2004-05	2005-06
Wagon Utilisation				
NTKM/ Wagon/ Day (BG)	2468	2574	2617	2872
Wagon Km./ wagon / Day (BG)	204.6	187.8	204.4	211
Wagon Turn-round (in days)(BG)	7.0	6.7	6.4	6.1
Track Utilisation				
NTKM/ Route km (million)	7.74	8.14	8.57	9.05
Pass. Km./ Route Km (million)	10.5	10.8	11.5	12.2
NTKM / Engine Day Online (Goods-BG)				
Diesel	164,713	199,958	218,045	279,066
Electric	326,798	352,669	415,244	465,375
Manpower Productivity				
NTKM/ Employee (million)	0.26	0.28	0.31	0.33
PKM/ Employee (million)	0.37	0.40	0.43	0.47

Financial Review of Tenth Plan

The Railways had projected a requirement of a plan outlay of Rs. 64687 crores for the Tenth Plan, with a budgetary support of Rs. 40615 crores including contribution to SRSF amounting to Rs. 10,965 crores. The Tenth plan was approved with an outlay of Rs. 60,600 crores including budgetary support of Rs. 27,600 crores. The total achieved outlay during the Tenth plan period is likely to be Rs. 84,708. Table 1.7 below shows the sources of financing of the Plan as projected and likely to be realized.

Table 1.7 Tenth Plan Projection and Actual Outlay (Rs. Crores)

	Original Outlay*	Likely to be achieved
Internal and Extra Budgetary Resources	Rs 33,000	Rs .46,545
Gross Budgetary Support	Rs 27,600	Rs. 38,163 **
Total	**Rs. 60,600**	**Rs. 84,708**

* As approved by Planning Commission

**Including Budgetary Support for SRSF, Diesel Cess and National Projects

Table 1.8 indicates the year wise performance of resource mobilization. A more detailed break up of the financing of the Tenth Plan is given in Table 1.9. There is a 36 per cent increase in the actual Plan Outlay for the Tenth Plan, as compared with the initial approved outlay. The Total Gross Budgetary Support of Rs 38163 crores includes contribution of Rs 9789 crores from General Exchequer towards the SRSF, Rs 3165 crores for National Projects and Rs 843 crores for externally aided projects. The Tenth plan has seen an increase in reliance on internal resources and market borrowings. The actual mobilization of internal resources has increased from Rs.3113 crores in 2002-03 to Rs.12206 crores in 2006-07 (RE) resulting in an increase in the Plan share from 27 per cent in 2002-03 to 47.5 per cent in 2006-07 (RE).

Table 1.8 Financing of Year-wise Plans (Rs. Crores)

Year	Internal Generation	Market Borrowings	Budgetary Support	Total
2002-03	3113	2517	5778	11408
2003-04	3475	2837	7081	13393
2004-05	3712	3041	8669	15422
2005-06	7033	3731	8074	18838
2006-07(RE)	12206	4880	8561	25647
Total (Provisional)	29539	17006	38163	84708

Table 1.9 Actual Financing of Tenth Plan

						(Rs. in cr.)
	2002-03	**2003-04**	**2004-05**	**2005-06**	**2006-07RE**	**Total**
a. Gross Budgetary Support						
Gross Budgetary Support	4264	5315	5493	5312	6485	**26869**
SRSF	1350	1600	2975	2499	1365	**9789**
Total (a)	**5614**	**6915**	**8468**	**7812**	**7850**	**36659**
b. Internal Resources						
Internal Resources	1977	2492	3009	6748	11418	**25644**
SRSF	1136	984	703	284	788	**3895**
Total (b)	**3113**	**3475**	**3712**	**7033**	**12206**	**29539**
c. Railway Safety Fund	**164**	**166**	**201**	**262**	**711**	**1504**
d. Extra Budgetary Resources						
i. IRFC Bonds	2517	2807	2991	3213	4670	**16198**
ii. Others (OYW, BOLT, PPP etc.)	0	30	50	518	210	**808**
Total (d)	**2517**	**2837**	**3041**	**3731**	**4880**	**17006**
Total Plan Outlay	**11408**	**13393**	**15422**	**18838**	**25647**	**84708**

Table 1.10 Gross Budgetary Support towards National Projects

Year	**Amount (Rs in cr)**
2002-03	350
2003-04	500
2004-05	700
2005-06	1165
2006-07*	450
Total Tenth Plan	3165

*Ministry of Finance had agreed to provide Rs 2092 cr for the national projects in 2006-07. Against this Railways have received Rs 450 cr upto Dec 06.

Allocation of Funds and Utilisation

The allocation of funds for new lines, gauge conversion, doubling, traffic facilities works, railway electrification & MTP projects is given in Table 1.11.

Table 1.11 Expenditure Performance During Tenth Plan (Rs. In Crores)

Head	Plan Head	Annual Plan 2002-03	Annual Plan 2003-04	Annual Plan 2004-05	2005-06 Ant. Exp.	Annual Plan 2006-07 (BE)	Total
		Exp.	Exp.	Exp.	Approx.		
11	New Lines	1315	1493	1690	1998	1500	7996
13	Restoration of dismantled lines	98	45	22	14	10	189
14	Gauge Conversion	812	1164	1171	1242	1299.88	5689
15	Doubling	578	532	488	680	1052	3330
16	Traffic Facilities – Yard Remodelling	174	205	277	363	615	1634
35	Electrification Projects	250	148	115	74	226	814
81	M.T.P.	312	351	317	211	308	1499
	TOTAL	**3539**	**3938**	**4080**	**4582**	**5010.88**	**21151**

The Railways have also been able to satisfactorily meet most of the targets in respect of project execution, rolling stock manufacturing and acquisition during the Tenth Year Plan. Table 1.12 below summarizes the achievements vis-à-vis the physical targets pertaining to major plan heads and activities.

Table 1.12 Targets and Achievements

	Tenth Plan target	Likely to be achieved by end of Tenth Plan
New Lines (kms)	1310	945
Gauge Conversion (kms)*	4000	4432
Doubling (kms)	1575	1363
Track Renewals (kms)	23000	24053
Railway Electrification (kms)	1800	1809
Wagons (FWUs)** no.s	65000	86619
Coaches (no.s)	9160	10722
EMUs (no.s)	1965	869
MEMU / DEMU (no.s)	750	610
Diesel Locomotives (no.s)	444	607
Electric Locomotives (no.s)	343	524

* This represents the revised target; the target was revised from 2365 during the Mid Term Appraisal although the same has not been incorporated in the MTR document.

** Excludes departmental wagons

As can be seen, the actual achievement would exceed the targets in respect of most of the heads, the exceptions to the general rule being new lines, doubling and acquisition of EMU/MEMU/DEMU. Doubling projects were constrained by long lead construction activities such as major bridges while new lines by land acquisition processes. The spill over is likely to be wiped out in the first year of the Eleventh Five Year Plan. The shortfall in EMU/MEMU/DEMU is primarily on account of a conscious decision to allocate the limited production capacity of coaches to manufacture of more urgently required general service coaches. Secondly, in view of the on-going work of conversion of the DC traction to AC in Mumbai area, the issue of choice between retro-fitment and new manufacture of EMUs and the technology for such EMUs also took time to be settled. It has now been decided to go in for Insulated Gate Bipolar Transistor (IGBT) based EMUs and the shortfall would be wiped out in the initial years of the Eleventh Five Year Plan.

Given the fact that Railways are struggling with capacity constraints after the sudden and rapid growth during the Tenth Five Year Plan, the need to identify and execute urgently required capacity enhancement projects cannot be overstated. The shelf of unfinished projects would require an amount of Rs.53946 crores for completion.

Technological Upgradation

During the Tenth Five Year Plan, several initiatives to induct modern technology were launched. These include High horse power Electric Locos, Diesel Locos and improved *LHB* type coaches. Indian Railway's Production Units are now fully equipped to produce these locos and coaches. Similarly, in the area of freight operations, *Freight Operation Information System* (FOIS), an IT tool for track and trace movement of freight rakes was implemented at major locations. The other initiatives taken on hand include computerized control charting, crew management, Coaching Operations Information System and National Train Enquiry System. The last named project would totally modernize the system of passenger enquiries and when completed, would be capable of providing on line information to the passengers.

Safety

Despite the pressure of running ever increasing number of trains, the safety record of Railways during the Tenth Five Year Plan has been extremely satisfactory marked by steady improvement as shown in the table below. The vastly improved safety performance is mainly attributable to host of measures which include well-directed investment under a corporate safety plan (2003-2013) initiated during the Plan. Major activities covered under the plan include elimination of track renewal arrears, bridges, rolling stock, signaling, track circuiting and communication, adoption of fire -proof and crash-worthy coaches, level-crossing safety enhancements, anti-collision devices and human resource development.

A dedicated fund named SRSF worth Rs.17,000 Crores created for the purpose has contributed significantly in the effort. The Fund entailed a dividend free grant of Rs. 12000 crores from the General Exchequer and Rs. 5000 crores to be generated by the Ministry of Railways by levy of safety surcharge on passenger fares.

Table 1.14 Safety Performance during the Tenth Five Year Plan

Year	Collisions	Derailments	Level Crossing Accidts	Fire in Trains	Misc.	Total	Million Train Kms.	Accidents /MTKMs
2002	30	280	88	9	8	415	756.4	0.55
2003	16	218	96	14	7	351	786.2	0.44
2004	9	202	95	14	5	325	790.8	0.41
2005	13	138	70	10	3	234	810.1	0.29
2006*	9	131	75	15	4	234		

New Policy Initiatives

A number of major policy initiatives were taken during the Tenth Plan period. Work on Dedicated Freight Corridors on the Eastern and Western routes have been initiated. The other initiatives launched during the Plan include Container Policy Liberalization, Wagon Investment Scheme, Rail-side Warehousing Scheme, Liberalisation of Siding Rules, Terminal Incentive Scheme and Freight Incentive Schemes. For the first time, rail borne container operation, hitherto the exclusive domain of Container Corporation (CONCOR) was thrown open to private players who are willing to invest in rolling stock and terminal infrastructure. 14 firms have already been registered under the scheme. The other schemes have also evoked a very positive response and have helped in a large measure in enhancing the carrying capacity of the rail system and improving its efficiency.

Induction and use of Information Technology also witnessed a significant expansion during the Plan. Besides networking of the five major nodes of Passenger Reservation System (PRS), its reach has been expanded to cover all district headquarters. Internet based reservation through IRCTC has greatly added to the ease and convenience of accessing the PRS. More than 1500 stations have been covered under an Unreserved Ticketing System (UTS). Terminal Management System of FOIS and pilot projects for Parcel Managment *System*, Control Charting, Crew Management System and Integrated Coaching Management System are the other key initiatives initiated during the Plan.

Rail Vikas Nigam Limited (RVNL) was set up as a special purpose vehicle to execute the bankable projects for strengthening of Golden Quadrilateral and Port / Hinterland Connectivity under the *National Rail Vikas Yojana (NRVY).*

In order to contain the energy charges being paid by Railways to State Electricity Boards, a plan for direct procurement of power from NTPC and other Central power generating agencies has been initiated. Railways have signed an MOU with NTPC for setting up Captive Power Plants for Railways. A site for construction of a 1000 MW Power Plant has already been selected.

A dedicated PPP Cell has been set up in the Ministry to take forward the task of mobilizing private investment in identified areas such as development of metro and mini-metro stations into world class stations, development of an agri-retail chain by leveraging the surplus land and logistics chain of railways.

Areas of Concern in the Tenth Plan

Faced with the uphill task of lifting the bulk traffic on offer, the movement of piecemeal traffic had largely been relegated to a low priority and has consequently suffered in the last few years. The market for piecemeal traffic, on the other hand, has been growing and the strategy of bringing in this high value traffic through domestic containerization has not gained sufficient momentum.

Considerable headway has yet to be made in the area of developing line and terminal capacities, both for freight and passenger traffic. The passenger terminals have not grown in line with the growth in passenger traffic leading to congestion at major terminals. Freight terminals too need more mechanization too handle the higher levels of traffic. Safety in train operation continues to be a concern even while safety records have improved. Security too has come under focus in the wake of new threats. Project implementation continues to be a problem area and there have been failures to complete projects in time. IR has yet to achieve satisfactory levels of asset reliability and this critically affects the transportation capabilities. The high probability of failure combined with the randomness with which such failures occur affect the operations very adversely. Indian Railways have still a long way to go in development of manpower skills consistent with emerging technologies.

CHAPTER TWO: CHALLENGES DURING THE ELEVENTH PLAN

Introduction

In order to keep pace with and stay ahead of the economy's growth rate, Indian Railways has to double its transportation capacity, increase volumes by constantly reducing the unit costs and provide world-class service to its customers. To achieve this within a limited timeframe is an extremely daunting task and the Railways have identified two key challenges, one in the area of investments and the other in the area of its core business of logistic solutions to freight customers and passengers.

The remarkable performance of the Indian economy created a buoyant market and through innovative policies Indian Railways expanded its transportation capabilities, thus spurring further economic growth. The unprecedented increase in freight and passenger traffic has led to greater focus on strategic investments to augment capacity. The challenge today is to make quick and good investments, reap the benefits and strategically reinvest to sustain this virtuous cycle of growth and prosperity. Internal resources would not be sufficient to undertake the kind of investments required and a transparent process of identification of beneficiaries and partners will be needed to bring in resources from the private sector.

The second big challenge is to institutionalize the market responsiveness of pricing policies and planning priorities through a definite process of customer client focussed strategies. The simple idea is that prices have to respond quickly to changing market conditions. The concept of lean season prices, concessional prices for empty return routes, higher prices for in-demand mineral exports are all part of the strategy of price discrimination and market segmentation based on demand elasticities. Institutionalisation of this change from production centric policies to customer centric policies will require altering the mechanisms of freight and passenger pricing. Indian Railways will have to move towards a better understanding of each segment of the market and develop sector specific strategies.

Outlook for the Eleventh plan

Rail transport is crucially dependent on the growth in Gross Domestic Product (GDP), especially those sectors which generate transport volumes through their forward and backward linkages. Empirically, rapidly developing countries like India exhibit a transport elasticity exceeding unity. However, historical elasticity of rail freight to GDP has ranged from 0.6 to 0.75. The Tenth Plan has been an exception in that railway traffic has more or less kept pace with the GDP growth and exceeded the GDP growth in the latter years. The targeted rate for growth for GDP for Eleventh Five Year Plan is 9 to 10%. At a macro-economic level, the outlook for Railways is promising.

At a disaggregated level, transport-intensive sectors such as power, coal, steel and cement have witnessed some of the fastest growth rates and are poised for massive expansion.

With increasing global integration of the economy, international trade has also been expanding translating into higher volumes of transport from the ports to the hinterland and vice versa. Whereas our growth has so far been service sector dominant, there are signs of a shift towards manufacturing as an engine of future growth. This will create more jobs in the country and thus take advantage of the process of globalization. All these development are transport enhancing in nature. On the other hand, the trend towards more pithead or shore-based generation of power, massive development and expansion of petroleum pipelines and the National Highway network along with increasing ascendance of higher capacity multi-axle trucks in the truck-fleet are factors which could potentially reduce the transport volumes in general and rail transport in particular. Global competition also implies that there would be greater premium on cost efficient and just in time kind of transport services. Similarly, in the passenger business, GDP growth would bring about a concomitant growth in demand for passenger journeys but increasing competition from airlines in the premium segment and modern buses/personalized vehicles in the medium distance segments. The opportunity for growth does not automatically translate into good performance. The Railways would have to further strengthen their competitive edge to make the best of the available opportunities. The main strength of Railways lies in its ability to obtain network-based economies from high volumes and extremely favourable energy efficiency compared to other modes. Inability to provide cost efficient door-to-door service and differentiated service to customers is the prime weakness of the Railways.

The main objective in the Eleventh Five-Year Plan is creation of adequate transport capacity to handle the projected growth in the medium term and the long term, of both passenger and freight traffic and provide improved services to both segments. It is important to note that some of the major network capacity addition will be beneficial for the Twelfth Plan rather than the Eleventh Plan period. Thus the key element of the Eleventh Plan strategy would be to fully exploit the additional capacity created in Rolling Assets combined with capacity enhancement of the network through quick yielding investments.

Thrust Areas of the Eleventh Plan

Freight Business

The Railways plan to increase their market share in both bulk and non-bulk freight traffic by improving the quality of service with reduction in transit time and better reliability and availability. The Railways will facilitate building of logistic parks, container and other freight terminals through public-private participation to encourage the movement of non-bulk commodities by rail. The success in the Tenth Plan is largely attributed to the reduction in unit cost of operations combined with rationalizing freight structure. Both these efforts will be continued further along with increased use of IT-enabled services for improving customer interface.

Passenger Business

Low cost airlines are giving stiff competition to upper class segments of the passenger business. Other segments, particularly the short and medium distance passenger business,

are facing intense competition from the vastly improved road services. The Eleventh Plan strategy is to consolidate the rail share in passenger business, particularly, in long distance and medium distance segment by increasing the commercial speed of passenger trains, and introduction of fast services between metropolitan cities with speed up to 150 kmph. Development of High Speed Corridors on selected routes is seen as another key strategy for inter-city transport and is also an environmental friendly solution. Speeding of passenger services utilizing MEMU and DEMU rakes would also be pursued with greater vigour. Trains would be augmented to 24 coaches on all important sectors. In passenger services improved customer interfaces through IT enabled services are expected to yield major gains.

Capacity Enhancement

The Eleventh Plan will mark a significant change in the Railways' investment strategy for capacity augmentation. Until now the emphasis has been on incremental capacity augmentation. A major policy shift has come about with the announcement of construction of Dedicated Freight Corridors separating freight traffic from passenger traffic on trunk routes. The Golden Quadrilateral and its diagonals account for a significant portion of freight and passenger traffic and this trend is expected to continue. The proposal for capacity augmentation through construction of Dedicated Freight Corridors (DFCs) along the highly saturated freight lines is the new long-term strategy to provide premium services in freight and passenger. The existing trunk routes along these dedicated freight corridors will also require investments to improve speeds and capacity so that the quality of passenger services can be significantly enhanced.

Additional capacity on other routes based on a route-wise planning and low-cost capacity improvements will be the other elements of the Eleventh Plan strategy. Route wise planning will enhance line and terminal capacity simultaneously since often terminals act as binding constraints affecting the fluidity of train movement. Reduction in asset failures would also be part of the strategy to improve line capacity in the interim period.

With the quantum increase in both passenger and freight traffic during the last three years of the Tenth Plan and the projected increase in the Eleventh Plan, rolling stock availability will be a key factor. In addition to augmenting the existing production capacities, new production facilities for coaches, locomotives and wagons would be required. These new production facilities would have to be capable of producing superior rolling stock like higher horsepower locomotives, better coaches and wagons.

Technology Upgradation

The Indian Railways Modernisation Plan (IRMP), 2005-2010 envisaged modernization of passenger and freight business segments. The Eleventh Plan will continue this process. Technological improvements are envisaged in fixed infrastructure and rolling assets. Reduction in unit cost of operation by introducing heavier trains of 22.9t/ 25 t / 30 t axle load will be pursued with greater vigour. High capacity wagons with better payload to tare ratio fully exploiting the standard moving dimensions on existing routes and introducing longer freight trains on specified sections will be explored. Higher capacity locomotives would also be progressively increased. The Railways plan to run double

stack container trains and longer passenger trains of 24/26 coaches. Higher capacity coaches are also on the anvil.

Information technology applications hold the key to the Railways' sustained improvement in services and efficiency. The concept of "ticket at doorstep" will be further developed for reserved, unreserved and suburban tickets. Further it will be extended to automatic ticket vending machines for suburban, long-distance unreserved, as well as reserved passengers. An integrated Railway information system shall be developed and implemented to provide information of train movement, ticketing, facilities on display systems on stations and trains, as well as through diversified media such as the Internet, through telephones / mobile phones, television, radio and newspaper feeds, etc. The system will also be extended to freight and parcel customers.

The implementation of the Freight Operation Information System (FOIS) has reached the next stage where the benefits will now begin to accrue to the customers with the implementation of the Terminal Management System. FOIS will be extended to all loading points and will interface with customers' information systems, weigh bridges, etc. The Railways plan to extend the facility of payment gateway to more customers.

Energy

The Railways are an energy efficient mode of transport and will make efforts to further improve the energy efficiency by adopting environmental friendly measures by use of fuel-efficient locomotives, adopting energy-efficient technologies for manufacturing and maintenance activities, reducing the transmission loss in electric OHE lines, and improving the fuel management in diesel locomotives.

Safety

The paradigm behind most of world-class railways is minimal human dependence, best achieved by technological aids together with reliability of assets. The Railway Safety Review Committee recommended that the arrears of renewal of track, bridges, rolling stock and signaling gears be wiped out within a specific time frame. Accordingly, a non-lapsable Special Railway Safety Fund of Rs. 17,000 crores was set up during the Tenth Plan period with funding by a dividend free grant of Rs. 12000 crores from the General Exchequer and balance Rs. 5000 crores to be generated by the Ministry of Railways by levy of safety surcharge. The SRSF investment will be completed during the initial years of the Eleventh Plan. The Corporate Safety Plan (2003-2013) contains an investment plan along with quantifiable targets and quality benchmarks for improving safety. Elimination of collisions through use of Anti-Collision devices, adoption of fire-proof coaches to reduce fire accidents, crash worthy coaches to reduce fatalities in case of accidents and reducing level crossing accidents are all part of this Plan. All these would be incorporated in the Eleventh Plan. Improving safety through technological up gradation and reducing human intervention in operation, enhanced training to impart better skills in operation and maintenance of assets will be the focus.

Human Resources

Indian Railways has a tradition of being a humane employer and as we embark on this ambitious high growth path the challenge is to ensure continued and active participation of our workforce in this process. The large human resource base has to keep pace with the rapid changes through appropriate re-skilling and new recruitment policies so as to improve the ratio of the skilled workforce. The Railways would strive for improvement of work environment and culture, staff morale, rationalisation of staff strength to improve productivity to meet the needs of higher growth while ensuring that there is no shortage of manpower for safety.

Resource Mobilisation

Indian Railways have shown the ability to generate substantial investible surpluses through dynamic pricing policies, increased volumes and reduced unit costs of operations. In the Eleventh Five Year Plan the focus will be on higher internal generation, increased public and public-private partnerships and generation of resources through through leveraging and commercial exploitation of its assets.

SECTION II: BUSINESS PROJECTIONS AND STRATEGY

CHAPTER THREE: FREIGHT BUSINESS

The Freight sub-group forecast the freight traffic for the Eleventh Five Year Plan and has recommended an estimate that they consider most plausible. The methodology for arriving at a plausible estimate of future traffic was based on a combination of three estimates. These estimates were obtained using time-series regression, extrapolation of historical and recently observed rail transport elasticity to GDP and disaggregated sectoral end-use analysis of all important traffic streams transported or potentially transportable by rail.

Time- series Regression

The net increase in originating loading and freight output during the Tenth Five Year Plan is likely to be of the order of 234 Million Tonnes and 143.5 BTKMs respectively. With a constant rate of accretion (equal to the average annual incremental growth in absolute terms during the Tenth Plan) to the base- year figures of 726 Million Tonnes and 476.8 BTKMs for 2006-07, the originating loading and freight output would reach 960 Million Tonnes and 620 BTKMs by the terminal year of the Eleventh Five Year Plan. This assumes an implicit lead of 645 KMs. Extrapolation of compound rates of growth of 6.8% and 6.3% achieved in respect of originating loading and freight output during the Tenth Five Year Plan also yields comparable figures of 975 Million Tonnes and 629 BTKMs by the terminal year of the Eleventh Five Year Plan (2011-12).

Elasticity to GDP

Four scenarios were built based on the assumption of GDP growth rate of 8% and 10% and rail transport elasticity of 0.72 and 0.87, with 2005-06 as the base year. Table 3.1 below summarizes the results obtained for each scenario.

Table 3.1 Forecasts of Traffic - Different Scenarios (Tonnes and NTKMs)

	Scenario 1*		Scenario 2**		Scenario 3***		Scenario 4****	
Year	**Mtonnes**	**BTKMs**	**Mtonnes**	**BTKMs**	**Mtonnes**	**BTKMs**	**Mtonnes**	**BTKMs**
2006-07	688	457	704	472	748	497	765	508
2007-08	737	487	765	511	801	532	832	552
2008-09	789	520	833	554	858	570	906	602
2009-10	845	554	907	600	918	610	986	655
2010-11	905	591	988	651	984	653	1074	713
2011-12	**971**	**631**	**1079**	**708**	**1055**	**701**	**1173**	**779**

* GDP growth 8per cent, Rail Transport Elasticity .72 ** GDP growth 10per cent, Rail Transport Elasticity .72*** GDP growth 8per cent, Rail Transport Elasticity .87 ****GDP growth 10per cent, Rail Transport Elasticity .87

With the advantage of the almost final figures of 2006-07 being available now, it is possible to find a validation of the scenarios. It turns out that for the year 2006-07, the actual loading and freight output falls somewhere between the Scenarios 2 and 3 – i.e. a GDP growth of around 8% and rail transport elasticity of around 0.8. It would indicate that by the terminal year of the Eleventh Five Year Plan, it is likely that the originating

loading and freight output could reach a level of 1055 to 1079 Million Tonnes and 701 to 708 BTKMs.

Commodity-wise projections

A summary of the major developments in industries having a direct bearing on rail freight transport is as follows:

- Coal would continue to be the mainstay of the rail traffic accounting for close to 40% of the total traffic. Within coal, requirement for power would continue to account for around 75% of the total. According to CEA's estimate, the addition to coal- based thermal power generation capacity during the Eleventh Five Year Plan is likely to be of the order of 37,000 MW. Excluding the pithead/shore-based projects amounting to 23500 MW, 12500 MW would require rail transportation. Assuming that 75% of the planned capacity comes on stream, additionality to traffic carried by Railways would be of the order 55 Million Tonnes. There might, however, be a slight shift in the pattern if domestically mined coal fails to keep pace with demand and imported coal fills the breach in addition to the imports which are already taking place on considerations of blending. There would also be increased demand from steel and cement plants - industries which are undergoing rapid expansion. The total quantum of rail- borne coal traffic is likely to be to the tune of 400 Million Tonnes.
- According to the estimate made by the Working Group of Ministry of Steel, the capacity addition to steel production in the country during the Eleventh Five Year Plan would be of the order of 40 Million Tonnes. This should have a major implication for the demand for rail traffic as each tonne of steel production is likely to add 5-6 Million Tonnes of raw materials and finished product to rail traffic. Even if a conservative estimate of 70% of the capacity addition actually materializing is considered, that would mean an incremental iron- ore movement of the order of 45 Million Tonnes. Given that the Railways are making a serious and concerted effort to win back steel traffic, a major addition to movement of finished steel is also likely. The prospects for iron-ore export would continue to be bright but could be plagued by uncertainty connected with competition from domestic producers and global over -capacity resulting from rapid expansion in China. The present volume of 52 Million Tonnes, however, is safely expected to go up to 75 Million Tonnes.
- The current policy of aggressively marketing rail services for cement traffic would imply that Railways may be able to capture a larger share of the total cement production projected at 250 Million Tonnes at 2011-12. On the assumption that the rail co-efficient would go up from 42 % to around 55 %, this would mean traffic of volume of 135 Million Tonnes in 2011-12.
- Fertilizers and foodgrain traffic would continue to grow slowly. There could be a shift in the pattern of movement of foodgrain from year to year depending on whether the country produces a surplus or depends on import to meet the requirement of food- deficit regions.
- Petroleum demand would continue to stagnate with the expansion of the product pipeline network.

- Efforts are being made to have a two-pronged strategy, one of developing double-decker wagons and the other to use double stack containers for automobile traffic. At the end of the plan period automobile business is expected to generate Rs. 1000 crores per annum.

A projection of the traffic based on the above summary is given in Table 3.2 below.

Table 3.2 Commodity-wise Projection for the Terminal Year

	2006-07			2011-12		
Commodity	Originating Loading (Million Tonne)	Revenue NTKMs (billion)	Lead (Kms)	Originating Loading (Million Tonne)	Revenue NTKMs (billion)	Lead* (Kms)
Coal- Power House	218.93	135.74	620	275	170.50	620
Coal -steel Plants	37.20	12.42	334	50	16.70	334
Coal – Others	53.87	31.30	581	75	43.58	581
Coal-Total	310	178.25	575	400	230.78	575
Iron Ore-Steel Plants	62	21.39	345	110	37.95	345
Iron Ore - Exports	52	26.68	513	75	38.48	513
POL	33	22.24	674	35	23.59	674
Fertilizer	36	30.17	838	50	41.90	838
Cement	65	37.38	575	135	77.63	575
Finished steel	19	20.10	1058	40	42.32	1058
Food grains	46	60.44	1314	60	78.84	1314
Others including containers	103	67.98	660	205	135.30	660
Grand Total	726	479.16	660	1110	706.78	637

*On the basis of experience of the last decade, the average lead obtained during the Tenth Plan has been assumed to continue unchanged.

A summary of the projections arrived at by various methods is given in Table 3.3 below.

Table 3.3 Summary of projections

	TONNAGE (MILLIONS	BTKMS (BILLIONS)	LEAD (kms)
2006-07 (RE)	726	479	660
USER'S PROJECTIONS	1110	707	637
TIME-TREND ANALYSIS	960-975	620-629	645
ELASTICITY W.R.T. GDP	1055-1079	701-708	-
RECOMMENDED BY THE WORKING GROUP	**1100**	**702**	**638**

The Working Group has felt that a freight loading target of 1100 Million Tonnes by the terminal year of the Plan could be regarded as realistic and most likely. In reaching this conclusion, the Group is guided by the disaggregated commodity-wise analysis of the prospects and considerations of the balance between the challenge and attainability.

Operational Strategy

There could be no doubt that handling the projected traffic volume (1100 Million Tonnes by the terminal year of the Plan) would strain the already over-stretched carrying capacity of the railways. Benefits of major initiatives for capacity expansion already initiated viz. Dedicated Freight Corridor; doubling and gauge conversion would be available only towards latter part of the Plan. The railways would, therefore, be required to take initiatives in the following areas.

- Carry forward the carefully re-engineered innovations in operation and maintenance practices to squeeze further efficiencies out of the existing assets. This would entail further improvement in the wagon turn-round, calibrated investment in rolling stock and terminal capacity to universalize the concept of engine-on-train handling and eliminate waiting time for indents. Directed investment on identified mineral routes to quickly switch over to 25 tonnes axle load would also be required. New wagons would need to be designed and developed in tandem to take advantage of such infrastructure. The payload to tare ratio, which is presently in the regions of 2.6 needs to be improved to 4.
- Spot the opportunities in the market and forge partnerships with industry to set up logistics parks which may emerge as major nodes of freight traffic generation in future.
- Design and deliver premium and differentiated services to industries like steel and cement which could be charged differently based on the value added services.
- Forge Partnership with major Agri Retail Chains.
- Take the ongoing IT initiatives for monitoring movement of rakes to their logical conclusion.

- Develop and commercialize special-purpose car-carriers and double stack / triple stack containers for a variety of containerized cargo.
- Develop existing and new terminals to handle specific commodities including bulk handling of commodities.
- Initiate long-term transportation agreements with major customers.
- Develop facilities and rail linkages with ports for improved and additional handling of traffic.

Parcel Business

Railway's market share in the Parcels and Express Cargo is only about 1.5 per cent of the total. Railways would plan to make a major inroad in the business and aim at doubling of the volume and a five-fold increase in earnings (from Rs. 650 crores currently to about Rs. 3000 crores).

Table 3.4: Parcel Business Projections

Year	Tonnage (million tones)
2007-08	7.15
2008-09	7.86
2009-10	8.65
2010-11	9.50
2011-12	10.45

In the short term the strategy would stress on focusing on optimum utilization of the available resources- utilizing the parcel space in mail/express trains and leasing VPs on round trip basis. The long- term strategy would involve restructuring of the business with new products and partnerships along with increasing reliance on emerging IT solutions and a possible hiving off of parcel business from passenger services. Other elements of the strategy will include:

- Positioning as logistics service provider
- Time tabled parcel services
- Long term agreements with other service providers and customers
- Leasing of parcel trains
- Customized parcel vans

Investment of Rs. 100 crores per annum in infrastructure for development of parcel terminals and parcel vans has been proposed during the Plan.

Logistics Solutions

Multimodal Logistic Parks

A pilot project was initiated in 2002 in collaboration with Central Warehousing Corporation (CWC) to develop warehousing facilities at a goods terminal. The CWC built a state of the art warehouse with a capacity of 15000 tonnes and provided ancillary facilities in the integrated goods shed complex of the White Field Satellite Goods

Terminal at Bangalore. Encouraged by the response to this initiative, IR and CWC have entered into a MoU to develop 22 other locations on the same lines. This idea is being further refined to bring in total logistic solutions along with warehousing. The scheme will promote inter-modal movements with rail as a critical element of the combination.

Agri-Retail Chain

In the Eleventh five-year plan the proposal is to invite private investment from agro-chain developers and cater to the needs of the rural markets.

CHAPTER FOUR: PASSENGER BUSINESS

Passenger Projections

There are two main segments in passenger business: suburban and non-suburban (or long distance). Suburban passengers constitute the bulk of passenger numbers, the ratio between suburban and non-suburban passengers being 59:41. The trend of growth of passenger traffic, both suburban and non-suburban from 1991-92 is given in Table 4.1 below.

Table 4.1 Trend of Growth of Passengers

Plan	Year	Suburban Passenger (in millions)		Non Suburban Passenger (in millions)		Total (in millions)	
		No. of Passenger	per cent growth	No. of Passenger	per cent growth	No. of Passenger	per cent growth
	1991-92	2412.00	-	1637	-	4049	-
VIII	1992-93	2297.56	(-) 4.74	1467	(-) 10.38	3764.56	(-) 7.02
	1993-94	2317.96	0.89	1406	(-) 4.16	3723.96	(-) 1.08
	1994-95	2449.69	5.68	1485	5.60	3934.69	5.66
	1995-96	2526.98	3.16	1534	3.30	4060.98	3.21
	1996-97	2640.89	4.51	1575	2.61	4215.89	3.81
IX	1997-98	2726.54	3.24	1691	7.37	4417.54	4.78
	1998-99	2724.83	(-) 0.06	1744	3.13	4468.83	1.16
	1999-00	2826.38	3.73	1814	4.01	4640.38	3.83
	2000-01	2931.51	3.72	1972	8.71	4903.51	5.69
	2001-02	3075.56	4.91	2094	6.19	5169.56	5.42
X	2002-03	3011.45	(-) 2.08	2037	(-) 2.72	5048.45	(-) 2.34
	2003-04	3076.75	2.17	2126	4.73	5202.75	3.06
	2004-05	3275.36	6.46	2200	3.48	5475.36	5.24
	2005-06	3442.06	5.09	2444.18	3.48	5886.24	7.50
	2006-07 (BE)	3646	5.93	2596	6.22	6242	6.05

Passenger traffic is subject to supply-side constraints in some cases and is also highly sensitive to passenger fares; dips in demand are invariably associated with upward revisions in fares. Although the growth rate of passenger traffic was only 2.17 per cent during the first three years of Tenth plan period, there has been a substantial pick-up in growth in the latter years .This provides an optimistic setting for the Eleventh Plan period. Three scenarios of passenger growth have been worked out with sub-urban growth rates between 3 to 4 per cent, non-suburban, between 7 to 8.5 per cent and overall growth rates between 5 per cent and 6 per cent. (Table 4.2 below)

Table 4.2 Projections for Originating Passengers (In Million)

YEAR	**SUBURBAN**			**NON-SUBURBAN**			**TOTAL**		
2006-07 (BE)	**3646**			**2596**			**6242**		
	Proposed Growth Rate			**Proposed Growth Rate**			**Proposed Growth Rate**		
	Sc. 1	**Sc. 2**	**Sc. 3**	**Sc. 1**	**Sc. 2**	**Sc. 3**	**Sc. 1**	**Sc. 2**	**Sc. 3**
2007-08	3908	3920	3927	2811	2831	2830	6720	6751	6757
2008-09	4026	4049	4065	3030	3059	3071	7056	7108	7136
2009-10	4146	4183	4207	3262	3319	3332	7408	7502	7539
2010-11	4271	4321	4354	3508	3601	3615	7779	7922	7969
2011-12	4399	4463	4507	3768	3908	3922	8168	8371	8429
Compounded Growth Rate (in percentage terms)	3	3.3	3.5	7.7	8.1	8.5	5	5.5	5.6

The opening up of the economy, renewed emphasis on passenger business and the increased propensity to travel has resulted in the increase in the number of passengers. Keeping in view these factors it is expected that there will be 3 per cent growth in suburban traffic while overall passenger traffic (suburban and non-suburban) is expected to grow at the rate of 5 per cent per annum.

The share of upper classes in the overall passenger traffic is less than 1 per cent and that in the non-suburban segment slightly higher at 2 per cent. However, its share of the overall passenger earnings is much higher at 18 per cent. It is expected that with increasing prosperity and aspiration levels, the current trend of higher growth of upper-classes especially AC-3 Tier would continue. Class-wise projections of growth of non-suburban passenger traffic has been worked out on the basis of this assumption and is given in Table 4.3 below.

Table 4.3 Projection of Growth of Non- Suburban Passengers (in Millions)

Class	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	Percentage growth (in %)
1st AC	1.30	1.37	1.43	1.50	1.57	1.63	5
2nd AC	13.55	13.96	14.38	14.81	15.25	15.58	3
3rd AC	23.37	25.24	27.38	29.84	32.54	35.06	10
First M/Exp.	0.75	0.45	0.27	0.16	0.09	0.00	-20
First Ordinary	2.19	1.31	0.79	0.47	0.28	0.00	-20
ACCC	10.68	11.21	11.83	12.54	13.36	14.42	7
Sleeper M/Exp.	190.70	204.05	219.35	236.90	257.04	276.52	9
Sleeper Ordinary	4.95	5.05	5.16	5.29	5.48	5.69	3
Second M/Exp.	525.46	567.04	611.16	657.96	707.58	760.19	8.93
Second Ordinary	1832.19	1981.61	2138.28	2302.58	2474.90	2659.82	9.03
Total	2605.14	2811.29	3030.03	3262.05	3508.09	3768.91	8.93

Strategies for the Plan

The Eleventh Plan passenger traffic projections are shown in Table 4.4. In terms of originating passengers it is expected that the Railways will carry 8400 million passengers by the terminal year of the Plan.

Table 4.4 Projections of Passenger Traffic

	2006-07 (RE)	2011-12
Originating Passengers (in millions)	6242	8400
Passenger Kilometers (in billions)	700	880

The Plan will focus on reducing the cost of operations, developing attractive service packages, and adoption of competitive pricing to safeguard share of upper class travel vis-à-vis airlines.

Capacity of Coaches and Train Composition

To cater to the projected growth of non-suburban traffic at 8-9% p.a., it would be necessary to expand supply by increase in train services and augmentation of seating capacity of trains. Work is already under way to increase seating capacity by 15 per cent – 20 per cent in 3AC and GSCN. Longer trains with modified passenger coaches with increased seating capacity on dense routes, double-decker AC coaches for inter-city travel, and full AC trains between state capitals are some of the steps being considered.

Considering the growth in second class travel both ordinary and reserved type, it is proposed that more trains with composition of GS and GSCN would be introduced on busy and popular routes.

Train Loads

Augmentation of train loads to 23/24 coaches and in certain cases 26 coaches for well-patronized trains are proposed. Initially, 26 coach trains would be introduced only on selective routes where additional investment is low. The running of longer passenger trains results in reduction in the unit cost per train kilometre and increase in the revenues. For running these trains, more powerful locomotives on non-electrified routes and high capacity power cars will be required. Yards and terminals will need to be redesigned to accommodate and maintain these rakes.

Decongesting major passenger terminals

Major passenger terminals need to be decongested. For achieving this, coach utilization will be optimized through reductions in lie-over periods; rakes will be standardized for greater flexibility in utilization in alternate services; terminal facilities like proper lighting, watering, jet cleaning and provision of sufficient stabling lines will be improved; modular stalls for catering/ vending will be provided and food plazas will be planned on the first floor or mezzanine floor. While planning for expansion of major terminals or development of new terminals, proper dispersal of passengers will be planned through provision of inter-modal transfer facilities for like bus terminals.

Another way to decongest major passenger terminals particularly in metropolitan towns would be by provision of halts at convenient points short of the main terminal in both directions.

High Speed Trains

Increase in Speeds to 150/160 kmph

To improve speeds and capacity on the main trunk routes it is proposed to upgrade passenger train speeds to 150/160 kmph. Delhi-Agra-Bhopal-Nagpur-Chennai, Delhi-Kanpur-Lucknow and Delhi-Kanpur-Howrah have already been identified for running of 150 kmph trains. Gradually other trunk routes on the Golden Quadrilateral and diagonals would be made fit for running 150 kmph trains.

High Speed Passenger Corridors

The rapid growth of the economy, rising industrialization and urbanization and unprecedented growth in inter-city travel has opened infinite possibilities for developing high-speed passenger corridors. These trains will cover distances of up to 600 kms in about three hours. All alternatives including Private Public Partnership will be considered for implementation of these corridors.

These energy efficient and environmental friendly systems are relevant in the context of growing concerns about global warming. There is also a need to close the technological

gap between the developed countries and India in this respect. High-Speed Rail requires modern and state-of-the-art signaling / communication and maintenance practices for infrastructure and rolling stock. Such technological know-how and engineering skills would have tremendous spin-offs for the Indian industry.

Pre-feasibility studies for a few identified corridors for building and operating special trains capable of 250-350 kmph shall be carried out – one each in the Northern, Western, Southern and Eastern region of the country. A number of corridors like Mumbai-Ahmedabad, Delhi-Chandigarh-Amritsar, Delhi-Jaipur, Chennai-Bangalore, and Chennai-Coimbatore-Ernakulam, Howrah-Dhanbad-Patna etc., have the potential for High-Speed passenger services.

Commuter-like traffic around big cities

Railways already have a scheme in place for running of various categories of trains like suburban (EMU, MEMU, DEMU etc) inter-city trains, passenger trains around big cities. A Committee of Executive Directors was constituted to study the introduction of MEMU/DEMU service for the next five years. The Committee has recommended the use of MEMU/DEMU for a distance of 160 kms. *Based on the report, it is planned to acquire 55 units each of MEMU & DEMU (1 Motor Car & 3 Trolley Cars) per annum.*

Improvement of slow moving passenger trains

Slow moving trains affect capacity severely and certain steps need to be taken to remedy this. The commercial speeds of passenger trains are low on account of high frequency of stoppages as well long duration stoppages. Therefore the stoppages of trains at wayside stations will be reduced to one minute. Optimization of timings will be attempted to reduce time loss in precedence. Parcel traffic for wayside stations will be cleared by passenger trains selectively. Separate parcel trains are planned and the details are discussed in the section on Parcel business.

Uneconomic Branch Lines

The uneconomic branch lines can be classified into two categories, those with tourism potential and those without. The Hill sections on Indian Railways, primarily Darjeeling, Shimla, Ooty are being identified for development. The development in these areas is being planned in collaboration with private operators with the assistance of IRCTC. For other routes, which do not have tourism potential suitable models for maintenance and operation will be evolved in partnership with State Governments.

Traffic requirements of the Northeast

In the North Eastern region the Railway network extends over the state of Assam but has a small presence in the states of Tripura, Nagaland, Arunachal Pradesh, Manipur and Mizoram. Construction of railways in this region is costly due to the terrain. However for strategic reasons as well as for the development of the North Eastern Region a national level policy of expanding the railway network in the region is absolutely essential.

A number of new line and gauge conversion projects are in progress in the region. Three of these are aimed at providing connectivity to the capital city, namely Kumarghat - Agartala (Tripura), Harmuti - Itanagar (Arunachal Pradesh), Jiribam - Imphal (Manipur). A Rail-cum-road mega bridge at Bogibeel near Dibrugarh will connect the north and south bank is another big project. Some of the other works are gauge conversion of New Jalpaiguri-Siliguri-New Bongaigaon Section, Lumding – Silchar, Kathkhal – Bairabhi, and Rangia – Murkongselek, restoration of Senchoa – Silghat and Haibargao – Mairabari lines and a new line from Dudhnoi to Depa. The total cost of these projects is in the order of Rs. 6,000 crores. On an average about Rs. 500 crores per year are being spent for projects in progress in the Northeast region. *However in order to complete all the projects in hand within the Eleventh plan period as well as meeting with the requirement of the expansion of railway network, a total of* ***Rs. 8000 crores*** *will be required.*

Suburban Business

The class-wise projection of the growth of suburban traffic is given in Table 4.4 below.

Table 4.5 Projection of Suburban Passengers Growth

(Passengers in Million)

Class	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	Annual percentage growth (Compounded)
Second Class	3575.55	3682.81	3793.30	3907.10	4024.31	4145.04	3
Upper Class	219.34	225.93	232.70	239.68	246.87	254.28	3
Total	3794.89	3908.74	4026	4146.78	4271.18	4399.32	3

Expansion/improvement of suburban services

Suburban rail services play a major role in urban transport in the metropolitan cities and due to the fast pace of urbanization it is projected that about 50 per cent of Indian population would be living in urban areas by 2031. Existing rail infrastructure in and around the major cities having million plus populations is already saturated. The suburban services would also require separation from main line systems in places like Mumbai. The emphasis in suburban services would be to increase peak time services, and augment trains to 12 car rakes. Suburban EMU services with regenerative braking features for energy conservation and efficiency and introduction of stainless steel EMU coaches to improve the aesthetics will be considered.

The Mumbai suburban services are severely strained and will be augmented with the capacity additions as part of the MUTP works. The introduction of air-conditioned suburban coaches/trains will also be considered, if possible through public private partnerships. More MUTP works at Mumbai and other works in Chennai and Kolkata will be taken up for improvement/expansion of suburban and metro services.

The throw-forward for Metropolitan Transport Projects (MTP) at the end of the Tenth Plan Period is Rs. 3860 Crores. In order to speed up the projects and take up other urgently required works, it is proposed to provide Rs. 500 Crores per annum under this plan-head as against Rs.300 crores of the annual allocation during the Tenth Plan Period. *Thus, considering an allocation of Rs. 500 Crores per annum, the fund requirement for the Eleventh Five Year Plan Period works out to* ***Rs. 2500 Crores*** *for MTP Projects and This, however, excludes Rs. 2250 Crores that may be required for MUTP Phase-II in Mumbai (Plan head 81).*

Metropolitan Transportation Models for Other Cities

Existing rail infrastructure in and around the major cities like Ahmedabad, Chennai, Hyderabad, Jaipur and Patna is already saturated. Accordingly, project proposals for these cities should ideally be based on a new corridor, and as far as practicable on alignments adjacent to the existing corridors. The advantages of a new corridor are many:

a) It can be structured *ab initio* to meet specific requirements in terms of the number (capacity) and frequency (headway) and, consequently, the reliability of the desired services;
b) Both cost and revenue streams could then be made independent of the existing corridor and thus amenable to full accounting transparency;
c) The development of interfaces required with other modes of transport (such as road)) and support systems (such as issue of multi modal tickets, etc.) can be facilitated more readily.

For the development of IR Integrated MTPs different models of financing and execution need to be considered. It is now felt that it is not enough to share the cost alone but State Government must also share the operating losses.

International experience is clearly indicative of the fact that for MTPs to be financially viable and sustainable, they need to utilize the full potential of commercial exploitation – through the development of residential housing/colonies and commercial complexes, advertising and other innovative initiatives – on and along the corridor and, also, be supported by appropriate monetary and fiscal policies. In other words, the techno-economic feasibility analysis of the project must necessarily be backed by a comprehensive business plan. Besides quantifying the State Government's intentions in respect of the lands it proposes to earmark for the project, the support it proposes to extend to the project's activities (including commercial exploitation) by way of complementary tax and other policies must be laid out/committed at the project formulation stage itself. Unlike in the past when complete dependence on Railways and / or the Central Government was the norm, State/City Governments have of late proven themselves as willing and capable of fulfilling the role and responsibilities of 'promoter' in case of major infrastructure projects – besides DMRC. The recent sanction of stand alone metro rail projects for the cities of Mumbai and Bangalore, wherein investments in the scale of about Rs. 200 – 250 crores per km of tracks have been projected, are cases in point.

Further, State Governments are now achieving success in their attempts to create infrastructure and also raise resources/funds for city development through the adoption of innovative techniques. In view of the predominant role of the State Government, it should have the option of selecting the mechanism of project implementation – whether creation of a State PSU or any other SPV, including public private partnership (PPP) arrangements. Given IR's integral role in the project, the techno economic feasibility studies as well as the business plans must be prepared jointly with it. It would be responsibility of the selected mechanism to find the funds, financial sources for the project. The designated agency should be extended requisite autonomy in respect of the development of networking plans, operating norms and strategies, fixation of tariffs, commercial exploitation of all spaces in and around the project corridor, etc. *During the Eleventh five-year plan, Indian Railways will work with concerned State governments and design a model contracting agreement that can be the basis for all future suburban projects.*

Passenger Amenities and Services

The stations over Indian Railways were earlier categorized in 6 categories based on passenger earnings as shown in Table 4.6.

Table 4.6 Station Categories

S.No.	Category	Criteria
1	A	Non-suburban stations with an annual passenger earnings of Rs. 6 crores and above
2	B	I. Non-suburban stations with an annual passenger earnings between Rs. 3 Crores and Rs. 6 Crores II. Stations of tourist importance, or an important junction station (to be decided by General Manager)
3	C	All Suburban Stations
4	D	Non-suburban stations with passenger earnings between Rs.1 and Rs. 3 Crores
5	E	Non-suburban stations with passenger earnings less than Rs. 1 crores
6	F	Halts

A-1 is a new station category for stations with earnings of more than Rs. 50 crores. The total number of railway stations on Indian Railways, category-wise are broadly as given in the table below.

Table 4.7 Category wise number of stations

Category	No. of Stations
A-1	40
A	233
B	198
C	432
D	432
E	4889
F	1831
Total:	**8055**

Passenger Amenities

For the convenience of passengers travelling by railways, certain passenger amenities are required to be provided by the Railways at stations. These facilities can be divided into two groups namely, a) infrastructural facilities viz., platforms, waiting halls, waiting rooms, refreshment room, retiring rooms, foot over bridge, toilets, sitting arrangements, lights, fans, water cooler and b) service related facilities viz STD/PCO booths, cyber cafes, IVRS, UTS, public address system, signage, booking & enquiry facilities.

The various types of passenger amenities have been broadly classified into 3 categories, minimum essential amenities, recommended amenities and desirable amenities. Detailed guidelines have already been laid down stipulating the various types of amenities to be provided at various stations based on the station's category.

Infrastructural Facilities

An amount of Rs. 1175 crores will be required for upgradation of around 600 stations identified for development into model stations (Plan head 53). 19 metro and mini-metro stations have also been identified for development into world-class stations through the PPP route. *In addition, Rs 1055 crores will be required to develop adequate terminal capacities in major cities, state capitals and tourist centres (Plan head 16).* Efforts will be made to mobilize maximum amount for this purpose through PPP route. The newly set up Rail Land Development Authority (RLDA) has been given the task of developing metro stations into world-class modern stations and provide passenger amenities through construction of food plazas, and shopping malls. RLDA will carry out this through commercial development of railway land and air space that will include redevelopment of station premises.

In the last two years the thrust of the Railways have been to bring about perceptible improvements in the amenities and services provided to the passengers. Keeping this in view Railways have identified 'Touch & Feel' items for special attention, which include beautifying all metro, mini metro and city stations through public-private-partnerships by leveraging advertisement and publicity potential on the Indian Railways, providing ATM, AVM, cyber café and other modern amenities at major stations and maintaining high standards of cleanliness in trains and at stations. The plan is also to improve the lighting particularly on platforms, concourse, waiting halls, circulating area, booking, reservation

and enquiry offices and providing congestion free circulating area at all important stations. Upgrading waiting rooms, waiting halls and retiring rooms through public private partnership initiatives are among the other measures proposed. The list also includes improved station signages, installation of train running position indication boards, improved announcement systems, upgraded booking and enquiry offices, and ensuring availability of drinking water. Catering is another area identified for improvements along with other on board train services including bedrolls. It is also proposed to set up base kitchens through the public-private partnership. IRCTC shall award the franchise to the private agencies. Budget Hotels are also planned at 100 locations.

For the year 2006-07, on each Division 5 stations, have been selected for bringing about visible improvement in these areas. In the Eleventh five-year Plan, it is proposed to take up 5 additional stations on each Division (a total of 335 stations) every year for upgradation of these 'Touch & Feel' items. This would cover another 1675 stations.

Terminals

Terminal Capacity is an important determinant of carrying capacity affecting the flow of passenger and freight trains. Full benefits of the line capacity works like new line, gauge conversion, doubling and traffic facilities works cannot be derived until terminal constraints are removed. It is imperative that terminals are developed simultaneously to handle the projected levels of traffic with special emphasis on adequate amenities at for passengers. Metropolitan cities in India are hubs of activities for both passenger as well as freight traffic. In order to make Indian Railway a world-class railway system, substantial improvements to terminal facilities are required as listed under.

Table 4.8 Mega Terminals in Metropolitan Cities (Rupees in Crores)

S.No.	Metropolitan City	Name of the work	Cost
1.	Delhi	Upgradation of Delhi/New Delhi/Nizamuddin	500
		Anand Vihar – Phase-II	500
		Bijwasan*	100
		Shakurbasti	100
		Holambi Kalan*	100
2.	Kolkata	Chitpur Terminal	100
		Expansion of existing Howrah terminal	50
3.	Mumbai	Mumbai Area Terminals	200
4.	Chennai	New passenger terminal in Chennai area	200
5.	Bangalore	New terminal at Baiyyapanahalle	50
6.	Secunderabad	Secunderabad expansion	25
		Hyderabad expansion	25
	TOTAL		1950

***** *Proposal is for an integrated coaching and freight terminal*

Rs.1950 Crores required for Mega Terminals at Metropolitan cities will be provided in the Eleventh Plan (Plan head 16).

Table 4.9 Terminals in State Capitals, important tourist destinations

S.No.	Railway	Name of Station	Cost (Rs. In crores)
1.	CR	Nagpur – 2nd Coaching Terminal	25
	CR	Pune	20
2.	ER	Bardhaman	25
	ER	Asansol	25
	ER	Bhagalpur	50
3.	ECR	Patna – New terminal at Mahendrughat	50
	ECR	Darbhanga	20
	ECR	Samastipur	20
	ECR	Muzaffarpur	20
	ECR	Dhanbad	20
	ECR	Gaya	20
4.	ECOR	Bhubaneshwar	25
	ECOR	Cuttack	25
	ECOR	Puri	25
5.	NR	Varanasi	20
	NR	Dehradun	20
	NR	Ludhiana	20
	NR	Amritsar	20
	NR	Jalandur	20
	NR	Jammu	20
6.	NCR	Allahabad	25
	NCR	Kanpur	20
	NCR	Agra	25
	NCR	Mathura	20
7.	NER	Lucknow Junction	20
	NER	Gorakhpur	20
8.	NFR	Guwahati area – New terminal at Kamakhaya	20
9.	NWR	Jaipur	20
	NWR	Jodhpur	10
	NWR	Ajmer	10
10.	SR	Kochuveli – Phase-II - 2nd Coaching Terminal for Trivandrum	25
	SR	Thirrucherapalli	10
	SR	Madurai	10
	SR	Coimbatore	10
	SR	Mangalore	10
11.	SCR	Nanded	100
	SCR	Vijayawada	25
	SCR	Tirupati - 2nd Coaching Terminal	20

S.No.	Railway	Name of Station	Cost (Rs. In crores)
	SCR	Visakhapatnam	20
12.	SER	Hatia – Expansion	20
13.	SECR	Raipur	10
14.	SWR	Mysore	10
	SWR	Vasco-da-gama	10
15.	WR	Ahmedabad area	25
	WR	Vadodra	10
	WR	Surat	10
	WR	Indore	10
16.	WCR	Kota	10
	WCR	Jabalpur	10
	WCR	Bhopal	20
	TOTAL		**1055**

Rs.1055 Crores required for upgradation of passenger terminals at capital cities and places of tourist importance will be provided in the Eleventh Plan (Plan head 16).

Service related facilities

Physically Challenged/Senior Citizens

In line with the provisions of Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1995, Indian Railways are designing and are manufacturing coaches which have a separate compartment specially designed for wheel chair borne passengers including a suitably designed toilet. *During the Eleventh Plan period all mail/express trains shall be provided with these coaches (Plan head 53).* In addition, trains having air-conditioned accommodation would also be provided with air-conditioned compartments for disabled persons in these specially designed coaches.

Ticketing and enquiry and IT-enabled facilities

These areas will be given utmost importance during the Eleventh Five Year Plan with a view to achieving complete computerization of reserved and unreserved ticketing system. Computerised reservation network already covers over 1300 locations, including 600 district headquarters and a number of non-railhead locations. Unreserved Ticketing System (UTS) is presently available over 600 locations, and expected to reach around 1300 locations by the end of March 2007. This would cater to nearly 93 per cent of passenger earnings. Other stations, numbering more than 4000 will be on the network in the early part of the Eleventh Plan. User-friendly self-operated ticketing machines are being developed and installed. Automatic ticket vending on heavy passenger routes, especially on suburban sections, is being introduced in the current financial year as a pilot project on Western and Central Railways. Such machines will eventually be extended to all metro cities and suburban sections in the country (including non-railhead locations). These machines would be accessible through smart card, debit card/credit card and cash. Ticket distribution shall be further widened using infrastructure of a host of agencies such as post offices, banks, ATMs etc. Smart card based ticketing will also be tried. IT enabled services would also be available in the field of claims and refunds. On- train services will

include Internet services, ticketing and transmission of LIVE news, virtual office, and entertainment on demand, in the future.

Ongoing work for setting up of Integrated Train Enquiry System comprising both Interactive Voice Response System (IVRS) and manual enquiry provisions for dissemination of information on train running status, PNR status and availability of accommodation will be completed. This would enable a passenger to access the service by dialing a universal number (139) as a local call without prefixing any STD code and get connected to Interactive Voice Response System (IVRS). Even for manual enquiry, he will be guided through Interactive Voice Response System (IVRS). The Board has approved a remunerative and self-sustainable model along with the proposed basic enquiry and premium services and guidelines in this regard have already been conveyed to IRCTC & CRIS who will set up the ITES by appointing franchisee. SMS based services will also be provided. *All expenses for these amenities will be charged to Plan head 53.*

Cleanliness at Stations and in Trains

Provision of washable aprons at stations particularly on platforms where trains stop at morning hours is considered essential for improving the sanitation at stations. It is proposed to provide these at all major stations. A new design of washable apron of ballast less technology is being considered on a trial basis. Though the initial costs of these aprons are slightly more but they have a longer life (around 20 years) and involve less maintenance.

Mechanisation of the cleaning process is also being planned. Railways have started the "Clean Train Station" scheme at identified stations under which extensive mechanized cleaning attention is given to toilets, doorways, window glasses of AC Coaches and removal of garbage from dustbins. It is proposed to extend the system to about 50 locations by the middle of the Eleventh Plan period. Mechanized processes would also be developed for cleaning of trains at terminals.

Railways will also endeavour to provide Controlled Discharge Toilets in trains that permit discharge only after the train has attained a minimum speed after a certain number of flush cycles having been performed. This arrangement will enable prevention of discharge near bigger stations/densely populated areas as trains generally pass such areas at relatively slow speeds. This toilet design thus prevents direct discharge of waste at stations. *It is proposed to fit approximately 1000 such toilets every year at approximate cost of Rs.20 crores per year (Plan head 53).*

CHAPTER FIVE: CAPACITY ENHANCEMENT

New Line Projects

There is already a large shelf of new line projects with the Railways. Out of the 91 new line works, 14 works have already been completed and 77 works are yet to be completed. The budget allocation for the Year 2006-07 is Rs.1510 Crores. Therefore, the throw-forward at the end of the Tenth Plan Period, i.e. by March 31, 2007 will be Rs.27200 Crores. The physical throw-forward will be about 8300 kms. Projects that are essential from an operations point of view are listed in the Table 5.1.

Table 5.1 New Lines Required **(Rs. in Crores)**

S.No.	Railway	Work	Cost	Railway's Share	Remarks
1.	SCR	Jaggayapet to Mallecheruvu and Vishnupuram to Janapahad	100.00	100.00	To be sanctioned
2.	SCR	Bhadrachalam Road and Bhavanipalem (37 km)	100.00	100.00	To be sanctioned
3.	SCR	Obvularapalle-Krishnapatnam Port (113 KM)	426.34	127.92	Railways' Equity restricted to 30per cent
4.	SECR	Dallirajhara-Jagdalpur (235 KM)	940	447.18	Railways equity restricted to 47 per cent
5.	SWR	Kottur-Harihar (65 KM)	135.55	52.86	Deposit: Rs.82.69 Crores
6.	ECR	Shivpuri-Tori		0	Deposit Work
7.	ECR	Koderma-Ranchi (189 KM)	1033.04	344.28	Deposit: Rs.688.76 Crores
8.	ECR	Koderma- Tilaiya (68 KM)	354.37	354.37	
9.	ECR	Rajgir-Hisua-Tilaiya (46 KM)	245.17	245.17	
10.	ECOR	Haridaspur-Paradeep (82 KM)	594.34	178.30	Railways' Equity restricted to 30 per cent
11.	ECOR	Angul-Sukinda (98.7 KM)	344.00	103.2	Railways' Equity restricted to 30 per cent
12.	SR	Attiapattu-Puttur/Tiruvallur via Periapalayam	324.00	97.2	Railways' Equity restricted to 30 per cent
13	WR	Surat-Hazira New Line	98.98	29.69	Railways' Equity restricted to 30 per cent
14	SR	Idapally-Vallarpadam (8.5 Km)	246.5	0	Deposit Work of Min of Shipping
15	CR	Dedicated Freight Line between Wadala and Kurla	100	0	Deposit work of Mumbai Port Trust
		T O T A L	**3340.4**	**2180.17**	

As is evident from the above table, the Railway's Share for the remunerative New Line Projects for the Eleventh Five Year Plan is likely to be Rs.2200 Crores. Apart from the above-mentioned projects, remaining new line projects are not financially remunerative but are socially desirable projects.

Two major projects namely, new line work in Jammu Tawi-Udhampur-Baramullah and gauge conversion of Lumding-Badarpur-Silchar, have been declared as national projects. A provision of Rs.7000 Crores is to be earmarked for these national projects alone. During the Tenth Plan Period, the average utilization of funds under New Line Plan-head was Rs.1500 Crores per annum. *Keeping in view the large-scale traffic growth, it is proposed to increase the allocation under new line plan-head from Rs.1500 Crores per year to Rs.1800 Crores per year and the total requirement for new line project thus works out to* ***Rs. 9000 Crores*** *excluding the cost of national projects (Plan head 11).*

Gauge conversion

Out of the 68 gauge conversion works, 16 works have already been completed and 52 works are yet to be completed. The Budget allocation for the Year 2006-07 is Rs.1450 Crores. Therefore, the throw-forward at the end of the Tenth Plan Period, i.e. by March 31, 2007 will be 10,500 Crores. The physical throw-forward will be 6700 kms.

The uni-gauge objective is proposed to be taken up as a mission in the Eleventh plan as many of the MG/NG routes, on conversion, have the potential to become alternate routes. In order to complete the MG/NG Gauge Conversion works excluding those already sanctioned would require an additional amount of Rs.4835 Crores. *Total funds required to complete the important on-going sanctioned gauge conversion works and the alternate / important MG / NG routes is* ***Rs.18700 Crores*** *in the Eleventh Plan (Plan head 14).*

Doubling

There are as many as 144 doubling works, out of which, 36 works have already been completed and 108 works are yet to be completed. The allocation for the Year 2006-07 is Rs.1056.8 Crores. Therefore, the throw-forward liability at the end of the Tenth Five Year Plan, i.e. at 31.03.2007 would be Rs.6000 Crores while the physical throw-forward will be 2800 kms. All the doubling projects are financially remunerative. In addition to these sanctioned projects, there are remunerative doubling projects that are required to be taken up during the Eleventh plan. Table 5.2 provides the details.

Table 5.2 Doubling Works Required

S.No.	Railway	Work	Cost (Rs. in Crores)	Remarks
1.	CR	Panvel-Pen Doubling (35.46 KM)	96.17	Additional traffic of coal and steel
2.	CR	Doubling of Daund-Gulbarga (503 Km) with electrification	1070	
3.	CR/SCR	3rd and 4th Line between Itarsi-Nagpur-Ballarsha –Kazipet-		Part of North-South Dedicated Freight

S.No.	Railway	Work	Cost (Rs. in Crores)	Remarks
		Vijaywada		Corridor
4.	ECOR	Doubling of Titlagarh-Raipur (203 KM)	481.00	Additional traffic of coal, steel and Vishakhapatnam Port
5.	ECOR	4th line between Kotavalassa-Simhachalam North (16.69 Km)	86.00	Traffic growth on East Coast Route
6.	ECOR	Doubling of Banspani-Daitari (155 Km)	1182.00	
7.	ECOR	Doubling of Talcher-Sambalpur (169.57 Km)	508.71	
8.	ECOR	3rd line between Jakhpura-Haridaspur (23.53 km)	70.58	
9.	NR	Jakhal-Bhatinda (98 Km)	294.00	Coal traffic for Suratgarh Power House and Food Grain Traffic
10.	NR	Laksar-Haridwar-Dehradun (78.83)	250.00	To ease out existing capacity constraints
11.	NR	Lohta-Janghai (69.24)	207.72	
12.	NR	Anand Vihar-Tilak Bridge-3rd and 4th Line	150.00	
13.	NR	3rd Line between Sabzi Mandi-Ambala (194.37 Km)	583.11	
14.	NR/NER	Rosa-Sitapur-Burhwal (160.44 km)	481.32	
15.	NCR	4th line between Palwal-Mathura (Bhuteshwar) along with yard remodeling at Mathura (81 Km)	243.00	To segregate the stream of traffic for CR/WR right from TKD to Mathura
16.	NCR/WCR	3rd and 4th Line between Jhansi-Bina-Bhopal-Itarsi		Part of North-South Dedicated Freight Corridor
17.	NER	Doubling between Barabanki-Bhurwal (27.57 Km)	82.71	To decongest traffic
18.	NER	Doubling between Bhatni-Baitalpur (35.27 Km)	71.59	Only Single line patch on the GHY route
19.	NER	Doubling of Varanasi –Allahabad (124.31 Km)	321.00	To increase throughput
20.	NFR	Doubling of Guwahati-Lumding (180.59 Km)	541.77	To ease out the capacity constraint
21.	SR	Doubling between Kankanadi-Panambur (19.34 KM)	73.54	Additional Iron Ore Traffic to Mangalore Port
22.	SR	Doubling of Vijayawada to Gudur		Part of North-South Dedicated Freight Corridor

S.No.	Railway	Work	Cost (Rs. in Crores)	Remarks
23.	SCR	3rd Line between Kazipet-Secunderabad (130.73 km)	391.59	
24.	SECR	3rd and 4th Line between Jharsuguda-Champa		Part of East-West Dedicated Freight Corridor
25.	SECR	4th Line between Champa-Bilaspur-Bhillai-Durg		Part of East-West Dedicated Freight Corridor
26.	SER	Doubling of Panskura-Haldia-Phase-II – between Rajagoda and Durgachak	150	Port Connectivity work (RVNL has found the project unbankable and returned the project to Board to execute the work within the Railways)
27.	SER	3rd and 4th Line between Kharagpur-Chakradharpur-Jharsuguda		Part of East-West Dedicated Freight Corridor
28.	SER	3rd and 4th Line between Panskura-Kharagpur (44.69 km)	268.14	
29.	SWR	Hospet-Hubli-Londa-Vasco – Doubling (286 KM)	1200.00	Iron Ore and Coaking coal traffic from and to Goa Port
30.	WCR	Kota-Bina (303.1 km)	909.3	Coal Traffic from SCCR to KTPS, Fertilizer traffic from Gadepan (Kota), CFCL and NEL, Vijayapur
31.	WR	Doubling of Udhna-Jalgaon (306 KM)	605.95	To ease out capacity constraints
32.	WR	Doubling of Viramgam-Surendranagar section (65.26)	195.78	
		TOTAL	**13537**	

A number of doubling projects (Items 16, 21, 23, 24 and 26) will form part of the future Dedicated Freight Corridors. The projected cost of the remaining new doubling works for the Eleventh Five Year Plan works out to Rs.13537 Crores. Since most of the doubling projects are financially remunerative and will enhance capacity and throughput, it is proposed to complete all sanctioned doubling projects by the end of Eleventh Plan. *It is proposed to allocate **Rs.19000 Crores** for doubling projects including the throw-forward in the Eleventh Five Year Plan (Plan head 15).*

Traffic facility works

Grade Separators/Flyovers & By-pass Lines

In order to ensure free flow of traffic at junction stations, it is essential that different streams of traffic be segregated by providing grade separators (flyovers) or by-pass lines. A list of proposed grade separators / flyovers / by-pass lines at major junction stations is given in Table 5.3. This list could be further expanded / modified based on change in traffic patterns.

Table 5.3 Grade Separators / Flyovers / Bypass Lines (Rs. in Crores)

S.No.	Grade Separators/Flyovers/By-pass lines	Cost
1.	By-pass at Kharagpur	75
2.	Jharsuguda	75
3.	Nagpur –Wardha area	75
4.	Bhusaval and/or Jalgaon	75
5.	Bhopal	75
6.	Itarsi	75
7.	Khurda Road	75
8.	Vizianagaram	75
9.	Nagda / Ratlam	75
10.	Godhra	75
11.	Daund	75
12.	Arakkonam	75
13.	Bakhtiyarpur (ECR) for traffic of Barh powerhouse	75
14.	Tundla Flyover – Defreezing	75
15.	Dankuni Flyover – Recommissioning of the fly-over	75
16.	Katni	75
17.	Jalgaon and Udhna for Jalgaon-Udhna doubling	75
	TOTAL	**1275**

It is proposed that Rs.1275 crores will be provided for grade separators / flyovers in the Eleventh Plan (Plan head 16).

Freight Terminals

The originating freight loading is likely to touch 1100 million tones by the end of the Eleventh Plan period. The freight terminals capacities are given in the Table 5.5

Table 5.4 Goods Shed Capacities

S. No.	Railway	Full rake Goods shed	Half rake Goods shed	Full rake siding	Half rake siding	TOTAL
1.	CR	54	15	51	1	121
2.	ER	33	9	37	11	90
3.	ECR	27	6	72	5	110
4.	ECOR	32	10	46	18	106
5.	NR	160	14	77	10	261
6.	NCR	32	4	20	14	70
7.	NER*	42	14	5	1	62

8.	NFR*	46	9	9	6	70
9.	NWR*	97	17	5	1	120
10.	SR	42	11	57	6	116
11.	SCR*	94	10	67	6	177
12.	SECR	20	5	66	17	108
13.	SER	26	3	70	0	99
14.	SWR	51	0	27	0	78
15.	WR*	52	26	38	2	118
16.	WCR	35	0	31	0	66
	TOTAL	**843**	**153**	**678**	**98**	**1772**

***** *Includes both BG and MG*

In order to meet the target of 1100 million tones of originating freight loading by the end of Eleventh Plan, 50 new goods shed / siding will need to be constructed over the Railway network at a cost of Rs.10 Crores per terminal. Further 200 existing goods shed / siding will need to be upgraded / enhanced to cater to the additional traffic at a cost of Rs.2.5 Crores per terminal. *The total expenditure on freight terminals works out to* ***Rs.1772 Crores*** *during the Eleventh Plan period (Plan head 16).*

Other Traffic Facility Works

Works like provision of additional running lines at stations, conversion of 2-line station to a 3-line layout in order to ensure safety and improve operational flexibility at stations, conversion of halt stations into crossing stations, upgradation of signal interlocking at station, provision of intermediate block signaling to break the longer block section into smaller ones, are low cost Traffic Facility works which help in enhancement of capacity. As per the current estimate, the throw-forward liability for all such works in the Pink Book 2006-07 is approximately Rs.500 Crores. *Considering the fact that all these works will be completed in the next two years, a provision of* ***Rs. 2000 crores*** *is proposed for all such works in the Eleventh Plan period (Plan head 16).*

Logistic Parks

Logistic hubs can be developed along or near important railheads through joint ventures between state governments and Railways. These hubs will be strategically located to capture agro-industrial produce in the hinterland and to provide competitive transport to expand the access to markets for industries in the covered areas. These hubs could be developed as mini-freight villages or as logistics parks depending on the turnover. In the event of a large turnover, there is scope for accommodating a gamut of value added facilities like warehousing, refrigerated store houses, cranes and other handling facilities, packing/repacking, assemble, repairs, maintenance, financial services, agro marts, electronic centres, etc. These hubs can be developed through public-private partnerships on Build-Own-Operate basis as 24x7 service centers.

It is proposed to develop logistic parks integrating bonded warehousing, logistic processing, commodity exposition and logistic distribution. The key development is targeted at import / export logistic distribution facilitating international purchasers, third party & fourth party logistic companies and logistic agencies. *For development of such*

*logistic parks, it is proposed to provide **Rs.500 Crores** during the Eleventh Plan period (Plan head 16).*

Funds for Traffic Facility Works

Summing up all the above, the funds required for Traffic Facility Works in the Eleventh Plan Period is given in Table 5.5. As against the requirement of Rs. 8550 crores, Rs. 7500 crores are being allocated for these works.

Table 5.5: Traffic Facility Works (Rs. in Crores)

Mega Terminals at Metropolitan cities	1950
Terminals at State Capitals and important tourists places	1055
Grade Separators/Flyovers/Bye-pass lines	1275
Freight Terminals	1770
Other Traffic Facility works	2000
Logistic Park	500
TOTAL	**8550**

Electrification

By the end of the Ninth plan 16001 RKMs was electrified and during the Tenth Plan it was planned to electrify 1800 RKMs, with an outlay of Rs.1500 Crores.

Table 5.6 Electrification Progress

Year	Expenditure (Rs. In crores)	RKMs electrified
2002-03	251.97	455
2003-04	205.73	504
2004-05	183.58	320
2005-06	115.96	170
Total	**757.24**	**1449**
2006-07	273.50 (Outlay)	360 (Target)

The throw-forward liability as on 31.03.2007 works out to Rs.1080 Crores and the physical throw-forward to 1952 kms. During the Eleventh Plan Period, new routes would also be taken up for electrification to achieve a target of 3500 kms.

The total budget allocation for the Eleventh Five Year Plan is proposed as Rs. 3500 Crores to cater for all the sanctioned and identified railway electrification works and any new projects which may have to be taken up in addition to the above (Plan head 35).

Other Measures for Enhancing Capacity

25 Tonnes Axle Load on Iron Ore Routes

It is proposed to run 25 tones Axle Load Trains on iron ore routes of the Indian Railways spread over South Eastern, Eastern, East Coast, South Western, South East Central and South Central Railway. The details are given in Table 5.9.

Table 5.7 Iron Ore Routes

RAILWAY	WORK
ER	Asansol-Kalipahari-Durgapur via slow lines only
ECoR	Waltair-Kirandul section including Koraput-RGDA
	Daitari-Jakhpura-Cuttack-Paradeep
	JSG-Sambalpur-Titlagarh-Rayagada-Vijayanagaram-Vishakhapatnam
	SBP-SBPY-TLHR-NRG
SER	Kharagpur-Rupsa-Bhadrak
	Bondamunda-Barsuan-Kiriburu including BNDM-Birmitrapur
	Bondamunda-Nawagon-Purnapani- Hatia-Muri-Bokaro including DNC-Lohardaga
	Chandil-Anara-ADA-Damodar-BURN-Kalipahari including Anara-Rukni-Bhaga and Purulia-Kotshila
	BRKA-MURI-CHANDIL
	RKSN-DPS-Barajamda-GUA-BOLANI-BSPX JSG-BNDM-CKP-Tatanagar-KGP-Panskura-Haldia
SECR	Bhilai-Dhalli Rajhara
	Bhilai-Ahiwara
	JSG-CPH-BSP-DUG including Urkura-Mandichasaud
SWR and SCR	Hubli-Hospet-Bellary-Guntakal-Renigunta-Arakonam HOM/Ennore including Tornagallu-Ranjitpura and Hospet- Swami Halli branch lines Guntakal-Nandyal-Guntur-Vijayawada-Samalkot-Vizag Port Kanakapalli including Samalkot-Kakinada branch line Hubli-Londa-Castle Rock-Sanvordem-Curchorem-Madgaon Madgaon-Roha (KRCL) Ammasandra/Banasandra-Arsikere-Birur-Chikjajur-Harihar-Hubli Bellary-Rayadurg-Chitradurg-Chikjajur-Birur Arsikere-Hasan-Mangalore Hospet-Kottur-Harihar

Sections having 52 kg or 60 kg 90 UTS rails would be considered for 25-ton axle load train operation with suitable strengthening of ballast cushion and bridges wherever required. Premature renewal of 52 kg 90 UTS rails is not required for the 25-ton train operation and initially the trains may be operated with suitable speed restrictions, if required. *The financial implication for such up gradation works out to Rs. 2000 Crores for the Eleventh Five Year Plan (within Plan head 31).*

Dedicated Freight Corridor

The high-density network of the Golden Quadrilateral, which connects four metro cities of Delhi, Kolkata, Chennai and Mumbai including the diagonals, is popularly called the Golden Quadrilateral. Though comprising only 16 per cent of the network it carries more

than 50 per cent of the goods traffic and passenger traffic. This network is saturated at most of the locations.

Eastern and Western Corridors

In order to create capacity and improve quality of services, Dedicated Railway Freight Corridor Projects on Western and Eastern Routes were sanctioned in the Rail Budget of 2006-07. The costs of Western (1469 kilometers- Jawaharlal Nehru Port-Dadri/TKD) and Eastern (1232 kilometers - Ludhiana-Sonnagar) corridors are Rs. 16,592 crores and Rs. 11,589 crores respectively. The Eastern Corridor will in future be extended to Kolkata to connect the proposed deep-sea port in the region.

A Special Purpose Vehicle (Dedicated Freight Corridor Corporation of India Ltd.) has been formed to implement the Dedicated Freight Corridor Project on Indian Railways. The SPV will also implement the future corridors. The relationship between Ministry of Railways and the SPV will be codified in a Concession Agreement.

Apart from the above-named two corridors, planning for Dedicated Freight Corridors would be initiated in the Eleventh Plan Period for North-South, East-West, East-South, and South-South routes. North-South route is already saturated with line capacity utilization more than 140 per cent on Bina-Bhopal-Itarsi section and more than 120per cent on Nagpur-Ballarshah-Kazipet section. The route will need to be strengthened for movement of freight traffic between North-South. East-West Corridor has a line capacity utilization of more than 120 per cent on Durg-Bilaspur-Jharsuguda section. The route connects important Steel Plants and coalmines to the consumption centres and thermal power stations located in the West. East Coast Corridor connects the ports on the East Coast, iron ore mining areas and coalmines to the consumption centers in the South. Southern Corridor will provide better accessibility of ports on both West and East Coast to iron ore producers of Karnataka. Along with the DFCs, the feeder routes will also need to be strengthened.

Table 5.8 Requirement of Funds

Activity	**Funds (Rs. crores)**
Sanctioned DFC on Eastern and Western Route	35,000
New DFC	55,000*
Upgrading of Feeder Routes	15,000
Port Connectivity Works	2,000
Minor Port Connectivity's	500
Logistic Parks	500
Total	108000

* The requirement of funds will spillover to the next plan period for these projects

National Rail Vikas Yojana (NRVY) & Rail Vikas Nigam Limited (RVNL)

A largely non-budgetary, investment initiative for the development of Indian Railways, the *National Rail Vikas Yojana (NRVY)*, was announced by the Government during 2002. This initiative envisages removal of capacity bottlenecks in the critical sections of the railway network at an investment of Rs. 15,000 crores over the next five years. *Rail Vikas Nigam Limited (RVNL)* was incorporated for execution of the Golden Quadrilateral strengthening initiative under *National Rail Vikas Yojana*. *NRVY* is scheduled to be completed in a time frame of 5 years, except for the Mega Bridges. All projects, sanctioned as well as unsanctioned, to be taken up under the above 3 components of NRVY have been identified and transferred to RVNL, except the Mega Bridges.

Port Connectivity Works

The total volume of traffic handled by all ports during 2004-05 was 522 million tonnes, of which, 384 million tonnes, i.e. around 74 per cent was handled by Major Ports and remaining 138 million tonnes by non-major ports. In fact, during 2004-05, Major Ports have recorded a growth rate of 11.3 per cent, which is higher than the GDP growth rate. Out of the total traffic handled at major ports, petroleum products maintain the largest percentage at 33 per cent while iron ore is second at 20 per cent, coal and containers constitute 14 per cent each.

Ministry of Railways is committed to provide single / double line rail connectivity to ports. RVNL is implementing most of the port connectivity projects through Public Private Partnership by forming project specific SPVs. The total fund requirement for completing the identified sanctioned and unsanctioned works comes out to Rs.3824.31 Crores. The cost of these works is already included in the new line, gauge conversion and doubling Plan Heads.

Requirement of Funds (Plan heads 11, 14, 15, 16, 35, 81)

The total fund requirement for Eleventh Five-Year Plan is given in Table 5.10

Table 5.9 Capacity Enhancement -Requirement of Funds (Rs. in Crores)

S.NO.	PLAN-HEAD	COST (Plan head)
1.	New Line Projects	9000 (11)
2.	Gauge Conversion	18700 (14)
3.	Doubling	19000 (15)
4.	Traffic Facility Works	8550 (16)
4.1	Mega Terminals at Metropolitan cities **(details in Chapter on Passenger Business)**	1950
4.2	Terminals at State Capitals and important tourists places **(details in Chapter on Passenger Business)**	1055
4.3	Grade Separators/Flyovers/Bye-pass lines	1275
4.4	Freight Terminals	1770
4.5	Other Traffic Facility works	2000
4.6	Logistic Park	500
5.	Railway Electrification	3500 (35)
6.	Metropolitan Projects	4750 (81)
7.	Other Measures for Enhancing Capacity	2500
7.1	Running Of 25 Tones Axle Load On Iron Ore Routes	2000 (31)
7.2	Running Of 23/24 Coach Length Trains **(details in Chapter on Passenger Business)**	500 (53)
	TOTAL	**77050**
	NATIONAL PROJECTS	**7000 (11)**

SECTION III: INFRASTRUCTURE AND TECHNOLOGY

CHAPTER SIX: FIXED INFRASTRUCTURE

Track

Broad Plan objective is to enhance throughput, improve asset reliability and ensure safety through:

- Upgrade of iron ore route and feeder routes of Dedicated Freight Corridor to 25 tonne axle load.
- Complete switch over to mechanised maintenance of track by investing in track machines.
- Zero arrear of track renewal at the end of Eleventh FYP.
- Reduction in permanent and temporary speed restrictions.
- Use of stronger track structure with 60 kg, 90Kg/mm2 UTS rail.
- Zero deficiency of ballast and elimination of wooden sleepers.
- Greater use of technology.

Upgrade of routes for introduction of higher axle load trains

Iron Ore Routes

It is envisaged that the entire 6973 kms of iron ore route will be upgraded for running 25 T axle load trains during Eleventh plan period. It will start in the terminating year of Tenth plan. Track structure will be strengthened to suit the above traffic requirement.

Feeder routes to DFC

It is also envisaged that Dedicated Freight Corridor (DFC) will be constructed on the Delhi-Mumbai and Delhi-Howrah routes. 4220 kms of existing feeder routes joining the DFC will therefore, have to be upgraded. These works have been separately indicated in the section on Capacity Enhancement Projects for Eleventh Plan.

The fund requirement for both the above is expected to be Rs. 1800 cr (within Plan head 31).

Mechanised Maintenance of track

Track Machines

Due to heavy track structure consisting of concrete sleepers, heavier rail sections and long welded rail, it is not possible to maintain the track with conventional manual methods. Also, with the increase in traffic over existing routes as well as the proposed running on heavier axle loads complete mechanization of track maintenance has become necessary to ensure reliability of infrastructure and safety of traveling passengers. Greater emphasis needs to be given to rail management (including rail grinding). *A Master Plan has been developed for complete mechanization of laying and maintenance*

of track by 2012. A three-tier system consisting of Mobile Maintenance Units and gangs has been adopted for maintenance of the track utilizing heavy-duty machines and small track machines. *Total proposed outlay would be approximately Rs.4378 crores under plan head "Rolling Stock" (Plan head 21) and the details are given in Table 6.3.*

Requirement of funds for track machines of the order of Rs. 4378 crores, which is high in view of the competing demands on resources. There are also issues relating to reliability, availability and productivity of track machines and efficient utilization of scarce traffic block in the face of growing number of passenger and freight trains. To meet the above objectives, alternate investment option of Public Private Partnership in track machines will be explored during the Plan period.

Dedicated rakes to transport long rails

Indian Railways are progressively welding the rails thereby minimising the fish plated joints. All primary track renewals are being done with welded rails. On all the routes, the rails are welded into long length of one km or more. Longer rails in track leads to savings in maintenance efforts, efficiency in fuel consumption, reduced wear and tear of both the rails and the rolling stock and comfortable and safer travel. In order to reduce the population of welded joints, SAIL is now rolling 65/78 metre long rails against 13/26 metre long rails being rolled earlier. It is also planned that these rails will then be welded into 260 metre long panels at the steel plant and be supplied to work sites. There shall be associated investment in transportation of long rails, as special dedicated rakes (10 nos.) would need to be manufactured. *This will require an investment of about Rs. 99 cr. during the Eleventh Plan.*

SPURT Cars

For improving the safety aspects of track, through modern testing of rails, *high speed ultra sonic rail testing systems with data loggers shall be procured costing about Rs. 20 cr. each involving an investment of Rs. 100.0 cr (Plan head 21).*

BOBYN wagons

It is also proposed to procure 2100 BOBYN wagons during Eleventh plan (under Plan head 21).

Fund Requirement under Rolling Stock Programme

From the various items discussed above, the requirement of funds under RSP for track related works would be as under.

Table 6.1 Requirement of Track Machines in Eleventh Plan 2007-12

Type	Unit Cost (Rs in Cr)	Total Nos Reqd	Holding by Mar' 2007	Reqt for Eleventh Plan	To be Replaced	Total Nos Reqd	Approx Cost (Rs in Cr)
High Output Tamper	6.8	63	63	0	39	39	265.2
Turnout Tamper	9.4	81	58	23	14	37	347.8
Ballast Cleaning Machine	14.5	97	57	40	12	52	754
Shoulder Ballast Cleaning Machine	10	39	29	10	4	14	140
Worksite Tamper	6.2	139	71	68	23	91	564.2
Dynamic Track Stabiliser	6.2	139	62	77	0	77	477.4
Ballast Regulating Machine	5	70	27	33	7	40	200
Turnout Replacement Machine	7	53	25	21	8	29	203
Track Relaying Train	23.3	12	8	4	2	6	139.8
Track Laying Equipment	1	44	29	15	28	43	43
Rail Grinding Machine	50	5	0	5	0	5	250
Multi-Utility Vehicles/Tampers	1/8	70/300	34/0	36/50	0	36/50	436
Rail borne Mobile Vehicle	2	210	0	210	0	210	420
Track Recording Car	7.5	8	6	0	3	5	37.5
Workshop Modernisation	0	0	0	0	0	0	50
Camping Coaches	0.15	454	323	131	200	331	49.65
Total		**1782**	**792**	**723**	**340**	**1063**	**4378**

Table 6.2 Requirement of Funds (Plan head 21)

Description	Cost Rs in Cr
Track machines	4378
Hopper wagons	294
SPURT cars for USFD testing of rails	100
Flat wagons (BRN)	99
Total	**4871**

Track renewals

The planning of track renewal is based on the concept of route-wise renewals. The track renewal works sanctioned and to be executed at the beginning of Eleventh Plan and the accrual during the plan period are as follows: -

- Renewals Due at the beginning of Eleventh plan - 6200 km (including in Yards)
- Renewals expected to become due during Eleventh plan – 16500 km (excluding yard)
- Renewals Planned During Eleventh Plan – 16500 km (excluding yards)

Apart from the renewal of rails and sleepers, the other areas that would require investments for renewal during the Eleventh Plan period are detailed below.

Fittings Renewal

Presently, out of nearly 65,000 km of Broad Gauge track, about 58,000 km is laid with concrete sleepers. During the Eleventh Plan, another 7,000 km of track length is to be added with concrete sleepers. Currently the arrears of fitting renewals are about 9,000 km and another 20000 km will fall due for renewal during Eleventh Plan. *It is proposed to replace fittings to the extent of about 14,000 km during the Eleventh Plan.*

Renewal of points and crossings

It is proposed to renew about 30,000 turnouts during the Eleventh Plan. The new turnouts would consist of PRC sleepers with fan-shaped layout that would give better service and life as compared to the existing wooden sleepers.

Sleeper renewal on girder Bridges

All wooden sleepers on girder bridges are to be replaced. *Steel channel sleepers on bridges will replace the 2 lakh wooden sleepers during the Eleventh Plan.*

Ballasting

At the beginning of the Eleventh plan, the deficiency of ballast in the track would be about 105 lakh cum. Apart from that, the accruals on account of deep screening and track renewal will be about 470 lakh cum. *As against the gross requirement of about 575 lakh cum around 500 lakh cum will be procured during the Eleventh Plan.*

Casual Renewals

It becomes imperative to resort to casual renewals of rails and sleepers and fittings for maintenance of track, in areas prone to heavy corrosion, excessive wear and tear such as on sharp curves, sections with steep gradients etc. *The provision for casual renewal is expected to aggregate to Rs 2000cr (@ Rs. 400cr per annum) in Eleventh plan.*

The requirements of funds during the Eleventh Plan, based on the details above are summarized in the table below.

Table 6.3 Requirement of Funds (Plan head 31)

S N	Item	Quantity	Cost (Rs in Cr)
1	Rail Renewal Primary	14000 km	9660
2	Rail renewal secondary	3500 km	1155
3	Sleeper Renewal Primary	12000 km	3600
4	Sleeper Renewal Secondary	3500 km	750
5	Points and Xing renewals (TTR)	30000 sets	3600
6	Bridge Sleeper renewal (TBTR)	200000 Nos	280
7	Fittings renewals (TFR)	14000 km	770
8	Through Ballast Recupement	16000 km	1190
9	**Casual Renewals** and renewals in Yard	Lump sum @ 400 cr per annum	2000
10	Track Monitoring System/Rail Stress Measuring system		160
	Total		**23165**

Level Crossings Manning

Safety works at unmanned & manned level crossings are important for safety of both Railways as well as Road users. These include standardization of infrastructure at LCs, providing retro-reflective sign Boards, improvement of level crossings road surfaces, manning of unmanned level crossings as per laid down criteria and replacement of unmanned level crossings with limited use subways, where possible. *This work would continue in Eleventh Five Year Plan and expected fund requirement would be Rs. 1000 crores (Plan head 29).*

Yet another option being followed is that for accident prone unmanned or manned level crossings limited height subways have been permitted for sanction under General Manager's powers subject to other stipulations for closing of LC's. This strategy is expected to yield good results in not only closing a level crossing but in some cases more than one with State Governments concurrence. Over 300 such subways are expected to be completed during the Plan period.

Level Crossings Replacement

There are 535 sanctioned works of construction of ROB/RUB on cost sharing basis and there are about 1196 level Crossings where TVUs are greater than 1 lakh. Hence Railways has to continue spending the allocated amount to clear the backlog. *Rs. 11,000*

Crores would be required during Eleventh Five Year Plan towards 50 per cent share cost of Indian Railways for these works (Plan head 30).

Bridge rehabilitation

There are 1,27,768 bridges over Indian Railway. These are of different material and various types like masonary arch bridge, stone slab bridge, steel truss bridge, pre-stressed concrete bridge etc. Out of these 44 per cent bridges are more than 100 years old. Railway undertakes repair, rehabilitation / rebuilding of bridges on the basis of their physical condition as ascertained during annual inspections.

An annual average outlay of Rs. 300 Crores per year is anticipated, based on the projections from Zonal Railways, with total requirement of Rs. 1500 Crores in Eleventh Five year plan period.

Strengthening of Bridges for Higher Axle Load (25T Upgradation)

Bridges on identified routes would require strengthening/rehabilitation/rebuilding. *An expenditure of Rs. 500 Crores is anticipated for this during the Eleventh plan period.*

Strengthening of Bridges for Feeder routes

Bridges on feeder routes will have to be strengthened for 25T/30T operations. *An expenditure of approx. Rs. 500 Crores is earmarked for this based on the projections of Zonal Railways.*

Bridge Management System

There is a sanctioned pilot project on BMS on South Eastern Railway. After completion of this pilot project, BMS would be implemented on the entire system. A Computerized Bridge Management System (BMS) is required to handle issues relating to inventory, inspection and testing, repairs and rehabilitation, rebuilding, monitoring and resource optimization. The BMS would be capable of network level as well as project Level Management and Control. It would be capable of handling photographic & video records. *An expenditure of approx. Rs. 25 Crores is being earmarked for this.*

Bridge Testing Laboratories

Mobile Bridge Testing Laboratories equipped with state of the art Non Destructive Testing Equipment and diagnostic tools are being provided. At present Mobile Bridge testing laboratories have been sanctioned for 9 zonal railways. This will be extended to 16 zonal railways during Eleventh Five Year Plan. *Hence 10 more Mobile Bridge Testing Laboratories would be required at cost of Rs. 100 crores.*

Mobile Bridge Inspection Units

In compliance of recommendation/observation of Chief Commissioner of Railway Safety as well the safety requirement to provide access to inspecting officials to every part of the bridge especially inaccessible areas like underside of girder, bearings, top of upper

chord of triangulated spans etc, it has been decided to provide rail borne self propelled Mobile bridge Inspection Units having the bucket unit, platform unit and pier inspection units. Sixteen units have been approved for Indian Railways, one for each zone. *Out of this 2 units are at present under procurement and 2 units have been sanctioned in RSP and Rs. 90 Crores are required.*

Electronic Measuring of water level on bridges

There is need for monitoring flow level of water at identified critical bridges and a system of alarm generation when there is danger to train services. *This technology has not been developed so far, and therefore Rs. 10 Crores are being kept for R & D.*

Under water Inspection of Bridges

As a result of accident of Kadalundi Bridge in 2001, the significance of underwater inspection and integrity testing of underground foundations was realized. On Indian Railway system there are a number of old bridges for which completion drawings are not available. Techniques have been developed abroad for Non Destructive evaluation of foundation and mapping of unknown foundations. Pilot projects have been undertaken on these areas during Tenth Plan with specialized firms from abroad. Now they have to be implemented on zonal Railways by equipping them with necessary equipments and training. *Rs. 20 Crores would be required for this.*

Laying of long-welded Rails over Bridges

For better riding quality and also on anti-sabotage reason, it is desirable to continue long welded rails over bridges. *R&D on this subject has to be carried out during Eleventh Plan hence Rs. 5 Crores is required for this.*

Vibration Signature Analysis

It is proposed to use vibration characteristics of bridges for health monitoring. Pilot Project is underway. *For implementation on Indian Railways, Rs. 10 Crores are required.*

Remote monitoring using optical fiber technology.

To have real time monitoring of bridges especially in remote areas in order to get complete stress history, quick and cheap assessment of health of bridge techniques of remote monitoring are being used worldwide. Selected important & critical bridges are proposed to be instrumented for continuous monitoring. *Pilot project is already underway. For implementation on Indian Railways, Rs. 50 Crores are required.*

Continuous foundation Scour monitoring

Scour evaluation, monitoring and protection are important issues regarding safety of bridges. It is proposed to have real time monitoring of critical bridges ad also to have better & realistic assessment of scour in different strata for new construction as well provide scour protection to existing critical bridges. Pilot research project is underway with IIT Kharagpur. *Rs. 15 crores is required to follow it up with purchase of equipments and implementation on 16 Zonal railways.*

Seismic Isolation & Rehabilitation of Bridges

There is considerable emphasis on making nation's lifeline transport & communication system safe from earthquake hazards. Earthquake codes are being explored. Earthquake isolation provides a mean of safety & reduction in the cost of construction of seismic designs of bridges & structures. *For carrying out the studies, strong motion instrumentation in field & rehabilitation of bridges, an amount of Rs. 50 Crores is required during 5-year plan period.*

Advanced Corrosion Protection System for Bridge

There is need to use longer testing, more durable & economical paints and advanced corrossion protection systems on both shed and concrete Bridges especially in aggressive environment and remote locations. Such application would require some amount of applied Research & Development effort & trials. *An amount of Rs. 20 Crores is anticipated for this.*

Bridge Related works fund requirement (Plan head 32)

The total investment for the works related to Bridges would be Rs. 2895 crores (Plan head 32).

Civil engineering management information system (cemis)

Quick information is the backbone of any large transportation system in order to maintain a reliable and unaffected continuous traffic flow. Track Monitoring System (TMS) will be developed as a part of CEMIS. *The approximate fund required will be Rs 100 cr. A Rail stress measuring system is required at each division and this will cost Rs. 60 crores (Plan head 31).*

Captive Cement Plant

A captive cement plant as a joint venture to meet the requirements of sleepers and prestressed concrete girders is planned during the Eleventh Plan. *An allocation of Rs. 170 crores is proposed for this venture (Plan head 42).*

Other Electrical Works

The objective in the five-year plan is to consolidate the existing infrastructure so as to improve reliability of assets thus handling additional traffic in most cost-effective manner and to reduce fuel expenditures by sourcing power from cheaper sources.

As part of this objective, it is proposed to undertake replacement of various electrical assets to ensure safe and reliable operation, strengthening of existing infrastructure to handle increased traffic and strengthening/rationalizing power supply arrangements in workshops and railway colonies including segregation of load under Plan Head –"Other Electrical Works".

Plan Activities

In order to cope up with the challenges of increasing traffic, the following works are required to be taken up:

(i) Installation of capacitor banks to improve the power factor with a view to eliminating penalty/payment to SEBs for low power factor.

- Replacement of OHE on age-cum-condition basis in electrified Railways to improve the reliability of the system. The replacement of contact wire in Eleventh plan would be more in the Railways/Divisions those electrified in between 1960-65 specially ER and SER.

- First time in Indian Railways history, direct power supply from NTPC has been taken on GZB-CNB. Annual saving is approximately Rs.10 crores/month on an investment of Rs.68 crores. In view of encouraging result, more electrified sections will be taken up for availing direct power supply either from NTPC or Nuclear Power Corporation or Neyveli Lignite Corporation as the tariff offered by them is very cheap in comparision to State Electricity Boards. In addition to this, it is also planned to go for segregation of domestic load wherever feasible in order to achieve economy in energy bill for the energy consumed for non-traction purposes.

- It is also planned to set up captive power plant of 4x250 MW capacity in a central location in order to achieve reduction in traction fuel bill.

- Replacement of electro-mechanical remote control equipment with micro-processor based supervisory control and data acquisition system is also planned.

- Augmentation and rationalisation of power supply arrangements in workshops and sheds, railway stations and important yards due to increase in activities on account of growing traffic.

Keeping the above-mentioned points in view, the proposed outlay for Eleventh five-year plan is expected to be Rs. 3460 crores (Plan head 36) as indicated in the Table below:

Table 6.4 Requirement of Funds (Plan head 36: Rs. 3460 Crores)

SN	Description	Rs. in Cr
1.	Throw forward including the major work of DC to AC of remaining works-in-progress as on 1.4.2005 under Plan Head – "OEW"	810
2.	Sourcing of power from alternate cheaper sources.	600
3.	Proposed 4 x 250 Ministry of Power in JV with NTPC.	800
4.	Cost of the new works of different types to be proposed during 11th five year plan as per details given below:	1250
	i. Provision of capacitor banks to improve power factor. ii. Replacement of contact/catenary wire and traction sub-station/ switching station related works to improve reliability. iii. Works related to fixed structure/safety i.e. improvement of implantation of traction masts, auto-tensioning device etc. iv. Segregation of domestic load in order to achieve economy in energy bill. v. Augmentation/rehabilitation of power supply equipment. vi. Rewiring of service buildings. vii. Throughput enhancement work to augment the capacity of transformer, capacity of OHE in order to cope up with increased speed and traffic in the section.	
	Total	**3460**

Signaling and Telecom Works

Signaling

The Plan objective is to leverage technology for enhancing efficiency, reliability and safety of operating systems through real time control, automatic block clearance and mobile communication.

- Availability of on-board collision prevention system such as ACD, ETCS, ERTMS etc. would eliminate human interface and enhance safety.

- Absolute block system in use on most of the high-density network (HDN) effectively blocks 8-15 kms of a section for a single train leading to lower line capacity**.** A number of technology options are available for overcoming this handicap such as Auto Train Control system with cab signaling, integrated train

control and signaling systems. Appropriate technology will be selected taking into account the overall costs and benefit to the system.

- Switchover to systems and equipments of higher reliability such as electronic interlocking is planned progressively.
- Signaling systems at many stations are such that the main line is not isolated for run through trains and complete track circuiting is not available, resulting in unsafe situation at times. Isolation of run-through line and provision of complete track circuiting of station section can help in preventing collisions at stations.
- Mobile communication has taken huge strides but is yet to be introduced in substantial measure even though secure mobile communication has significant operational, safety and maintenance benefits.
- Computerized monitoring and predictive maintenance can significantly improve reliability and reduce overall cost of maintenance. There will be greater use of these concepts to achieve the corporate objective.

Replacement of over aged signaling Assets

Railway Safety Review Committee recommended that the arrears of renewal of signaling gears should be wiped out within a specific time frame. Accordingly, a non-lapsable Special Railway Safety Fund of Rs. 17,000 Crores was set up with funding by a dividend free grant of Rs. 12000 Crores from the General Exchequer and balance Rs. 5000 Crores to be generated by the Ministry of Railways by levy of safety surcharge. The objective was to liquidate the accumulated arrears of renewal of assets up to 1. 4. 2001 within a time frame of 6 years from 2001-02 to 2006-07. The specific works to be funded from the Special Railway Safety Fund were identified and included in a separate Works Programme published by the Ministry of Railways called the Green Book and approved by the Parliament in two parts, i.e., through Supplementary Budget 2001-02 and Railway Budget 2002-03.

A large portion of infrastructure of signaling due for replacement was approved for replacement under SRSF though small portion of this work shall spill over in Eleventh Plan. A commitment has been made to Parliament that over-aged assets beyond SRSF scheme shall be sanctioned for replacement on concurrent basis so that arrears are not accumulated. It is estimated that on an average 250 installations would need to be replaced every year. *An investment of Rs. 2625 Cr is required for this task (Plan head 33).*

Technology upgrade

Track Circuiting

Track circuiting of complete station yard on A, B, C, D, D Spl and E Spl routes will be done within first 3 years of the Eleventh Plan. As on 1st April 2006, it is estimated that 936 station yards remain to be completed and this will involve an expenditure of about Rs. 205 Crores out of which Rs. 150 Crores are already sanctioned and Rs. 55 Crores are to be sanctioned. It is proposed to cover E route and MG portions partially for track

circuiting during Eleventh plan. *It is proposed to provide track circuiting of 4500 locations at an approx. cost of Rs.800 Crores (Plan head 33).*

Track Circuiting with Automatic Signaling

It is proposed to provide continuous Track Circuiting on Automatic Signalling on selected sections keeping in view the line capacity and safety considerations. At present Automatic Signalling has been sanctioned for 2000 Route KM out of which 1800 Kms is likely to spill over into the Eleventh Plan. It is proposed to complete the C Route and selected sections on the A route to the extent of 1000 km. *1750 route Kms of Automatic Signalling would require an investment of Rs. 700 Cr (Plan head 33).*

Isolation at Run through stations

Panel Interlocking / Route Relay Interlocking /E Interlocking will be provided on all A, B, C, D, D Spl & E Spl routes of BG on a programmed basis. On E route where main express trains are required to run through at stations, isolation is proposed to be provided with complete track circuiting and central panel interlocking arrangements, and axle counters for ensuring complete arrival of train. *At about 270 stations of A, B, C, D Spl, D & E Spl routes, yards are not fully isolated and such stations are to be provided with over-run line/sand-hump at an estimated expenditure of Rs. 810 Crores.* On those E routes where non-stopping mail/express trains have been running, main line should be isolated, with full compliment of Track Circuiting in the station section. *About 250 such stations are to be covered need at an estimated expenditure of about Rs. 450 Crores (Plan head 33).*

On Board Train protection / collision prevention system

This system is meant to prevent the case of passing Signal at danger and to avert derailment / collision. The entire Broad Gauge network of Indian Railways shall be equipped with collision prevention system by 2013. *An investment of Rs. 3200 crores would be required to cover 40000 route kms during the Eleventh Plan period (Plan head 33).*

Provision of Block Proving by Axle Counters (BPAC)

Provision of BPAC / last vehicle checking through Axle counter will be made to ensure the clearance of Block Section. It is to be provided on all routes other than those provided with Automatic Block Signaling (ABS). *It is proposed to cover 3000 block sections (already provided with Central panel) at an approximate cost of Rs. 750 Crores (Plan head 33).*

Train Management System (TMS) and Centralised Traffic Control (CTC)

TMS provides efficient rail services, giving the commuters information on the real time basis about the status of train services. All train movements are displayed on a real video projection screen in the control room. CTC provides full control over complete section, covering a large number of stations and allowing operations of points and signals remotely from a Centralised location. This enhances capacity, as the time for giving the

green signal to a train will be minimized. TMS is already in operation on the sub-urban section of Mumbai on Western Railway and is under installation on Central Railway. *Based on this experience gained, it will be provided on 7 more divisions handling heavy traffic at a cost of Rs.200 Crores (Plan head 33).*

Automatic Train Control on Mumbai Sub-urban section

At present due to headway of 3 to 5 minutes on the sub-urban sections of Mumbai, approximately 5000 passengers are traveling on a train designed to carry 1960 passengers. By overlaying automatic train control system on the existing signalling system on sections with maximum traffic density the headway can be decreased to 2 to 2-1/2 minutes. This will be taken up as part of MRVC scheme under MUTP project.

Other Signaling systems for improving the line capacity, running of train at high speed and for improving the reliability shall be provided as per details given below.

Telecommunication

Optical Fibre Communication and Quad cable

More than 10,000 RKms still have obsolete overhead alignment based communication system on D, E/Spl, E and MG routes (not sanctioned for conversion). This needs to be replaced immediately to improve the reliability of block working, control communication, administrative circuits and emergency communication to achieve the availability objectives of corporate safety plan. It is planned that these 10,000 RKMs would be immediately replaced with OFC and quad cable based communication system @ Rs. 5.5 lakhs per km. *Hence, a provision of Rs. 550 crores is being made in the Plan outlay. In addition, in respect of throw forward of ongoing works to 2007-08, an amount of Rs. 400 crores will be required (Plan head 33).*

Mobile Train Radio Communication (MTRC)

At present, no secure and reliable communication system is available with any department for on board or mid section communication with the control offices, supervisors and officers for transmitting information. Walkie-talkie and VHF systems do not provide secure point-to-point communication and are limited to a range of about 5 Kms. As per the recommendation of RSRC, Board has accepted provision of on board and mid section communication facilities with a commitment to complete this work on A, B & C routes of IR. The work is already under progress on 3200 RKms. Mobile Train Radio Communication (MTRC) is proposed for A, B & C routes in the Eleventh Plan on the remaining 13000 RKms @ Rs. 8 lakhs per km. *An outlay of Rs. 1000 crores is needed in Eleventh Plan to complete this. In addition, in respect of ongoing works, a provision towards throw forward to the extent of Rs. 100 crores is needed (Plan head 33).*

Switching and networking infrastructure

The present switching network of Railway was designed for old trunk based system and with the proliferation of OFC and introduction of STD network on Railway circuits problems are being faced in routing the STD calls in a seamless and reliable manner.

Therefore, a TAX exchange (Trunk Automatic Exchange) at selected locations is the need of hour. Also, some of the major exchanges need to be upgraded for interfacing them with latest telecom technologies such as IP.

The other telecom infrastructure i.e. networking which carries various IT / data applications, need to be upgraded for improving the throughput with automatic route diversity between different railway units. This will help in saving rentals presently being paid to BSNL in respect of hired channels.

For upgrading the above telecom assets, provision of Rs. 300 crores i.e. Rs. 100 crores each for switching network, Wide Area Network and Local Area Network is required (Plan head 33).

Plan Outlay

The requirement of funds proposed and the quantum of work are much higher than that of the Tenth plan period. *An outlay of Rs. 12000 crores is proposed for the Eleventh Plan against a requirement of Rs. 12500 crores. .*

Table 6.5 Requirement of Funds (Plan head 33: Rs. 12500 crores)

S. No.	Item	Rs. in Cr	
		Outlay	**Physical Targets**
A. Signaling			
1	Complete Track Circuits on DSpl, D, Espl & E routes	800	4500 track circuit locations
2	Replacement of over-aged Signaling assets	2625	1250 stations
3	Replacement of over-aged Signaling assets in Block Section	175	Works sanctioned up to 1/4/2009 will be targeted for completion
4	Block Proving by Axle Counter/Last vehicle verification through Axle counter at all balance central panel stations (3000 Nos.)	750	3000 Block sections
5	CTC with Automatic Block Signalling on C route and selected sections of A route	700	1750 Rkms
6	Provision of isolation of Run through stations on E route	450	250 stations
7	On Board Train Collision Prevention system	3200	40000 Rkms
8	Clamp type Point Machine	250	10000 Nos
9	Train Management System & Centralised Traffic Control (in 3 divisions)	200	TMS/CTC at Chennai, Howrah, Secunderabad, Vadodara, Bengalooru, Tundla, Mumbai CST and New Delhi will be commissioned
10	Second Distant Signal for high speed goods train	300	1500 stations
11	Reliability Improvement & Strengthening of Maintenenance on HDN	600	Reduction of signaling incidences per thousand workload of Zonal Integrated Signal and Telecom Units to 5.28
	Sub Total	10050	
B	**Telecom**		
12	Mobile Train Radio Communication	1100	
13	Optical Fibre Communication	950	
14	Upgradation of SN, WAN, LAN	100	
15	Interlocking of Level Crossing Gates	300	1500 gates and telephones will be provided
	Total	**12500**	

CHAPTER SEVEN: ROLLING ASSETS, PRODUCTION UNITS AND WORKSHOPS

Technology, Operations and Maintenance

Wagons

Indian Railways have the broadest gauge and one of the lowest pay/tare ratio of wagons. During Tenth FYP, payload of existing wagons was increased by marginally modifying the under-gear increasing the axle load from 20.3 tonnes to 22.9 tonnes. The process will be carried further with a series of initiatives some of which are listed below:

- Instead of sticking to RDSO design alone, wagon manufacturers will be permitted to bring world-class wagon technology after evaluation and testing by RDSO.
- Universal switch over to freight wagons of 22.9 tonne axle load and selective introduction of 25 tonne axle load wagons on iron ore route and feeder routes of DFC.
- Retrofit of existing casnub bogie to upgrade it to 25 tonne will be examined.
- Possibility of introducing 3 axle wagons on existing network to increase its payload without increasing axle load will be considered.
- Switch over to lighter and corrosion resistant material like stainless steel, aluminum etc. for improving payload to tare ratio and reduction in requirement of body repairs.
- Introduction of lower diameter wheels and bogie mounted brake system to increase loadable volume of the freight wagons within a given schedule of dimension.
- Introduction of special purpose wagons for transportation of automobiles, bulk movement wagons for fly ash, cement, food grains, hazardous chemicals and other customized wagons.

Operating Strategy:

- Operation of freight trains without brake vans similar to developed countries by introducing end of train telemetry or last vehicle device. This will provide room for one additional wagon in all the trains, thus increasing throughput per train.
- Introduction of double stack (International) and triple stack (Domestic) containers on selected routes.
- Introduction of roll-on/ roll-off (Ro-Ro) operation.

Maintenance Strategy

With a view to improve reliability, reduce detachment, enhance safety and improve availability, it is proposed to follow the following strategy in wagon maintenance:

- Increased use of technology in examination with a view to reduce human interface and improve reliability.
- To upgrade and strengthen maintenance infrastructure.

- Repair/overhaul of critical components through OEM on the basis of unit exchange system of repairs.
- Strengthening of mechanized material handling in C&W depots, yards and workshops.

It is proposed to develop 16 world-class freight examination points (@ one per Railway) at an estimated cost of Rs.31 crores per location (total cost Rs.496 crores). Maintenance and repair of locomotives and rolling stock have traditionally being done in Railway maintenance facilities including workshop. Besides huge investment in machinery and plant, reliability of machines, productivity and cost of operation have often posed major managerial challenges. Innovative strategies in this regard will be followed by encouraging PPP in activities such as mechanized cleaning, tyre turning of wheels, assembly of wheels, material handling and other similar activities.

Simultaneously, it is also proposed to create new points and strengthen and upgrade existing points at an estimated cost of Rs.1616 crores as per the details given below:

Table 7.1 Maintenance facilities

	New Creation		Augmentation (including upgradation)		Upgradation		TOTAL **(Rs in Cr)**
	No.	Amount	No.	Amount	No.	Amount	
POH	3	270	2	60	-	-	330
ROH	9	108	21	210	12	96	414
Sick line					52	520	520
Unloadable repairs	8	80	-	-	-	-	80
Examination point	-	-	-	-	68	272	272
TOTAL		458		270		888	1616

Locomotives

Indian Railways are in possession of contemporary high horse power, three phase AC/AC, microprocessor control technology for the manufacture of diesel and electric locomotives in the production units at DLW and CLW respectively. Full benefits of these technologies could not be reaped due to limited number of locos manufactured so far- only – diesel and – electric locos. IR also has a large fleet of maintenance intensive diesel and electric locomotives with poor energy efficiency. Major thrust of traction technology for Eleventh FYP is planned as under:

- Complete switchover to the manufacture of 4000 horsepower EMD technology for diesel locomotives and 6000 horsepower ABB technology electric locomotives, discontinuing manufacture of low horsepower conventional locomotives to AC/ DC technology.
- Change over to IGBT control system instead of GTO on EMD/ABB locomotives.
- Provision of Head on Generation on Diesel and Electric Locomotives to avoid the need of alternators on self–generating coaches and generator van on trains with non self generating coaches.

- Locotrol technology for heavy-haul operation for 100 locomotives at an estimated unit cost of Rs. 60lakhs (total cost Rs.60 crores).
- Retro-fitment of fuel-efficient turbo-chargers and upgrade of power of 2600HP diesel locomotives to 3100/3300. 400 locomotives at an estimated unit price of Rs. 1.5 crores (total cost Rs.600crores) are planned.
- Switch over to CNG on shunting locomotives in 4 metropolitan cities.
- Switch over to the use of 5 per cent bio-diesel on main line locomotives.
- Retrofitment of roller suspension bearing on traction motors of 300 numbers of 3100 hp ALCO locomotives at an estimated total cost of Rs. 150 crores.
- Automatic engine stop and start device for conserving fuel in diesel locomotives.

Coaches / EMUs/DMUs

Indian Railways have acquired LHB Coach Technology with a number of customer and maintenance friendly features. However, latest technology is not yet available for the manufacture of EMU/MEMU/DMU. During Eleventh Plan period, the focus will be on introducing technologies that are customer friendly, maintenance friendly and eco-friendly. It will also be the endeavour to maximize revenue through greater utilization of vertical space and increasing number of passengers per coach/train. Some of the important thrust areas are listed below:

- Complete switch over to LHB Bogies instead of Schelierien Bogies on conventional coaches manufactured by ICF/RCF as the Bogie is maintenance friendly and requires far less pit attention.
- Manufacture of at least 50 per cent coaches to LHB design.
- Different technology options such as soft pipe buffer and tight lock coupler to fix the problem of jerk in LHB coaches are under consideration. Appropriate option will be selected after proving trials and all coaches modified during the plan period.
- All new sleeper, AC-3tier, AC-2tier and AC-I coaches manufactured from 2007-08 onwards will be of higher capacity. The capacity augmentation of these coaches will be from 72 to 84 (16.7%)for sleeper class, from 64 to 81 (26.5%) for 3 AC, from 46 to 48 (4.3%) for AC-2tier and for AC-I from 18 to 22 (22.2%).
- Design of double decker coaches within the existing MMD is under optimization. Manufacture of double decker coaches will be commenced in the year 2008-09.
- Environment friendly coach toilet systems in 4000 new coaches. Appropriate technology options such as “biological degradation” type or “vacuum retention, storage and evacuation at terminals” will be considered.
- All conventional coaches will be retrofitted with fabricated stainless steel toilet panels and other associated upgraded toilet fittings at an approximate cost of Rs.6 lakhs per coach to overcome the problem of corrosion and improve hygiene and aesthetics. All newly manufactured coaches shall also be with stainless steel toilets.
- Micro processor based LED Destination Boards on coaches.
- Upgrade of coach furnishings and interiors to make them aesthetically appealing, long lasting and maintenance friendly.

- Introduction of tight lock couplers with anti climbing features. Implementation of crashworthy design on coaches as has already been given by AAR.
- Introduction of double decker and Garib Rath type of coaches.
- Development of four numbers of state of the art, world class maintenance facilities at major metropolitan terminals equipped with integrated train preparation facility such as loading of linen, parcels, catering requirements, reservation charts and other compliments of on-board services at an estimated cost of Rs. 250 Cr. each. The maintenance facilities shall include provision of laser based wheel parameter recording system, vehicle overload and imbalance detector, hanging component detector, bogie performance detector, machine vision equipment for brake and suspension system, wheel data management system etc.
- Manufacture of EMUs/DMUs with 3 phase AC/AC, IGBT technology, stainless steel bodies and other advanced features.
- Manufacture of dual fuel (CNG/HSD) DMUs.
- Manufacturing coaching stock including EMU/MEMU/DMU to world class technology in the new manufacturing facility likely to be set up during the Plan period.

Production Units and Workshopts

The thrust areas for the Eleventh Plan period have been identified as induction of new machines with CNC technology, induction of laser/plasma technology for sheet and metal cutting, facilities for handling stainless steel and aluminium fabrications, switching over to modern and automated welding procedures by introduction of MIG/TIG/SAW welding machines. It is also proposed to use huck bolting instead of rivet fitment in wagon bodywork, laser based measuring instruments and computerized calibration equipment. The plan is to develop suitable CMT labs, at least one on each Railway, equipped with modern testing facilities and replace over aged M&P in workshops.

Requirement of Funds

A summary of inputs required for upgrading the infrastructure of open line maintenance depots is in Table 7.1. *An investment of approximately Rs.3400 crores is required for generating additional maintenance capacity in open line by augmenting existing centres as well as setting up new maintenance centres.* Infrastructure of 52 nominated B, C & D category freight maintenance Depots to be upgraded to A category. A thrust area would be developing “detachment less train examination depots”. *Expenditure on M&P during Eleventh Plan under Plan-head 41 will be increased to Rs 2200 crores to partially reduce arrears of replacement. Requirement of funds under Plan-head 42 would be Rs .10700 crores including expenditure on new and existing PU’s against which Rs. 10,100 is being allocated.* Summarizing, the total expenditure planned against the maintenance / enhancement of Workshop and Production infrastructure is tabulated below.

Table 7.2 Requirements of Funds (Plan head 42: Rs. 10700 crores)

PU/Workshop	Cost (Rs Cr.)
ICF & RCF – Capacity enhancement	100
New coach manufacturing unit	1000
CLW – Capacity enhancement	600
DLW – Capacity Enhancement	600
Civil Engineering workshop	90
S&T workshop	60
W/shop modernization and capacity enhancement	2700
Upgradation of Open line depots	3400
New units for Locomotive production	800
New units for POH	1000
Engineering and S&T workshops	150
Investment required for associated Stocking Depots	30
Cement Plant for Sleepers	170
TOTAL	10700

Workshops

The infrastructure of maintenance units, especially workshops, is in extremely poor condition and various Committees have repeatedly observed this.

The need for replacement of over aged and outdated machinery and plant was emphasized in the Tenth Five Year Plan; however, the arrears of replacements could not be wiped out during the Tenth plan period. Expenditure on replacement of machinery and plant and for procurement of additional machinery and plant was Rs.338 Crores and Rs.251 Crores respectively during the first four years of the plan. *Considering the need to reduce the arrears of the over aged machines, and also to induct high performance, high precision and high productivity new generation machines, allocation under the head 'Machinery and Plant' is being increased to Rs. 2200 crores approximately for the Eleventh plan period.*

In view of the specific remarks made by RSRC and Standing Committee of Parliament, a workshop modernization plan has been envisaged for the Eleventh Five Year Plan. Ten nominated workshops have been identified for implementation of the plan with the following deliverables:

a) Reduction in POH cycle time of coaches, wagons, diesel locos

b) Reduction in holding of assets inside workshops.
c) Increase in POH capability (Outturn) for all types of rolling stock.
d) Reduction in on-line failures of locos, wagons and coaches.
e) Improvement in POH quality in painting, interior furnishings as well as safety related maintenance aspects.
f) Reduction in NPOH (out of course repairs) arising, which would also lead to reduction in ineffectives.
g) Environmental benefits by reducing water consumption, air pollution, water pollution etc.
h) Improved working conditions for staff like light illumination, drinking water facilities, drainage and other staff amenities.
i) Improved health of works and better motivation.
j) Improvement in skill-set of workers.
k) Improved scrap realization.
l) Reduction in operating expenses by reducing energy consumption.

Production Units

The present annual installed capacities are given in Table 7.2.

Table 7.3 Installed Capacities

Production Unit	Capacity
DLW	150 Diesel Locomotives
CLW	150 Electric Locomotives
ICF	1000 Coaches
RCF	1000 Coaches
DMW	72 Diesel Locomotives rebuilding

Sanctioned works under execution are capacity enhancement of ICF to 1500 coaches per year and RCF to 1400 coaches per year. Yet there will be a gap vis-à-vis the requirements based on traffic projections.

Diesel & Electric Locomotives

Inputs are required at DLW to reach a production level of 200 diesel locomotives per year from the present 150 locos per year. Importing about 700 – 800 diesel locomotives can bridge the gap in requirement as against existing production capacity for the Eleventh Plan period.

Substantial inputs would be required at CLW for enhancing production capacity from the present 150 locos per year to the projected capacity of 200 locos per year. The gap in the requirement can be bridged by importing about 700 – 800 locomotives.

Two new units for locomotive production will be set up.

Coaching Stock

The requirement vis-à-vis production capacity indicates a shortfall of approximately 1150 coaches per year between requirement and production capacity over the Plan period. The production capacity will be increased by capacity enhancement of existing Units (RCF & ICF) and creating additional capacity through a proposed new Unit. The requirement per year during the Eleventh plan is 1150 coaches and the gap between this and the production can be possibly bridged by increasing capacity quickly. A new unit will be set up for the production of coaches.

Requirement of funds

The requirement of funds for the Eleventh plan is Rs.54600 crores as detailed in the Table 7.4.

Table 7.4 Requirement of Funds (Plan head 21: Rs. 59475 crores)

Type of Stock	**Nos.**	**Rate**	**Cost (Rs. In Cr.)**
Coach - AC	3300	11000	3630.00
Coach - Non-AC	13202	5200	6865.04
Coach LHB	1050	19532	2050.86
MEMU	1091	6906	753.44
DEMU	1173	12555	1472.70
EMU	2873	17246	4954.77
Dsl.Loco HHP	610	100000	6100.00
Dsl.Loco Conventional	1190	44000	5236.00
Elect.Loco HHP	665	100000	6650.00
Elect.Loco Conventional	1135	50500	5731.75
Wagon	62000	1800	11160.00
Track Machines and other related rolling stock (Table 6.2)	-	-	4871
Total			**59475**

Civil Engineering and Bridge workshops

The ten Engineering/Bridge workshops working on nine Zonal Railways are listed below in Table 7.5.

Table 7.5 Engineering Workshops

ENGINEERING/BRIDGE WORKSHOP	RAILWAY
Central Engineering Workshop, Manmad	Central
Engineering Plant Depot, Mughalsarai	East Central
Bridge Workshop, Jallandhar Cantt	Northern
Bridge Workshop, Lucknow	Northern
Bridge Workshop, Gorakhpur	North Eastern
Engineering Workshop, Bongaigaon	North East Frontier
Engineering Workshop, Arakkonam	Southern
Engineering Workshop, Lalguda	South Central
Engineering Workshop, Sini	South Eastern
Engineering Workshop, Sabarmati	Western

Most of the Engineering Workshops on Indian Railways are old and urgently require technology and equipment upgradation. It is anticipated that in near future, there would be a major increase in the steel fabrication works undertaken by Engineering Workshops as many bridges will require rebuilding / regirdering to make them fit for running of heavier axle load trains as well as for new bridges on the proposed Dedicated Freight Corridors. *Accordingly, an expenditure of Rs. 90 Crores is anticipated during the Eleventh Plan period.*

S&T workshops

S&T workshops are required to be upgraded and modernized in areas like automated assembly lines for relay manufacturing, facilities for manufacture of clamp lock type point machine, facilities for integration, simulation, testing and certification of Electrical and Electronic systems like Axle Counters, Audio Frequency Track Circuits, Electronic Interlocking etc. with appropriate collaboration with the OEM. The procedures and activities at the workshop need to be automated as well. Capacity augmentation is required for manufacture of certain items like IRS point machines, Tokenless Block instruments, Special purpose Relays, Electric Lifting Barriers. Despite this there would be need for outsourcing and ancillarisation for new products. *In the Eleventh Plan, major inputs would be necessary in the workshops amounting to Rs. 46 crores as per the details in Table 7.6.*

Table 7.6 Capital Inputs at Workshops

S.No.	Railway	Location of Workshops	Capital inputs required (Rs. Crores)
1	CR	Byculla	7
2	ER	Lilluah	5
3	NR	Ghaziabad	7
4	NER	Gorakhpur	10
5	SR	Podannur	10
6	SCR	Metugunta	7
	Total		**46**

In addition to the above, for the smaller workshops, which are primarily overhauling relays, block instruments and manufacturing smaller items, the capital requirements of Rs 12 crores are required and the details are as given in Table 7.7.

Table 7.7 Capital inputs at Minor workshops

S.No.	Railway	Location of Workshops	Capital inputs required (Rs. Crores)
1	NFR	Pandu	2
2	SER	Kharagpur	3
3	WR	Sabarmati	4
4	NWR	Ajmer	3
	Total		**12**

Procurement Policy and Material Management

The plan is for improved materials management in the Eleventh Plan with a view to reducing costs without impairing efficiency. This includes implementation of integrated MMIS (Materials Management Information System) for all Zonal Railways and Production Units for improved and effective Materials Management functions. Procurement of safety items through long term contracts and separation of regular procurement from vendor development will be part of the improved procurement strategy.

Purchase and disbursal procedures will be revamped so as to reduce inventory levels and control wastage and pilferage. For example, it is proposed to disburse materials by road through reputed cargo delivery service providers with real time tracking facilities (RFID). MMIS will be used for tracking the disbursal to each of the end users & their usage pattern. Modernisation of depots will be carried out during the next five-year plan in a major way, thus enhancing storage capacity and retrieval procedures. It is also proposed to delegate full powers of purchase to General Managers of Production Units for procurement of items required for production. Separate budgeting for safety and critical items within general-purpose stores (GP Stores) is planned.

The phased plan for improving the inventory turnover ratio also involves the use of MMIS and monitoring of the Turn Over Ratio. Techniques of inventory management will be progressively modernized. To ensure cent-percent availability of safety items, the definition of availability of safety items has been revised as stock level more than one month. To reduce surplus, inactive and obsolete items to bare minimum the regular review of items falling into these categories will be further intensified.

New strategies for future include receipt, accountal, issue & rejection of materials and payment to suppliers on real time basis, implementation of E-procurement, Extended MMIS on Net enabled Electronic data interchange for delivery, inspection and receipt between sellers and consignees. All this will enable electronic receipt of EMD & SD and payment to supplier, refund of EMD & SD to suppliers. Advance procurement planning calendar will be insisted upon to ensure timely placement of contract and monitoring of vendors performance.

CHAPTER EIGHT: SAFETY

Consequential train accidents came down from 473 in 2000-01 to 234 in 2005-06 and train accidents per million train kilometers has also came down from 0.65 in 2000-01 to the order of 0.26 in 2005-06. The trend of consequential train accidents since 1990-91 is given in Table 8.1. These figures are inclusive of accidents on Konkan Railway and Kolkata Metro.

Table 8.1 Consequential Train Accidents

Year	Collisions	Derailments	Level Crossing Accdts.	Fire in trains	Misc.	Total	Million Train Kms.	Accidents/ MTKms.
1991	41	446	36	9		532	617.1	0.86
- 1992	30	444	47	9		530	629.2	0.84
- 1993	50	414	51	9		524	632.3	0.83
1994	50	401	66	3		520	634.2	0.82
1995	35	388	73	5		501	641.9	0.78
1996	29	296	68	5		398	655.9	0.61
1997	26	286	65	4		381	667.1	0.57
1998	35	289	66	6		396	675.8	0.58
1999	24	300	67	6		397	686.9	0.58
2000	20	329	93	21		463	717.7	0.65
2001	20	350	84	17	2	473	723.8	0.65
2002	30	280	88	9	8	415	756.4	0.55
2003	16	218	96	14	7	351	786.2	0.44
2004	9	202	95	14	5	325	790.8	0.41
2005	13	138	70	10	3	234	810.1	0.29
2006*	9	131	75	15	4	234		

Cause wise analysis of the train accidents during the last 5 years, i.e., 2001-2002 to 2005 2006 is shown in Table 8.2.

Table 8.2 Cause wise break up of Accidents

Causes of Accidents	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006*
Failure of Railway staff	248	186	161	119	126
Failure of other than Railway staff	103	118	107	78	82
Failure of equipments	24	18	18	14	1
(a) Rolling Stock	11	6	6	5	1
(b) Track	13	11	9	7.0	
© Electrical		1	1	2.0	
(d) S & T			2		
Sabotage	14	10	18	4	9
Combination of factors		2	2	1	
Incidental	20	15	17	16	10
Could not be established	5	2	2	2	6
Under Investigation	1				
Total	**415**	**351**	**325**	**234**	**234**

***Figures for 2005-2006 are provisional.**

A Corporate Safety Plan (2003-13) was prepared in August 2003 with a view to prevent accidents and reducing the risk levels for the customers. The plan aims to progressively reduce accidents attributable to human failure and prevent passenger fatalities in accidents. The terminal year for this ten-year plan is close to the Eleventh five-year plan terminal year and therefore this plan draws heavily from the Corporate Safety Plan.

The paradigm behind most of world-class railways is minimal human dependence, best achieved by technological aids together with reliability of assets. The Railway Safety Review Committee recommended that the arrears of renewal of track, bridges, rolling stock and signaling gears be wiped out within a specific time frame. Accordingly, a non-lapsable Special Railway Safety Fund of Rs. 17,000 crores was set up with funding by a dividend free grant of Rs. 12000 crores from the General Exchequer and balance Rs. 5000 crores to be generated by the Ministry of Railways by levy of safety surcharge. The objective was to liquidate the accumulated arrears of renewal of assets up to 1.4.2001 within a time frame of 6 years from 2001-02 to 2006-07. The specific works to be funded from the Special Railway Safety Fund were identified and included in a separate Works Programme published by the Ministry of Railways called the Green Book, and

approved by the Parliament in two parts, i.e., through Supplementary Budget 2001-02 and Railway Budget 2002-03.

Since the inception of SRSF in 2001-02 Rs. 12,965 crores have been spent until March 2006. For the year 2006-07, an allocation of Rs. 2,240 crores has been made under SRSF in the Budget estimates. As per the declared objectives of the special railway safety funds, the accumulative arrears of removal of assets are to be liquidated by the end of 2006-07. However, certain works, mostly related to signaling, will spill over to 2007-08 for which balance requirements for 2007-08 is estimated as Rs. 1795 crores. In the Eleventh plan not only the arrears of renewals should be completely wiped out but also renewals due in a year should also be sanctioned, funded and executed. Further, during the Eleventh five-year Plan period efforts will be made to expedite the remaining safety related works planned in the Corporate Safety Plan.

Trends of rail accidents from 2001-02 to 2005-06 amply demonstrate that railway staff failures followed by failure of other than railway staff (mostly road users) still constitutes large chunks of 53.9 per cent and 31.3 per cent of total accidents respectively. Detailed rules have been prescribed for train operation during various failure situations that increase human dependence leading to stressful conditions thus causing accidents.

Gap analysis has revealed vulnerable areas like reception/dispatch during interlocking failures and signal passing at danger, negligence of road users at level crossings, lack of on-board fire detection and fire fighting equipment in trains, lack of predictive maintenance of track and signaling, infringement to track while undertaking construction activities. Apart from this external threats and quality of training are areas of concern.

Safety Requirements

Collision Free System

Without suitable onboard train protection system, accidents due to reception / dispatch during signal / interlocking failures or drivers passing signal at the danger cannot be eliminated. To make the system collision free by 2013 the Eleventh plan envisages progressive introduction of GPS based Anti Collision Device.

Signaling Requirements

Entire station yards on A, B, C, D, D spl. and E special routes will be track circuited within first 3 years of the Eleventh Plan as indicated in the section on Signaling. At about 270 stations of A, B, C, D, D spl, E spl. Routes, mainline are not fully isolated though non-stopping Mail-Express trains are running. Not only the speed is restricted at times due to this factor, there is every possibility of side collision. Such stations will be provided with over-run line/sand hump as per the details given earlier.

Coaches

Crashworthy features in coaches will be expeditiously provided as per the crashworthy coach shell design finalized by RDSO. On the existing fleet of coaches, crash buffers will be proliferated subject to successful experience of their use on SLRs. Apart from the new

coaches, old ones would be retro fitted with crashworthy features during the Eleventh plan period.

Level Crossings

A consolidated policy is being formulated on rail-road level crossings to cut down the vulnerability. During the Eleventh plan some enhanced and ingenuous standards will be put in place to save human lives. The policy will prescribe minimum distance between two successive level crossing gates, ban on introduction of new level crossings on existing sections, and traffic policing. The problem is severe at umanned crossings and the option of auto placement barrier booms or some other means to force a dead stop for a road vehicle would be explored. Cost effective subways ROB/RUB in lieu of manned as also unmanned level crossings especially where track runs on high embankment will be considered. Automatic placement of banner flag at non-interlocked manned level crossing is needed. Interlocking of manned level crossing gates will be undertaken based on traffic requirements. Railways are also conducting trials for provision of warning devices on level crossing using TAWD and gate ACD technologies.

Fire, Sabotage

On board capability to detect and fight initial phases of fire on passenger carrying trains will be built into the system. For this purpose, state-of-art smoke detection system will be deployed after trials. Automatic fire extinguishers should also be used at fire prone locations in coaches. Upgraded fire retardant material as prescribed by RDSO will be provided on all the new coaches and should be retrofitted on coaches during POH.

Efforts to improve surveillance of passenger areas and tracks will result in safer systems. To reduce the impact of outside interference focus will be on measures such as decongestion of passenger platform of parcels, prevention of unauthorized entry in the railway premises including track, anti- sabotage/anti-pilferage track fittings.

Asset Maintenance

Priority will be given to modernize, mechanise and upgrade asset maintenance practices relating to predictive maintenance in the areas of signaling and rail-wheel interaction.

Wagons

A significant proportion of freight stock population still has vacuum brakes with poor reliability as compared to air brake stock. The entire fleet of vacuum brake stock (about 90000 four wheeler units) will be completely phased out during the Eleventh five year plan.

Human Resources

With the introduction of new technologies in all fields of Railway working, human resources development assumes greater importance. Modernizing training aids and training of trainers are areas of concern. A centralised approach to work as a professional

set up like in developed countries appears is the solution for uniform application and universal ownership of training.

CHAPTER NINE: INFORMATION TECHNOLOGY

IT Applications

Indian Railways has so far been successful in harnessing Information Technology, and the Passenger Reservation System has been a model of e-governance. During the Tenth plan, systems such as Internet based enquiries, Internet and e ticketing, and the Unreserved Ticketing System (UTS) enabled Railways to meet the goal of "use of IT for enhanced passenger interface". Overall investment on IT during the 10th 5-year plan is estimated to be Rs. 650 crores. IT-based asset management and maintenance systems have not been adequately deployed in Indian Railways. Overall investment in IT systems needed by Indian Railways at this time is about Rs. 5200 crores, excluding the requirement for the Dedicated Freight Corridors. An outlay of Rs. 3100 crores will be required in the Eleventh plan period as summarized in Table 9.1.

Table 9.1 Requirement of Funds (Plan head 17: Rs. 5200 crores)

	Category	*Estimated overall cost (Rs. In Crores)*
1	Customer interfacing applications	1650
2	Operations related applications	150
3	Asset / resource management	1830
4	Back Office systems	650
5	IT Infrastructure related systems	920
	Total	**5200**

Resolving organizational issues including education and training of staff and officers in IT will be a key enabler for IR during the plan period. A provision for appropriate training programmes has accordingly been made in the projected outlay.

Major IT applications in Indian Railways

Passenger Reservation System (PRS)

The Passenger Reservation System was first commissioned in 1985 in New Delhi, and extended to Kolkata, Mumbai, Chennai, and Secunderabad by 1987. The first version of PRS (IMPRESS, developed by CMC Ltd) continued until 1997. It was based on five host computers, each running independently. The second version (CONCERT), developed by

CRIS, is a fully networked system, enabling "anywhere-to-anywhere" reservation. CONCERT was commissioned between 1997 and 1999, and is presently available at over 1330 locations, including non-railhead remote locations.

The PRS was extended to provide queries on the Internet in October 2001. In 2002, ticketing over the Internet (I-ticketing) was started by linking the PRS to IRCTC's web-based front-end. E-ticketing was started by IRCTC in 2005. Presently PRS handles about 10 lakh transactions per day, with revenue averaging about Rs. 20 crores daily.

Freight Operations Information System (FOIS)

The Freight Operations Information System was conceived in the early 1980s. The initial version was based on the TRACS software procured from Canadian Railways and modified by CRIS. The initial project estimate was Rs. 1098 crores, a large part of it for upgradation of communication networks to support data channels. However, the estimate was significantly reduced later on as the cost of communication technology reduced. The latest estimated cost of the project is Rs. 422.79 crores.

The Rake Management System (RMS) module was installed at 237 locations by 2002. The Terminal Management System (TMS) module has been implemented till date in over 350 locations out of the planned 550. For large freight customers, a pilot electronic payment gateway has been introduced in 2005. The track and trace facilities will be enhanced to the wagon level with incorporation of RFID technologies.

Finance / Stores computerization

In the mid-1990s, a decision was taken to convert batch-mode EDP applications to modern transaction processing systems. System Development Teams were set up in four EDP centres (SR, SER, NR, and CR) for the purpose, reporting to FA&CAOs of the concerned Zonal Railways. AFRES / PRIME (Financial Management and Payroll) applications have been developed and are under implementation in a few Zonal Railways. These applications are based on a distributed approach, with servers envisaged at each location.

An MMIS (Material Management Information System) has also been developed to replace the batch-mode inventory control systems, and is under implementation in 8 Zonal Railways and 5 PUs. The Personnel Information System has yet to be rolled out in any Zonal Railway, while PAS (Passenger Accounting System), FAS (Freight Accounting System), and OSS (Operating Statistics System) are still under development. Centralization of Financial / payroll systems has been taken up under a new project at a cost of Rs. 65 crores.

MIS project

The MIS project was conceived in 1998 to provide an MIS system for all departments of Indian Railways. The project was coordinated by FA&CAOs on the Railways. Different departmental requirements were handled by different Railways.

Table 9.2 MIS Projects on Zonal Railways

Southern Railway	Mechanical and S&T
Northern Railway	Electrical (part), Civil (part), Security
Central Railway	Electrical (part), Civil (part)
Western Railway	Vigilance

Vigilance MIS rollout is complete. Part rollout of other modules has been done in Southern Railway, Central Railway, and part of Northern Railway. Works have been sanctioned for 8 other Railways, though work is yet to start.

A committee to review the MIS project implementation had been set in Board at ED level. Based on the review, it has been decided to get the system converted to a centralized architecture by the National Informatics Centre (NIC), an autonomous organization under the Ministry of Communications and IT. Approximately Rs. 40 crores has been spent on the MIS system so far; the total estimated cost of the sanctioned works so far is Rs. 90 crores.

Unreserved Ticketing System (UTS)

The *Unreserved Ticketing System* (UTS) was conceived in December 2001. It provides the concept of "cluster-to-anywhere" booking, upto 3 days in advance for non-suburban and suburban tickets in the unreserved segment, which accounts for over 90 per cent of the tickets and 55 per cent of the passenger revenue. UTS was implemented by CRIS at New Delhi in August 2002. By March 2006, the system was implemented at over 550 stations. UTS is planned for installation at 1250 stations by March 2007; total investment would be about Rs. 250 crores. 200 Automatic Ticket Vending Machines, connected to the UTS system, are being installed in Mumbai area in the current financial year at a cost of about Rs. 10 crores.

Control Charting and Crew Management Systems

Individual divisions over the years developed local applications for Control Charting and Crew Management. In order to consolidate these efforts and remove limitations, a centralized approach was adopted in 2004. These systems were embodied in the original Detailed Project Report of FOIS also. The software for the centralized systems is being developed by CRIS. The systems are being implemented by the CAO/FOIS organization. Total investment on these systems will be over Rs. 120 crores on completion

Other applications

Parcel Management pilot, Claims Management System, Health Management pilot, etc are other systems under development and implementation by CRIS (estimated cost Rs. 6 crores). Workshop Management System is under implementation by CRIS. In the first phase, 15 Workshops are being covered. The second phase will include 16 other major workshops. In addition, Diesel Locomotive Maintenance Management System is being developed by CRIS (at an estimated cost of Rs. 11 crores).

CRIS has also developed office automation applications for a few Zonal Railways and units, such as SECR, ECoR, and RDSO.

The Long Range Decision Support System (LRDSS) is a standalone application for long-range and operational planning of different types. Presently, the system is being modified to enable data import from FOIS for generating some of the input files while data for other input files is collected manually.

Information Systems proposed for the Eleventh Plan

The following information systems will be enhanced / developed during the Eleventh plan period to satisfy the information needs of the Railways:

- Concept of "ticket at doorstep" will be further developed for reserved, unreserved and suburban tickets. The concept will be extended to automatic ticket vending machines for suburban, long-distance unreserved, as well as reserved passengers. Over 5000 ticket vending machines are proposed to be installed. These machines will be installed in parking lots, waiting halls, station concourses, as well as in universities, offices, shopping malls etc.

- An integrated Railway information system shall be developed and implemented to provide information of train movement, ticketing, facilities on display systems on stations and trains, as well as through diversified media such as the Internet, through telephones / mobile phones, television, radio and newspaper feeds, etc. The system will also be extended to freight and parcel customers.

- FOIS will be extended to all loading points and will interface with customers' information systems, weigh bridges, etc. Facility of payment gateway shall be extended gradually to more customers.

- A comprehensive information system for the Dedicated Freight Corridors will be conceptualized, developed, and implemented. The system will support the DFCs during their project and operational phases. Funding for this system will be included in the DFC project.

- The Crew Management System will be enhanced and implemented in all lobbies. A crew optimization and simulation module will be built into the system and features such as IVRS / mobile phone queries for the crew as well as integration with payroll and personnel management systems will be implemented.

- Rolling stock will be tracked and traced across the Railway network using suitable technology such as RFID for wagons and coaches and GPS for locomotives. Necessary trackside structures will be provided at major stations, yards, and later extended to workshops and maintenance facilities.

- Comprehensive asset maintenance systems shall be developed and implemented for locomotives and rolling stock maintenance, track and bridges and signaling and telecom assets, buildings, fixed structures, land, and miscellaneous assets. The systems will be interfaced with the central Geographical Information System (GIS) of Indian Railways.

- ERP systems will be used in manufacturing facilities (Production Units), in line with global and Indian trends, to streamline operations and reduce costs. Automation of manufacturing and maintenance units shall be integrated with IT through extensive use of embedded IT systems. Product lifecycle management (PLM) systems to automate the production and distribution of design-related information throughout the organization through the use of Computer Aided Design (CAD) and Computer Aided Engineering (CAE) tools will be deployed in a coherent fashion. This will result in a tremendous improvement in the maintenance efficiency, inventory management, and procurement of engineering items.

- An integrated Energy management system shall be developed and installed to optimize the use of fuel and electrical energy. Back-office systems will be strengthened significantly during the plan period:

- A comprehensive Financial Management System, in line with accounting reforms project presently under execution, will be implemented.

- Material management system and e-procurement systems will be implemented on all Railways.

- A comprehensive system for Personnel management including employee health management will be developed.

IT infrastructure proposed

The following are the areas that have been identified for the Eleventh plan.

- Integrated management of data networks for quick and efficient data transmission. Electronic transfer of information requires reliable and high-capacity network infrastructure. While fund provision for networking is made in individual projects, effective management of IR's data networks is an organizational issue that will need quick resolution if benefits are to be reaped from IT. The Telecom department will therefore need to offer data networking services for all of IR's IT applications, to ensure economy and optimal utilization of resources.

- A comprehensive security system for IT shall also be developed to prevent the increasing incidence of computer fraud from affecting Indian Railways.

- A Knowledge Management system, including a portal to disseminate and share information across the organization as well as outside it, will be made operational. The possibility of public-private participation (PPP) shall be explored in the area of dissemination of information through the Internet.

- A comprehensive business continuity system for all IT applications will be made operational. Suitable disaster recovery facilities shall be provided for this purpose.

- A unified Geographical Information System will be developed for Indian Railways to ensure seamless availability of geographical information, be it for asset tracking, mapping of fixed assets, managing large projects, or for use at the time of an accident.

- Finally, an initiative to provide extensive office automation system to reduce manual office work such as maintenance of paper records and movement of paper files shall be taken up. Electronic archival of records along with extensive electronic search capabilities will be provided as part of this system.

- An integrated network of IT applications will be developed with reproduction and redundancy using Railway OFC infrastructure to the maximum possible extent thus reducing the cost of IT applications.

Eleventh Plan Strategy

The strategies for the Eleventh plan are:

- Centralization of information systems as far as possible.

- Creation of a core of project managers and operations managers and personnel well versed in the intricacies of IT.

- Empowerment of managers down to the field units to enable them to make effective use of IT in their work.

- Strengthening of CRIS and other internal IT service providers in terms of manpower, facilities, and internal processes.

- A comprehensive education and training programme for staff in order to enable them to manage the massive influx of IT equipment planned in the Eleventh plan.

Requirement of funds

Cost estimates have been made based on broad parameters such as the sophistication of the system, extent of geographical spread, and special devices and technologies planned to be used. IT spending in the domestic market had increased more than 4 times to over Rs. 30,000 crores per annum. At the rate of increase being experienced presently (over 25 per cent), in 6 years it would touch Rs. 100,000 crores. A comparison of the situation prevailing in 2000-01 against that in 2005-06 is shown in Table 9.3.

Table 9.3 IT Industry Figures

	2000-01	**2005-06**
Annual revenue of IT hardware, software and service providers in India	Rs. 17,750 crores (US$ 3.9 billion)	Rs. 1,26,000 crores (US$ 28 billion)
Exports	Rs. 10,750 crores (US$ 2.3 billion)	Rs. 94,500 crores (US$ 21 billion)
Domestic	**Rs. 7,000 crores (US$ 1.6 billion)**	**Rs. 31,500 crores (US$ 7 billion)**

In a related development, in 2003, the Ministry of IT announced the launch of the National E-Governance Plan (NeGP) at an estimated cost of Rs. 22,000 crores. The 25 mission-mode projects under this plan are progressing rapidly, and two of them (MCA-21 project of Department of Company Affairs and Customs EDI project) have started to deliver results. The MCA-21 project, estimated to cost Rs. 341 crores, has been made operational by July 2006 at all the offices of Registrar of Companies except J&K. The Customs EDI project, already in progress in 2003, costing over Rs. 150 crores, has also been implemented at all major ports, ICDs, and land customs stations. Therefore it is expected that in the Eleventh plan period, other Government organizations will also rapidly computerize their activities.

An investment of an estimated Rs. 5200 crores is needed for providing basic IT-enabled systems in Indian Railways (Plan head 17).

Recommended fund outlay

Most of the envisaged application areas dealing with customer interfaces would be fairly well developed by the end of the Eleventh plan period for which an investment of Rs. 5200 crores would be needed. The summarized position is given in Table 9.4.

Table 9.4 Fund Outlay

Total outlay (Rs. Crores)	Annual outlay at the end of the plan period	Percentage of overall capital outlay*
5200	923	2.2

**** Overall capital outlay is assumed to increase by 12 per cent annually***

Staff education and training

By the end of the Eleventh plan period, about 4 lakh staff would be using computers or computing devices regularly in their work. 40,000 persons would be coordinating the management of computing or network devices. Over 2500 persons would be needed to handle core IT functions, including 150 to 200 project managers. Education and training will therefore play a very important role to ensure that the IT systems envisaged are correctly assessed and scoped out, correctly developed, and finally, are correctly implemented. A suitable provision for training has therefore been made in the recommended outlays.

Coordinating bodies for IT programme implementation

A massive IT implementation programme as described above can only be achieved if strong central control is exercised. For this, the primary need is for a strong program monitoring and coordination body within the Board. Board's processes will be strengthened so that no IT project is started without a clear idea of the scope of the system. Costs and benefits accruing over the lifetime of the project would be considered while determining the application architecture rather than initial costs alone. In addition, central organizations such as CRIS will be strengthened so that it can take up development and implementation of diverse applications, evaluate new technologies, and set standards for code and data. Strategic partnerships with industry and academia will also be explored.

Research & Development

Tenth Plan Allocation and Expenditure

The table below indicates the allocation and expenditure patterns for 10th Five Year Plan for RDSO.

Table 9.5 Tenth Five Year Plan Expenditures

Provision for Tenth Plan*(2002-03 to 2006-07)*	Rs.100 Cr
Actual Allotment during Tenth Plan (2002-03 to 2006-07)	Rs.149 Cr.
Actual Expenditure for 4 years (R.E. used for 2005-06)	Rs.49.97Cr.
Budget Provision for 2006-07	Rs.61 Cr.
TOTAL LIKELY EXPENDITURE	**Rs.111 Cr.**

Proposals for Eleventh Plan

For the Eleventh plan RDSO proposes to carry out a total number of 104 projects costing Rs.1344.45 Cr. The R&D component of the total cost will be Rs.463.43 Crores**.** After a review in the Ministry, it was decided that 6 projects could be dropped. The revised outlay after dropping these projects is Rs.1316.1 Cr. and Rs. 424.13 Cr (Research Component)**.** The major areas of research / projects in the Eleventh plan are given below. *Thus an outlay of Rs. 425 crores is proposed for Railway Research (Plan head 18).*

Table 9.6 Major Project Areas

Projects	**Amount (Rs. In Crores)**
Heavy Axle Load Projects (14)	48.57
Safety Projects (10)	14.90
Dedicated Test Track – Heavy Axle load	87.30
Dedicated Test Track – New Technologies	25.00
Acquire 3 Spurt Cars	45.20
Total	220.97

The R&D activities have been categorised in 3 priority areas. The top priority areas are adoption of high axle loads, and safety, with 22 projects. Second level priority has been assigned to 68 projects relating to improving reliability of assets, technological up gradation & modernization, and improving throughput & speed. The third category of projects is relates to environment, passenger comfort, cost optimization & energy efficiency. The break up of costs for these projects is given in Table 9.7.

Table 9.7 Project Areas (Rs. In crores)

Project Areas	**Total Cost**	**Research Cost**	**No. of Projects**
Adoption of High Axle Load	153.07	48.57	12
Safety	44.90	14.90	10
Reliability of Assets	83.50	45.50	13
Upgradation and Modernisation	853.13	287.58	47
Throughput and Speed	156.40	12.45	8
Environment	9.00	9.00	4
Passenger Comfort	2.50	0.13	1
Cost optimization and Energy Efficiency	8.60	1.00	2
Others	5.00	5.00	3
Total	1316.10	424.13	100

SECTION IV: HUMAN RESOURCES

CHAPTER TEN: HUMAN RESOURCE DEVELOPMENT

Human Resource Management

The main focus during the Eleventh plan is to improve the ratio of skilled workforce to the unskilled. The capital outlay for human resource management will be Rs. 700 crores. Out of this Rs. 200 crores will be utilized for additional training infrastructure, and Rs. 300 crores for development and provision of supervisory development programes, acquisition of simulators and other such machines for training, development of model rooms and laboratories. For the benefit of the staff and greater transparency in the administration, touch screen kiosks with service related information would be provided at an estimated cost of Rs. 200 crores.

The revenue budget for training would be pegged at Rs. 850 crores as compared to Rs. 660 crores provided in the Tenth five-year plan. The resources will be used to provide e-learning modules, customer care training for front line staff including RPF, supervisory development skills, and organizational development and management development initiatives. During the Eleventh five-year plan the annual recruitment is expected to be about 25000 per year.

Health and Environment

The medical department is unique in that it provides both Industrial Medicine and Curative Clinical Medical services. Curative medical treatment is provided to 63 lakh persons, out of which 58 lakhs are serving employees and the rest are retired personnel. Accident Relief resources available are, ARME Scale-I, 174 in number, ARME Scale-II 325 numbers and 14 Self Propelled Accident Relief Trains. There are 121 Railway Hospitals with 13770 beds and 115 private hospitals that are recognized. There are 586 Health Units. Medical personnel include 2506 IRM doctors, 1000 other doctors and 24,000 para medical staff.

During the Eleventh plan period 6 Food Laboratories will be developed at Delhi, Mumbai, Chennai, Kolkata, Guwahati and Nagpur. There are 6,322 wayside railway stations and 3,23,495 employees at these stations. To provide better health care to these employees powers will be given to the Medical Officer located 25 Kms. away from railway hospital to get common Pathological test, X-Ray and other such tests done by tying with private diagnostic centers reducing the distance from 75 kms. A pilot project has been started for Road Mobile Medical Van to enable the railway doctor to visit each wayside station on a regular basis.

Super-Specialty Hospital

Railwaymen and their families have access to one of the best health care systems in the country delivered to them through 121 hospitals and 586 health units spread across the length and breadth of Railway network. Railways spend about Rs. 712 crores per annum on health care. Rs. 34.2 Cr. (4.8 per cent of annual budget) is spent on referral cases to

specialize hospitals outside railways. In order to ensure world class facilities at the door step of Railway employees, it is proposed to have four super specialty hospitals under joint ventures through PPP with renowned health care group in private sector. A sum of Rs. 40 Cr. will be allocated for this purpose during Eleventh Plan period.

Table 10.1 Requirement of funds

SN	**Zonal Railway**	**Amount (Rs. In crores)**
1	CR	99
2	ER	86
3	NR	129
4	NER	57
5	NFR	38
6	SR	187
7	SCR	38
8	SER	42
9	WR	78
10	ECR	46
11	ECoR	93
12	NCR	22
13	NWR	32
14	SECR	13
15	SWR	16
16	WCR	87
	Total	**1063**

Manpower

More specialist doctors will be made available in Railway Hospital. In addition to IRMS specialist doctors, recently orders were issued for engagement of honorary visiting specialists and to call specialist doctors from the private sector on a case-to-case basis. These will be sufficient to fill the present need of specialist doctors in Railway Hospitals.

Human Resources and Technology

Eleventh Plan period is going to witness technology explosion. Induction of new technologies and consolidation of existing ones in rolling stock is going to be at an unprecedented scale. Modernization of workshops, sheds and depots will revolutionize maintenance and repair of rolling stock with greater emphasis on mechanized examination. Similarly, huge investment is planned in track machines for mechanized track maintenance, which is a natural corollary to switch over to PSC sleepers. Mechanized cleaning of coaches and platforms/stations will be inevitable in view of the need for providing world class services and customers becoming more demanding.

IT will have greater role in virtually all aspects of functioning of Railways. Besides FOIS, COIS, PRS, UTS the Plan period will witness computerization of control chart &

crew lobby, office automation, introduction of PRIME and AFRES and remote sensing diagnostic system for rolling stock maintenance.

Training

It is recognized that challenges of high trajectory growth in freight and passenger traffic and revenue can only be met by matching development of the organisation's human resources. Indian Railways have therefore chalked out an ambitious plan for training of all categories of its employees by upgrading existing in house training infrastructure, adding new ones and liberally making use of specialized training facility available in private and public sector within the country and abroad.

Blue print for training will broadly involve:

- Training of artisan, ministerial and supervisory staff in existing skills.
- Retraining of staff to handle new technologies and IT.
- Modernization of training institutes with emphasis on training aids including models.
- Augmentation of classroom and hostel facilities.
- Mobile training vans.

The plan will witness proliferation of new technology in practically all areas of functioning of Railways. Upgrade of technical, HR and managerial skills of all categories of Railway men will, therefore, become an imperative necessity of HR management during the plan period. Suitable consultants will be engaged by IR to comprehensively analyze the training needs of all levels of artisans, ministerial, supervisory and managerial staff and design appropriate courses.

It is proposed to allocate an estimated sum of Rs. 300 Crores. for additional training infrastructure, Rs. 300 Crores. for upgrading the existing training infrastructure, Rs. 200 Crores. for acquisition of simulator and other training aids. It is also proposed to allocate a sum of Rs. 500 Cr. for creation and implementation of ERP package across all units/Division/HQ to automate, simplify and quicken the process of establishment matters, D&A matters, staff grievances, training activities for all the 14 lakhs of employees of Indian Railways with regard to staff welfare and greater transparency in the administration touch screen kiosks with service related information would be provided at an estimated cost of Rs. 200 Crores.

Training Institute for welding

Welding is assuming increasingly important role in the repair, maintenance and production of rolling stock. Growth in requirement for welding skills has outpaced available training infrastructure on IR. Two training institute for welding at an estimated cost of Rs. 5 Cr. are therefore planned during Eleventh Plan.

Corporate Welfare Plan

Indian Railways have about 13 lakhs employees spread over 16 Zonal Railways, Nine Production Units and other establishment. To meet their housing needs, IR has about 6.1 lakh houses giving housing satisfaction level of 46 per cent. IR also has Railway

Institutes, Railway Clubs, Community Halls, Sports Stadium and Hospitals etc. for the welfare of Railway employees.

IR has prepared a ten year corporate welfare plan (2006-2015) with major focus on improved housing and other related services. Thrust areas include:

- Reconstruction of substandard quarters on age-cum-condition basis.
- Improvements/upgrade of substandard quarters – provision of bathrooms, kitchens, etc.
- Reconstruction of quarter (other than substandard quarter) on age –cum-condition basis.
- Any other major work required to be done on age-cum-condition basis e.g. Re-roofing, replacement of decayed woodwork etc.
- Augmentation of water supply for staff quarters including replacement of corroded pipes and pumps etc wherever required.
- Electrical items:
    a) Rewiring of quarters on age-cum-condition basis
    b) Upgrade of fittings in quarters as per norms including consequential strengthening of transformers and cables.

An estimated Rs. 4500 – 5000 crores is likely to be spent over ten-year period. About 60 per cent of this requirement is planned during eleventh plan period. Construction of housing colonies can also be explored through PPP/BOT Model. IR will also encourage its staff to go for their own houses by tripling the allocation for house building advance over Tenth plan period.

SECTION V RESOURCE MOBILISATION AND GOVERNANCE FORMS

CHAPTER ELEVEN: RESOURCE MOBILISATION & PLAN OUTLAY

Resource Mobilisation

The Railway Plan is financed through five different sources, (i) Capital from General Exchequer; (ii) Internal Generation; (iii) Railway Safety Fund (Railway's share out of diesel cess); (iv) Special Railway Safety Fund; and (v) Market Borrowings.

As highlighted in Chapter 1, Table 1.9**,** the financing pattern of the Railways has progressively shifted towards greater reliance on internal resources and market borrowings during the course of the X Plan. The actual mobilization of internal resources has increased from Rs.3113 crore in 2002-03 to Rs.12206 crore in 2006-07 (RE) resulting in increase in its share in the Plan from 27% in 2002-03 to 48% in 2006-07 (RE). The share of internal resources in the overall X Plan works out to 35% as against that of budgetary support of 45%. The share of EBR in the Plan works out to 20%. The financing of investment in the 11th Plan would continue to reflect this shift in a large measure

Financing the Eleventh Plan

The Plan outlay for Eleventh Plan is proposed as Rs 2,51,000 cr. The proposed funding pattern is discussed below. Three alternatives have been examined

Table 11.1 Summary of Alternative Financing Scenarios

(Rs in cr)	Alternative I **(Base case)**	Alternative II	Alternative III
Gross Budgetary Support	**86,000**	**86,000**	**86,000**
	34%	**34%**	**34%**
Internal Resources	**90,000**	**90,000**	**75,000**
	36%	**36%**	**30%**
Extra Budgetary Resources	**75,000**	**75,000**	**90,000**
	30%	**30%**	**36%**
Proposed Plan Outlay	**251,000**	**251,000**	**251,000**

Note: Freight earnings in Alternative I is based on a loading of 1100 MT by the terminal year of the XI Plan with YPMT increasing gradually in the range of 2.2% to 3.8% to reach to Rs. 62.67 cr in the terminal year from the present Rs. 59.8 cr. Alternative II is based on a loading of 1215 MT with YPMT remaining constant at the present Rs. 59.8 cr. Alternative III assumes the freight loading as 1100 MT with a constant YPMT of Rs. 59.8 cr.

The various alternative funding patterns are based on different levels of internal generation, ranging from Rs 75,000 cr to Rs 90,000 cr, depending on assumptions discussed in the section on internal generation. Based on the range of internal generation a concomitant reduction in reliance on funds from GBS has been proposed in alternative funding options.

Table 11.2Alternative II (Base Case Scenario)

	Total for XI Plan *(Rs.in cr)*
a. Budgetary Support	
Capital from General Exchequer	80,300
Contribution for SRSF	1,200
Diesel Cess for Safety Fund	4,500
Total (a)	**86,000**
b. Internal Resources	
Internal Resources (incl. SRSF)	**90,000**
c. Extra Budgetary Resources	**75,000**
Total proposed Outlay for XI Plan	**2,51,000**

A summary look at each source of funds follows.

Gross Budgetary Support (GBS)

Components of GBS provided in Tenth Plan are compared below with the proposed ones for Eleventh Plan.

Table 11.3 Gross Budgetary Support

(Rs in cr)	**Tenth Plan**	**Eleventh Plan**
Capital from General Exchequer	26,869	80,300
SRSF	9,789	1,200
Diesel Cess for Safety Fund	1,504	4,500
Total	38,163	86,000
Per cent share in Plan outlay	45%	34%

The contribution towards SRSF, from GBS represents the balance of Rs 1200 crores due from the general exchequer. The transfer from Central Road Fund taken as 'Diesel Cess for Railway Safety Fund' currently stands at around Rs. 711 cr per year. Anticipating

that the collection in Central Road Fund will increase with the increase in road traffic, the Railways' share has also been assumed to increase to Rs 900 crores per year during the Eleventh Plan. Accordingly the share of diesel cess for Railway Safety Fund has been assumed at Rs. 4500 cr in the Eleventh Plan.

Excluding the balance contribution from the General Exchequer towards SRSF and Railways share in the Diesel Cess Fund, the Gross Budgetary Support is proposed as Rs 80,300 cr. This includes Rs 7,000 cr for National projects. While this projection reflects a significant increase in absolute terms, the percentage share of GBS in the Plan outlay has been projected as 34 per cent, which is much less than share of GBS in the Tenth plan

Ongoing External Aid through GBS

A few Railway projects receive external funding through the GBS.

Table 11.4 Externally funded Projects

World Bank - IBRD Loan - IDA Credit	US $ 305 m US $ 60 m	Rail component of MUTP
ADB	US $ 314 m	Railway Sector Improvement Project - Strengthening of Golden Quadrilateral & its diagonals - Accounting Reforms project
KfW Loan	Euro 95 m	Railway Signalling Project on Ghaziabad-Kanpur Section

Balance loan amounts available during Eleventh Plan are about Rs. 3000 crores. All loans are expected to be utilized by 2008-09.

Indian Railways is unique in that it is one of the only Railways in the world, with mixed operations - passenger and freight - that generates resources for its development expenditure, besides fully covering its operational costs. This is in sharp contrast to most world Railways that depend on subsidy for operations and development expenditure. The demands for expansion of the rail infrastructure, imposed by the growth in Gross Domestic Product projected for the Eleventh Plan would dictate a significant step up in Budgetary Support. This is the rationale for the base case scenario proposed. The Railways are seeking an increase in GBS to sustain expansion and upgradation of the infrastructure required to support the transportation needs of the economy. It is estimated that the Railways would need to carry 1100 million tonnes of freight and nearly 8400 million passengers by the terminal year of the Eleventh Plan period. This growth scenario warrants not only speedy completion of certain critical and throughput enhancement works but also taking up of ambitious mega-projects for rapid modernization and expansion of the railway network.

While there is a sustained increase in internal generation of resources, these are inadequate to finance the investments required. Market borrowing will also have to be resorted to with prudence, keeping in view the cost of debt and intrinsic nature of Railway projects - the long gestation period and low rates of returns. Hence, reliance on Gross Budgetary Support for expansion of the Rail Network may be contained to 35-45% of the Plan Outlay (as projected in different alternatives), but would continue to be critical for ensuring availability of adequate transport infrastructure in the country.

Internal Resources

Railways propose to contribute Rs 90,000 cr from internal generation towards the proposed Eleventh Plan outlay of Rs. 2,51,000.

Table 11.5 Internal Resource Generation (Base Case Scenario)

(Rs in cr)	**Tenth Plan**		**Eleventh Plan**	
	2002/03--2006/07	Annualized growth	2007/08--2011/12	Annualized growth
Passenger	72512	9.2	127533	12.7
Other coaching	5778	14.6	12376	9.8
Freight	163487	11.2	295369	11.1
Sundry	6775	12.4	13395	15.3
Clearance of suspense	502		700	
Gross Traffic Receipts	249054	10.8	449373	11.6
Misc. Receipts	10374	12.7	11836	1.6
Total Receipts	259428	10.9	461209	11.3
Ordinary Working Expenses	166549	5.8	276940	12.0
Miscellaneous Expenditure	1516	11.0	2284	4.5
Appropriation to Pension Fund	33312	6.7	59179	13.6
Dividend	15334	21.8	32142	19.5
Payment of Deferred Dividend	2159		664	
Total Expenditure	218870	6.9	371209	12.5
Investible surplus	**40558**		**90000**	

The underlying assumptions are:

- Freight loading: 1100 mt. in the terminal year i.e. incremental loading of nearly 75 mt. per year.
- Freight earnings in Eleventh Plan period assessed at Rs. 295369 crores- growth of 11.1 per cent per annum with yield per million ton (YPMT) at an average of Rs. 62.67 crores from the present level of Rs. 59.8 crores. It is assumed that YPMT will increase gradually in the range of 2.2% to 3.8% every year.
- Passenger earnings during the period have been assessed at Rs.1,27,533 cr. assuming a constant growth 12.7 per cent. No increase in fares contemplated.
- The overall traffic earnings to grow at 11.6 per cent per annum.
- Ordinary Working Expenses are assumed to grow at 10 per cent
- Likely impact of VI Central Pay Commission super-imposed to give annualized growth of 12 per cent.
- Direct impact assessed at Rs.6000 cr - provided in 2008-09. Consequential impact also built in subsequent years projections.
- Pensionary charges assumed to increase by 8 per cent per annum. In addition, impact of VI Central Pay Commission also suitably provided

Alternative scenarios for internal resource generation have been generated based upon variation in loading / rate of growth of freight earnings based on increase in earnings per million tonne.

Based on the above scenarios it is seen that the range of internal generation would be Rs. 75,000 cr to Rs. 90,000 cr. While the Railways would strive to increase earnings through higher throughput levels, and generate more funds through its own resources, capacity constraints make it difficult to target loading of more than 1100 MT and 8400 million passengers by the terminal year. The expenditure of the Railways is largely of a fixed nature, with approximately 45% comprising of staff related expenses and 29% the cost of fuel. Operational and safety considerations dictate the need to ensure adequate provision for working expenses. Further in the 11^{th} Plan, an additional requirement of more than Rs. 30,000 cr would arise for implementing the recommendation of the VI Pay Commission. The base case scenario therefore seems most likely to fructify in as far as the potential of internal generation by Railways.

Extra-Budgetary Resources (EBR)

The base case scenario of Rs 86,000 cr as Gross Budgetary Support and Rs. 90,000 cr as internal resources would leave a gap of Rs. 75,000 cr in the proposed plan size of Rs. 2,51,000 cr. This would be made good through the extra budgetary resources. For this, Railways will be exploring all areas, including the conventional market borrowing through IRFC. The various options are listed below:

- Market borrowing through IRFC
- Japanese Funding for DFC
- Debt and Equity participation raised by RVNL/ other SPVs to finance projects
- Cost sharing by State Governments / Government agencies

- Viability Gap funding
- Wagon Investment Scheme (WIS)
- Rolling Stock leased from manufacturers
- Public Private Partnership (PPP) – BOT, BOLT etc.

Public Private Participation

Expansion of the railway infrastructure would increasingly entail seeking public private participation. The adoption of this approach would rest upon evaluating the benefits to the Railways in terms of improving efficiency and raising additional resources. Alternative approaches on revenue sharing will have to be approached based upon the nature of projects taken up. The concession agreements would range from private finance initiative involving annuity payments to revenue sharing based on level of service rendered to equity participation in joint ventures.

Conclusion

Notwithstanding the alternative funding patterns explored above, in view of capacity constraints and requirement of funds for meeting expenditure likely to be imposed by the VI th Pay Commision, the funding pattern is proposed as under.

	Rs in cr.
Gross Budgetary support	86,000
Internal Resources	90,000
Extra Budgetary resources	75,000
Total XI Plan	2,51,000

Public Private Partnerships

With sustained economic growth, pressure on the transport infrastructure in general and railway in particular, has mounted. Consequently, the need for capacity augmentation, bottleneck removal, and provision of improved services has acquired great urgency. This not only calls for massive resources but also efficient models of project formulation, appraisal and execution. Experience world over and in several sectors in our country has established that Public Private Partnerships help the Government to harness the private sector efficiencies in project execution and service provision while allowing it to leverage limited resources for a large number of projects. As on date, Indian Railways have a large self of uncompleted projects whose completion would require about Rs 65,000 crores. To meet the requirement of future growth of Indian Railways further new investment projects are required, for which massive funds are needed. The magnitude of the task is huge and any neglect of the same is bound to lead to severe capacity limitations adversely affecting the competitiveness and growth of the economy.

It is estimated that Indian railways would not be able to generate sufficient funds internally, through borrowings and from budgetary support for meeting the investment requirements of the Eleventh Five Year Plan. The shortfall would be met through private investments in PPP projects. Additional investment from private sector is also expected

through their own investments in ancillary facilities created on their own as a consequence of partnerships with IR. *Together it is expected that about Rs 66,000 crores worth of investments would be done by private sector through PPP during Eleventh Five Year Plan.*

Build Operate Lease Transfer / Build Operate Transfer

The original scheme was launched in 1994. Of the 14 tenders called, 12 were cancelled for high lease demand and the other two failed at various stages. The scheme was reviewed and it emerged that:

(a) Certain prerequisites such as prior availability of land, designs, drawings and a Model Concession Agreement need to be fulfilled to remove uncertainty and doubt in the minds of bidders.

(b) Risks are also to be allocated optimally instead of loading all the risks to the bidder and Railway officers need training for PPP projects, which are different from EPC projects. So far only one project, gauge conversion of Viramgam- Mehsana, has been completed on BOT at cost Rs. 80 crores. The maintenance of the line is with Railways and the contractor is being paid fixed annuity for the construction.

Own Your Wagon / Wagon Investment Scheme

Own Your Wagon Scheme has been in existence for many years. An amount of around Rs. 516 crores were mobilized from railway customers during the IX Five year Plan. This, however, represented only a small part of the total expenditure of Rs.18776 on rolling stock. Further, during the first four years of the Tenth Plan no private investment has come under this scheme. The scheme has been revamped and renamed as Wagon Investment Scheme (WIS) with the provisions for freight rebate and supply of guaranteed number of rakes over a period ranging from 7-15 years for various categories of wagons. The new scheme has been well received.

Joint Ventures / Special Purpose Vehicles

Gauge conversion of Surendranagar - Rajula city and its extension to the Pipavav port was executed under a joint venture arrangement between Railways and GPPL at a cost of Rs 373 crores. The SPV Joint Venture named Pipavav Rail Corporation Limited (PRCL) was established in 2001 with Rs 200 crores equity and Rs 173 crores debt. The equity was shared equally between both the partners. The project was successfully completed and commissioned during the Tenth plan. The SPV also achieved remarkable results in establishing efficient benchmarks in operation and maintenance. However there have been problems regarding generation of the guaranteed traffic from the port adversely affecting the finance of the company.

Following PRCL, two other SPVs namely HMRDC to execute Hassan Mangalore gauge conversion and port link project and KRCL gauge conversion of Palampur- Gandhidham projects were formed. Rail Vikas Nigam Ltd. (RVNL) was formed to act as an umbrella SPV for creation of JV SPVs for Railway.

Experience with the SPVs indicate that in future more freedom needs to be given to SPVs in terms of design, construction and maintenance of the assets created through SPVs. Participation of strategic partners should be encouraged and pursued as this brings greater value to the initiative. As the SPV becomes sustainable on its own, Railway's equity might be gradually reduced to provide greater independence and opportunity for the SPVs to excel in their operations. However, Railway can retain special powers on decisions on vital issues in such cases. Viability gap funding should be provided in the form of interest free subordinate debt rather than outright grants. Concession fee in the form of a fixed sum or as a percentage of the revenue should be provided in the Concession agreement. SPVs should be encouraged to combine the roles of infrastructure owner, container/ freight operator and possibly road transport operator to gain a competitive edge in the Logistics Market.

Eleventh Plan Strategies

A range of PPP models are available which need fine-tuning for the specific requirement of each project.

Leasing and Service Agreements

Hospitality Sector

There are several activities, which are either loss making or underutilize the railway's existing assets. Among these are catering, budget hotels, advertising, running rooms and on board train services. These activities require managerial approaches that can respond fast and efficiently to changing market demand and passenger expectations. The prerequisite to success of such private partnerships are, meticulous attention to definition and specification of service standards, and competitive bidding. Corporations like IRCTC can carry out such bidding.

Parcel Services

Piecemeal leasing of parcel vans in some important mail express trains has already been tried on Indian Railways. The underlying principle is that private sector is good at aggregating piecemeal bookings and arranging "first mile" and "last mile" services. Railways could then concentrate on carrying the parcels, which pose no problem as these are to be carried by Mail/express trains, exactly as at present. A logical extension of the policy would be to lease full parcel services between a pair of cities that might run periodically at a frequency determined by market demand. The private operators also could be encouraged to own rolling stock and offer full trains for scheduled running by Indian Railways on the same lines as container operations.

Uneconomic Branch Lines (UBLs) and Hill Railways

At present there are many Uneconomic Branch Lines that are running at losses. Hill railways connecting Darjeeling, Ooty and Shimla are also among such loss making lines. SPVs could be formed in partnership with state governments, local bodies and railway PSUs. The services could be handed over to SPV under Service Agreements/Management contracts for time-bound and targeted reduction of losses

through enhanced efficiency, freedom in setting level of services and fares, multi skilling of staff and innovative maintenance practices. Another variant of the model could be concessioning of the entire line with fixed and moving assets. Accounting separation of such branch lines would be a prerequisite for achieving organizational separation and independent operation by the SPV. Yet another possible model for such services would be estimation of losses and inviting bids from potential entrepreneurs to run services with defined service level and quality, the sole bidding parameter being highest revenue share offered or lowest subsidy sought.

Commercial Development of Land and Air Space

Indian Railways has approximately 43,000 hectares of vacant land. These are mostly alongside track in longitudinal strips, around railway stations, and in railway colonies. Land in metros and other important urban centers is a valuable asset and its true value needs to be unlocked. Rail Land Development Authority (RLDA) has been set up by an amendment to the Railway Act 1989 in the year 2005 with main objectives of generating revenue, upgrading railway assets, providing world class state of the art passenger facilities and services at stations. Implementation would be mainly through public private partnerships. Region/ City specific SPVs with private partnership would be established in the beginning for identifying, project development and marketing of railway land. Project specific JV SPV would be established through competitive bidding in order to maximize the sharing of revenue. RLDA would mainly put railway assets as equity whereas private partner could put cash as equity forming the project SPV.

Telecom Network

Partnerships in sharing of infrastructural assets like towers, OFC network, to provide better services for the customers are also envisaged. Value added services emerging from providing Internet connectivity on trains would be the focus of such partnerships.

Modernization of Major Stations

The most urgent task in this regard would be modernization of Metro City Railway Stations like Delhi, Mumbai etc. to provide world class passenger amenities and services. However, there is no need to invest scarce government fund in these projects as these stations have enormous potential to attracting private investments. Areas around the stations and the air space above platform could be commercially developed through PPP. The main objective of railway should be to increase the platforms space by shifting majority of platform level operational and passenger services to the first floor concourse level. This level could cover the entire length and breadth of the platform areas creating world-class passenger amenities and services.

New Passenger Terminals

The growth of passengers and demand for trains is increasing every year. The existing metro city stations do not have space for future expansion to meet this growing demand. Hence new passenger terminals are being planned in such cities like, Delhi, Mumbai etc. These terminals would come up away from the center of city for at places already having some railway infrastructure including land for constructing such terminals. State government or the city development authority will provide additional land if required for

developing a modern passenger terminal on the line of modernization of stations. As it would be a green field development there would be greater opportunity with comparatively easier execution for maximizing commercial development in order to achieve train operational area free of cost and at zero maintenance cost too. Such projects could also be taken up through PPP on JV SPV model decide through competitive bids.

Road Over Bridges (ROBs) on BOT

Indian Railways is getting more than Rs.710 crores annually from Central Road Fund for funding of ROBs and other Safety related works at L-Xing gates. As a policy Indian Railways has to share 50 per cent of the cost of ROBs. There are many L-Xing gates with substantial percentage of intercity road vehicles. ROBs could be constructed on these L-Xing gates on BOT basis involving private sector with revenue streams coming from toll collection from road vehicles. This would require a tripartite concession agreement with railways paying maximum of 50 per cent of the cost, State Government providing any land required for project free of cost and allowing the private concessionaire to collect toll for the concession period.

Public Private Partnerships in Dedicated Freight Corridor

The new Dedicated Freight Corridor (DFC), initially covering about 2700 route kms at an approx. will cost Rs.22000 crores linking the ports of western India and the ports and mines of Eastern India to Delhi and Punjab respectively. The construction of this Corridor will be implemented through an SPV being created for the purpose. The project offers immense potential for PPP in the form of BOT or BOT-annuity contract packages. This type of concession would be tried for the first time on Indian Railways. For the success of this model, a unique combination of risk sharing and incentives is required to be developed. With the involvement of private sector in design, construction and maintenance of railway infrastructure there are possibilities for introducing model maintenance system, life cycle cost designs and new advanced construction technology. The SPV could bring in additional ancillary revenues through commercial exploitation of land, construction of freight terminals and logistic parks.

Container Services

Private operators are being allowed to operate Container Services on Indian Railways. So far 14 private firms including CONCOR have registered under this scheme and have deposited a total amount of Rs 540 crores. This policy is required to be taken further ahead by building in suitable guarantees and commitments from railways in order to enable the private operator to provide value added container services and make investments in container handling facilities like ICDs and Container Freight Stations (CFSs). Long-term commitments on transit time and access charges on the part of Railways would be necessary for achieving private investments in the container logistics sector. There are several investment projects like freight terminals, multi modal logistics parks, warehouses, ICDs, which could be financed and built by the private sector on their own provided Railways offer concession on Build Own and Operate (BOO) basis. Private firms having license for container service would be best placed for taking up such projects.

Rolling Stock Manufacturing

Wagon Manufacturing

The projected requirement of wagons for Eleventh Five Year Plan is 1.3 lakh FWU to meet the normal traffic growth on Railways alone, which is about 45 per cent higher than the wagon acquisition for the first four years of Tenth Five Year Plan period. Wagon manufacture on IR has mostly been through private sector, which will be continued and strengthened in future.

Wagon Investment Scheme (WIS) has laid down the basic framework for enabling private investment in rolling stock. Besides encouraging WIS, other instruments such as leasing will be actively pursued. Steps will also be taken to develop special product wagons, higher axle load wagons for DFC and upgrade the existing wagons by encouraging private investment. Railways will be open to sharing of risks and evolving appropriate mechanism for a payback to private investor on investments in the new technology.

Coach/EMU manufacturing

The requirement of coaches / EMU projected for Eleventh Five Year Plan is 22689 vehicle units as against 12202 for Tenth Five Year Plan, an increase of 86 per cent. Manufacture of coaches / EMUs currently is mostly through two Production Units viz. ICF and RCF fully owned by the Railways and in a limited way through two PSUs namely BEML and Jessop. The existing installed combined capacity of ICF and RCF are 2000 vehicle units per annum, which can be augmented to 2900 vehicle units per annum after completion of works already sanctioned. BEML and Jessop can additionally manufacture another 450 vehicle units per annum. Considering the need for getting contemporary world technology, improved maintainability and harnessing the expertise and efficiency of private manufacturer of international repute in running a coach factory, a new unit for coach manufacture will be set up through a joint venture to bridge the gap between the demand and augmented manufacturing capacity.

Locomotive Manufacturing

Requirement of Electric & Diesel Locomotives as projected by the Sub Group on Eleventh Five Year Plan is 1800 each (360 locos per year). The requirement takes into account quantum jump in traffic including construction of DFC, increased number of licensed operators in containers, implementation of engine on load concept, right powering of trains to improve average speed and the need to avoid detentions arising out of frequent change of locos even within the same traction. The existing capacities for the manufacture of these locomotives are 150 per annum each which can be augmented to 295 per annum for Electric Locos and 250 per annum for Diesel Locos. The gap between the requirement and the augmented capacity will be bridged by setting up locomotive manufacturing unit as a Joint Venture, with the objective of bringing in world class technology, lower maintenance and operating costs and harnessing expertise and efficiency of private sector of international repute in running such a plant.

Suburban Railway Projects

As per the Central Government policy urban mass transport is now under the purview of State government and Ministry of Urban Development. However the existing suburban services on Indian Railways would continue to meet passenger demand. These services are at present loss making and become a bottleneck for running of long distance trains and freight trains on the same tracks. Through proper PPP model these services could be upgraded and losses could be reduced. Gradually suburban services could be separated from other train services. The sequencing of actions could be separation of accounting, followed by organizational separation creating suburban entities, followed by partnership with state government and private sector in SPV. Such SPV should also have the mandate for modernization and up gradation of services at the request of state government. State Governments should agree to finance on the basis of Peak Cash Deficit Funding by the Indian Railways similar to the funding of Phase II of the rail component of the MUTP being implemented through MRVC. SPV should enter into an agreement with IR for gradually reducing the operating losses reaching zero within a time frame of 5-10 years. SPV should be allowed to develop alternative sources of revenues through advertising rights, leasing of spaces to service providers etc. IR should get better track availability for its long distance passenger and freight trains after such up gradation.

Budget Hotels and Food Plazas

Budget Hotels and Food Plazas are ancillary railway services provided near stations but these could be best developed, designed, financed, constructed and managed by the private sector. These could be executed through Build Own Operate and Transfer (BOOT) model on a 15-30 years concession. A PSU like IRCTC or an authority like RLDA could best perform Land lease for Budget Hotels and Food Plazas. The concession should be given through competitive bids to get a prefixed annual license fee plus an upfront one-time concession fee determined through bidding process.

Multi Modal Logistics Parks

Large integrated hubs in international logistics chain providing large number of rail sidings with sheds, large inland container depot, warehouses for storage, office buildings for logistics operators, highway connectivity, and smaller assembly units working on imported raw materials for export purposes could be one of the most significant developments during the next five years. Indian Railways entered into Memorandum of Understanding with Central Warehousing Corporation for building warehouses at 22 locations all over India. Many multi-modal logistics parks could be built along the alignment of DFC with partnership of state governments and private sector. DFC would enable running of daily time tabled freight trains from such logistics parks to important ports for export and import. This would bring down the cost and time of transportation drastically compared to highways. Major logistics private players could act as the lead promoter, with respective State Governments providing land and road connectivity, and SPV for DFC partnering for providing rail sidings and rail connectivity. A separate joint venture company could be formed for each such logistics park on Build Own and Operate (BOO) basis. Such Parks could either be built at strategic locations or could be dovetailed to Special Economic Zones (SEZs). Ministry of Railways intends to partner with state

governments and private logistics operators and infrastructure providers for establishing such parks.

Partnership with State Government

In order to meet the aspirations of State Governments in getting rail projects executed or expedited in their states, Ministry of Railways has started the concept of cost sharing of financially unviable but socially desirable projects sponsored by the states. Cost-sharing started with suburban rail projects in metro cities and later, it was expanded to take up gauge conversion, doubling and new line projects also. State governments share 1/3rd to 2/3rd of the cost of project under Memorandum of Understanding (MOU) with Railways for completing the projects in a time bound manner (up to 5 years). Such MOUs have been executed so far with Governments of Maharashtra, Karnataka, Andhra Pradesh, Jharkhand, Tamil Nadu and West Bengal for suburban, new line, and gauge conversion projects.

The existing policy of cost sharing takes care of just the financing part of the project without any advantage in operation, maintenance and marketing of the railway lines so created. As an extension of this policy, Joint Venture SPVs should be formed with each state government for construction, maintenance and marketing of such socially desirable railway projects. Branch lines whose extensions are being planned through such arrangement should be handed over to the SPV who should then operate and market the lines in a manner similar to the Port Linking Project SPVs. Zonal Railways should carry out O&M on MOU with full cost reimbursement basis. The SPV should encourage alternative revenue generation through ancillary activities and commercial utilization of land under its jurisdiction. Through this arrangement, unremunerative regional/ branch lines would be separated with the State Government as an equal stakeholder. This would also allow socially desirable projects to achieve financial viability.

Plan Outlay

Based on the reports of the Sub-groups a exhaustive plan document covering various aspects has been prepared. The proposed outlay under different Plan-heads is summarized below. The total outlay works out to Rs. 251000 crores.

Table 11.9 Plan-head wise Summary of Plan Outlay

Head	Plan Head	X PLAN Expenditure	Percent	XI PLAN outlay	Percent
11	NEW LINES	9202	10.86%	16000	6.37%
14	GAUGE CONVERSION	6240	7.37%	18700	7.45%
15	DOUBLING	3461	4.08%	19000	7.57%
16	TRAFFIC FACILITIES -YARD REMOD	1623	1.92%	7500	2.99%
17	COMPUTERISATION	608	0.72%	5200	2.07%
18	RAILWAY RESEARCH	71	0.08%	425	0.17%
21	ROLLING STOCK	26807**	31.65%	59475	23.70%
29	Road Safety-Level Crossing	641	0.76%	1000	0.40%
30	Road Safety-ROB/RUB	863	1.02%	11000	4.38%
31	TRACK RENEWALS	15363	18.14%	23165	9.59%
32	BRIDGE WORKS	1740	2.05%	2895	1.15%
33	SIGNALLING & TELECOM WORKS	4447	5.25%	12000	4.78%
35	ELECTRIFICATION PROJECTS	810	0.96%	3500	1.39%
36	OTHER ELECTRICAL WORKS	787	0.93%	3460	1.38%
41	MACHINERY & PLANT	827	0.98%	2200	0.88%
42	WORKSSHOPS inclu. PRODUCTION UN	1262	1.49%	10100	4.02%
51	STAFF QUARTERS	324	0.38%	1085	0.43%
52	AMENITIES FOR STAFF	416	0.49%	1455	0.58%
53	PASSENGER & OTH. USERS' AMENIT	1235	1.46%	3500	1.39%
62	INVESTMENT IN PSUs	3723	4.39%	41000*	16.34%
64	OTHER SPECIFIED WORKS	766	0.90%	1000	0.40%
81	M.T.P.	1450	1.71%	4750	1.89%
71	INVENTORIES	2041	2.41%	2590	1.02%
	Total	84708	100.00%	251000	100.00%

*This comprises of Rs. 9000 crores as equity for DFCCIL, Rs.18000 crores assistance from JBIC and other sources for DFC project, Rs. 4000 crores for other PSUs including RVNL, and the balance of Rs. 10000 crores for High Speed Passenger Corridor.

**This includes Rs. 3336 for payment of capital component on leased assets

ANNEXURE I

No. 18/9/2005–Tpt.
Planning Commission
(Transport Division)
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Yojana Bhavan, Sansad Marg,
Dated, the 24th March, 2006.

OFFICE MEMORANDUM

Subject: Working Group on Railway Programmes for Eleventh Five Year Plan (2007–2012).

I. In the context of the formulation of the Eleventh Five Year Plan (2007–2012), it has been decided to set up a Working Group on Railway Programme. The composition of the Working Group will be as follows:

1	Shri J.P. Batra, Chairman, Ministry of Railways.	Chairman
2	Shri Shiv Dasan, Financial Commissioner (Railways) Ministry of Railways.	Member
3	Shri R.R. Bhandari, Member (Mechanical), Ministry of Railways.	Member
4	Shri R.R. Jaruhar, Member (Engineering), Ministry of Railways.	Member
5	Shri R.S. Varshneya, Member (Staff), Ministry of Railways.	Member
6	Shri Ramesh Chandra, Member (Electrical) Ministry of Railways.	Member
7	Shri S.B. Ghosh Dastidar ,Member (Traffic), Ministry of Railways.	Member
8	Shri Ashok Kumar, Executive Director (Planning) Ministry of Railways.	Member
9	Shri J.P. Shukla, Managing Director, Rail Vikas Nigam Ltd. (RVNL), C 2/10, Safdarjung Development Area, Aurobindo Marg, New Delhi – 110016.	Member
10	Shri B.N. Puri, Adviser (Transport), Planning Commission	Member
11	Representative of Ministry of Finance	Member

12	Representative of Department of Shipping,	Member
13	Representative of Department of Road Transport & Highways	Member
14	Representative of Ministry of Coal	Member
15	Representative of Ministry of Steel	Member
16	Representative of Ministry of Power	Member
17	Representative of Department of Industrial Policy & Promotion	Member
18	Representative of Ministry of Petroleum and Natural Gas	Member
19	Representative of Department of Fertilisers	Member
20	Representative of Department of Commerce	Member
21	Shri. R.Gopala Krishanan, Executive Director, Tata Group of Industries, Bombay House, 24, Homi Modi Street, Mumbai – 400 001.	Member
22	Shri A. Ramakrishna, Deputy Director General Larsen & Toubro Group (L&T), ECC Construction Group, Mt. Poonamallee Road, Manapakkam, P.O. Box No. 979, Chennai – 600 089.	Member
23	Dr. Amit Mitra , Secretary General, Federation of Indian Chambers of Commerce & Industry, Federation House, Tansen Marg, New Delhi	Member
24	Shri N. Srinivasan, Director General, India Habitat Centre, Confederation of Indian Industry, 23, Institutional Area, Lodhi Road, New Delhi– 110003.	Member
25	Shri C.M. Khosla Ex–Member , Railway Board 128, Sunder Vihar, New Delhi – 110003.	Member
26	Shri Anup Singh, 16–A, Palam Marg, Vasant Vihar, New Delhi – 1100057	Member

27	Shri S.K. Suri, Addl. Member(Planning), Ministry of Railways.	Convener

II. **Terms of Reference:**

1. To evaluate the physical and financial performance of the Railways during the Tenth Plan. This would, inter alia, include assessment of various policy initiatives undertaken with regard to development of rail network, optimal utilization of transport capacity already created; improvement in quality of services, technological upgradation and modernization of rail infrastructure etc.

2. To project traffic targets both passenger and freight during the Eleventh Plan, in the light of the transport requirement of the projected rate of growth of the economy.

3. To formulate detailed physical plan which may include total spillover schemes of Tenth Plan as well as other new schemes proposed to be taken up during the Eleventh Plan.

4. To suggest policies for creation of time–bound world class rail infrastructure in the context of emerging economic imperatives of globalization of Indian economy. The policy framework may focus on :

   (a) Identification of growth areas and accordingly assess the requirement of augmentation of capacity to meet the traffic requirement of the high growing economy by providing quality service at competitive costs.

   (b) Specific measures for technological upgradation and modernisation of rail infrastructure to make it world-class.

   (c) Improving safety in rail operations to meet the world standards.

   (d) Measures to carry out organizational reforms such as making production units as profit centres and outsourcing of non–core activities.

   (e) Regulatory mechanisms for tariff setting including the need for setting up a tariff regulatory authority as well as rebalancing of tariffs by rational indexing of the line haul cost to the tariff.

   (f) Measures for encouraging public partnership involving State Govts., local bodies, ports etc. and public–private partnership in the capacity augmentation of rail infrastructure and also to identify

areas for such partnership. The quantum of likely investment during 11th Plan through such partnership could also be estimated by the Group.

5. To identify measures to improve capacity augmentation on high density corridors as well as increase in the average speed of trains by following corridor based approach with clear cut indications of individual components within the particular corridor for improving the quality and reliability of services. The possibilities of construction of Dedicated Freight Corridors on the pattern of Eastern and Western Corridors may also be examined by the Group.

6. To suggest measures for improving the sanitation and other passenger amenities at the stations as well as in trains and modernization of coaches. The Working Group may also suggest measures for improvement of average speed of trains in passenger segment along with improvement in quality and reliability of services.

7. To assess total requirement of funds to meet the investment requirement of various Railway sector programmes during the Eleventh Plan. The Group will also suggest measures for mobilization of resources with specific focus on internal resources of Railways. The quantum of Budgetary Support required to supplement the resources of Indian Railway for financing the Railway Plan may also be estimated.

8. To assess the requirement of funds for replacement and renewals of railway assets and new additions to the system to avoid accumulation of arrears.

9. To assess the progress towards ongoing accounting reforms in Railways.

10. To identify surplus manpower in certain areas considering the possibilities of technological upgradation, modernization of services and outsourcing of non–core activities. The Working Group may also suggest the specific plan for reduction in the manpower in Railways.

11. To assess the traffic requirements of the North–east with a view to planning for augmentation of its capacity.

III. Chairman of the Working Group may co–opt any other Member(s) for the work of the Group.

IV. The Secretary of the concerned Ministry / Department will nominate the representative of their Ministry/ Department and their nominations may be sent to the Chairman of the Working Group.

V. The expenditure of TA/DA of official members in connection with the meetings of the Working Group will be borne by the parent Department/Ministry to which the official belongs as per the rules of entitlement applicable to them. The non–official members of the Working Group will be entitled to TA/DA as permissible to Grade I officers of the Government of India under SR 190(a) and this expenditure will be borne by the Ministry of Railways.

VI. The Working Group is required to submit its report by 31st August , 2006. Ministry of Railways will provide Secretariat for the Working Group.

(R.K. Parmar)
Under Secretary to the Government of India

I. Copy of the order to:

1. Chairman of the Working Group (10 copies)
2. All Members of the Working Group

II. Copy to the Secretary of the following Ministries/Departments with the request that the representatives of their Ministry/Department may be nominated and their names may be sent to Chairman, Railway Board, Ministry of Railways:

1. Secretary, Ministry of Finance
2. Secretary, Department of Shipping
3. Secretary, Department of Road Transport & Highways
4. Secretary, Ministry of Coal
5. Secretary, Ministry of Steel
6. Secretary, Ministry of Power
7. Secretary, Department of Industrial Policy & Promotion
8. Secretary, Ministry of Petroleum & Natural Gas.
9. Secretary, Deptt. of Fertilizers.
10. Secretary, Department of Commerce

III. Copy also to:

(1) P.S. to Deputy Chairman
(2) P.S. to MOS, Ministry of Planning
(3) P.S. to Member (Transport)
(4) P.S. to Member Secretary, Planning Commission
(5) P.S. to Adviser (Transport)
(6) P.S. to Adviser (Plan Coordination)
(7) P.A. to Under Secretary (Administration)

(R.K. Parmar)
Under Secretary to the Government of India

ANNEXURE II

SUB GROUPS FOR XI FIVE-YEAR PLAN

	GROUP	CONVENOR
1	Sub-groups on Business Strategy-	
	(a) Freight including Multimodal Business	Adviser (Traffic)
	(b) Passenger Business including Suburban Business	AM (Commercial)
	(c) Parcel Business	ED (Freight Marketing)
	(d) Pricing, Costing Tariff Policy and Social Burden	EDTCR
	(e) Service Quality and Customer Interface Management	AM(Commercial)
2	Sub-groups on Infrastructure-	
	(a) Track & Bridges, Signal & Telecommunication, OHE	AM(Civil Engg)
	(b) Capacity Enhancement including New Line, Gauge Conversion, Doubling, Traffic Facility Works & Railway Electrification	AM(Plg)
	(c) Rolling Assets	AM(Prod.Units)
	(d) Dedicated Freight Corridors *& Port Connectivity*	Adv(Infra)
	(e) Energy Efficiency	AM (Plg)
3	Sub Groups on Policy Issues -	
	(a)Resource Mobilisation, Additional Sources of Funds, Loans and International Aid, Cost Control, Profit Centres, Accounting Reforms and Regulatory Mechanism, *Organisational Restructuring and Outsourcing, PSUs,*	AM(Budget)
	(b) *Public Partnership, Public Private Partnership*	Adv(Infra)
	(c) Strategies for Speedy Project Implementation	AM(Works)
	(d)Human Resource Management, Health & Environment, Staff Quarters & Security.	AM(Staff)
	(e) Research & Development and Information Technology including related networking/ telecom issues.	AM(IT)
4	Group on Safety	ED(Safety)