

11. Traffic and Transportation

11.1 Overview

During the last four decades a number of in-depth traffic and transportation planning studies have been undertaken for metropolitan Delhi and the National Capital Region. The findings of these studies inter alia led to the recently launched Delhi Metro Rail Project. All the studies have stressed the need to strengthen the institutional set up and to plan, implement, co-ordinate, fund and monitor an integrated urban transport system. A draft bill to enable the establishment of a unified metropolitan transport authority is under consideration by the GNCTD. A high powered road safety and traffic engineering committee is functioning under the chairmanship of the Chief Secretary of GNCTD.

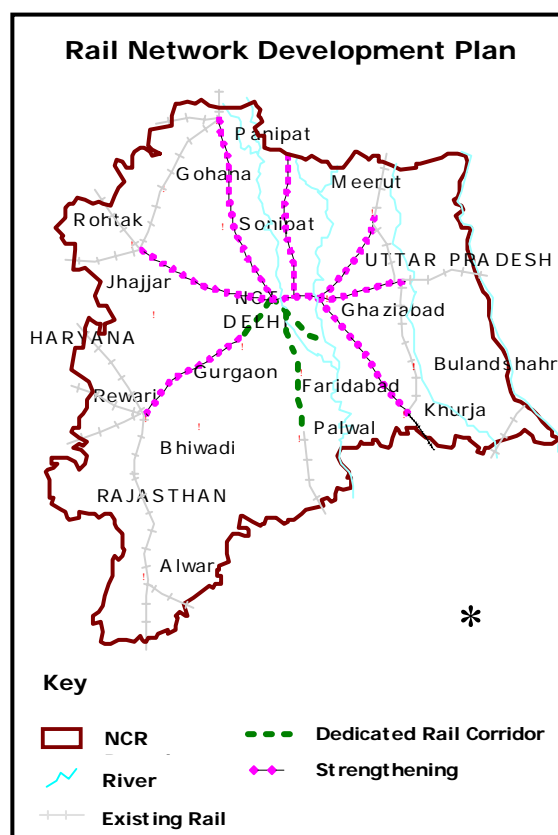
Fundamentally, the factors causing deterioration in the transport system of metropolitan Delhi are, multi-agency planning and implementation, inter-agency interests and conflicts, lack of a strong will to improve the public transport system, lack of land use-transport integration, and, above all, a non-existent public transport culture. In the context of Delhi 21, the objective and long term goal is to provide, promote and ensure, safe, economic and efficient movement of all categories of passengers and goods, in an environment friendly manner, through an integrated multi-modal transportation system.

11.2 Policy Framework

11.2.1 Regional Transport Linkages

The solution to Delhi's transport problems does not only lie just in the NCT. It also depends on the linkages to DMA towns, in particular, and to the NCR towns in general. Though suburban trains are already in operation between Delhi and its neighbouring towns, the service is inadequate, unreliable and inconvenient

due to the lack of feeder services from trip-end points.



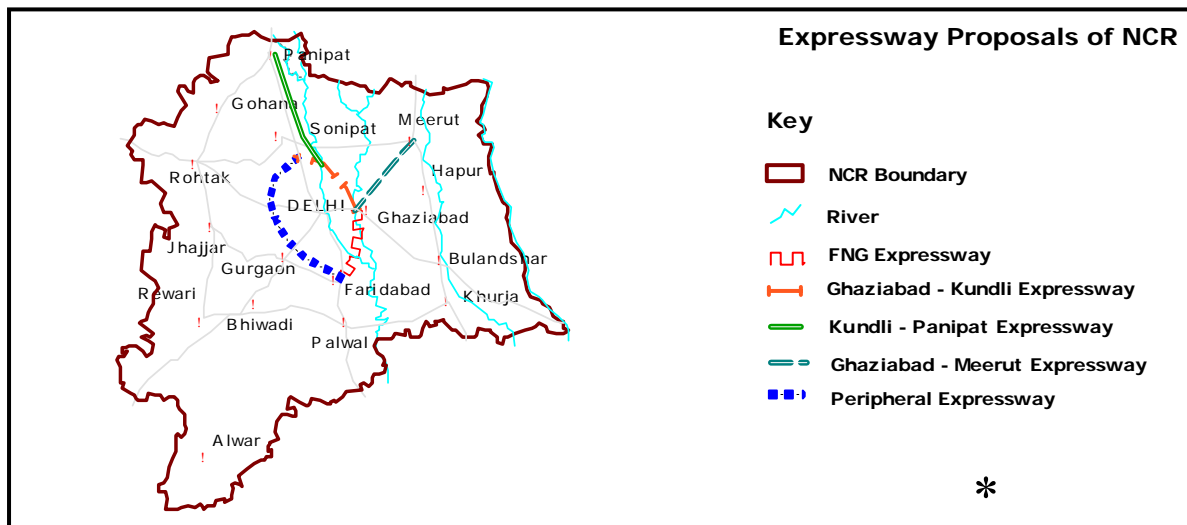
Source: Delhi 1999 – A Fact Sheet NCRPB

The cost of strengthening the regional linkages should be shared by the beneficiary states (Uttar Pradesh and Haryana) and agreed with the Ministry of Railways. It has also been agreed that efforts should be made to explore the possibilities of Special Purpose Vehicles (SPV) for use on certain schemes through an innovative finance mechanism. It has also been proposed that the Bhiwadi - Rewari - Gurgaon railway line could be implemented on a BOT basis involving the NCRPB, at the project development as well as implementation stage.

The NCRPB proposed six expressways but none have been developed. Real estate formed the core-subsidising element in the financing plan for the FNG expressway but a formal decision to proceed has yet to be taken at Government level. For the Ghaziabad-Meerut and Panipat-Kundli-

Ghaziabad expressways, feasibility studies for certain sections are in progress. The peripheral expressway on the western side

of the city, which will act as an urban bypass, is being planned for implementation on a BOOT basis.



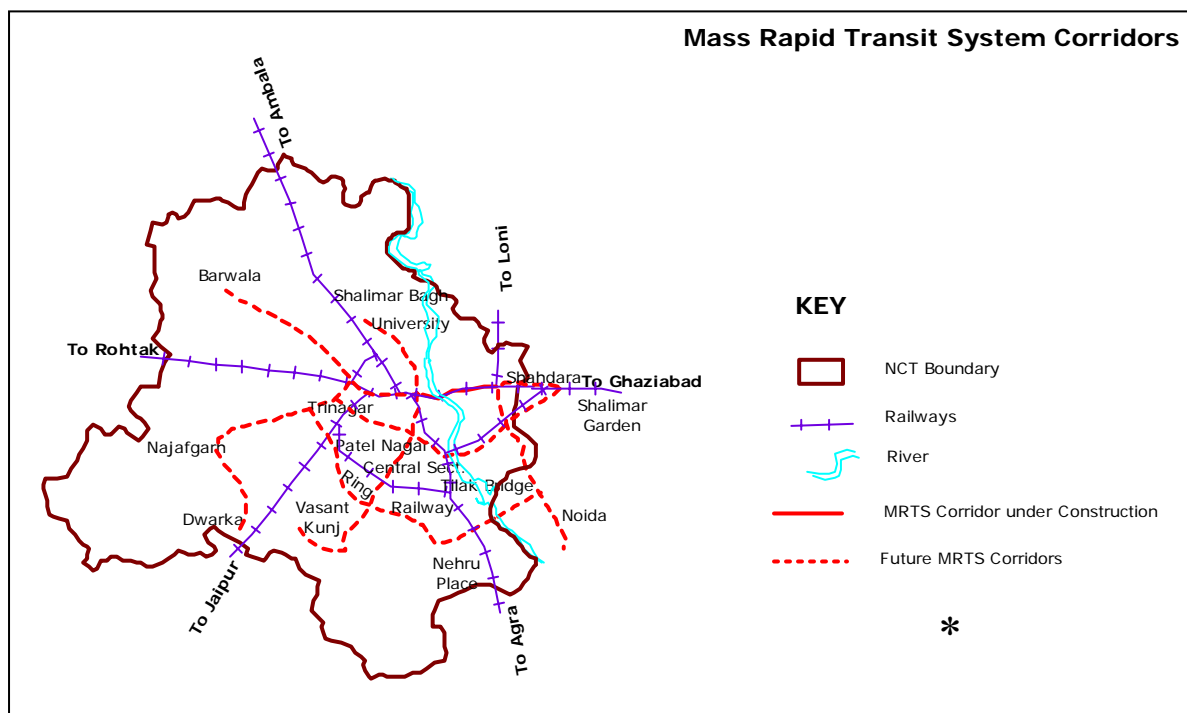
11.2.2 Ring Railway

The ring rail, which was expected to carry 12% of the commuter load, at present carries less than 1%, with only 12 services. The main hurdles are limited capacity especially in the northern portion of the ring, inadequate feeder services, commuter inconvenience and lack of integration with radial lines. A preliminary survey indicated that there was virtually no scope for improving the capacity of northern portion of the ring (between Tilak Bridge and New Delhi station) but it would be possible to

augment the capacity in the southern ring. The strengthening project (98 kms out of 144 kms of ring railway and radials within NCT) will facilitate operation of Electric Multiple Units (EMU) with frequent services in peak hours.

11.2.3 Delhi Metro Rail Project

The first decisive step to introduce an MRTS was taken after the feasibility study was completed in 1990. It recommended a rail-based system, comprising of a network of underground, elevated and surface



corridors aggregating to nearly 200 Km to meet the travel demand of 2005 and beyond. Construction commenced in 1997. (See map of MRTS corridors). It was estimated that after the completion of the first phase about 1.95 million commuter trips would be removed from the roads. The benefits would include a reduction in journey time, savings in fuel and man-hours and resultant reduction of atmospheric pollution and accident rates.

11.2.4 Road-Based Public Transport System

The absence of proper traffic planning and infrastructure facilities for private buses plus the lack of control in their operation, coupled with poor service quality of DTC, due to paucity of funds and inadequate support from Government in the past, has contributed significantly to the decline in the city bus service.

The present road based system suffers from lengthy zigzag and overlapping destination oriented routes, improper distribution of buses, disorganised private sector operation with little or no control, inadequate supply of buses, poor spatial coverage and a lack of priority to public transport.

However, DTC has recently set itself the objective of providing a well co-ordinated, integrated, adequate, efficient, economic and environment friendly world class transport service on sound business principles for all categories of travellers. This has been based on the pattern of London Transport, and has initiated action to privatise bus operations changing its role from a provider to a regulatory body. In parallel it is to set up a dedicated IT department to promote e-governance in the Corporation.

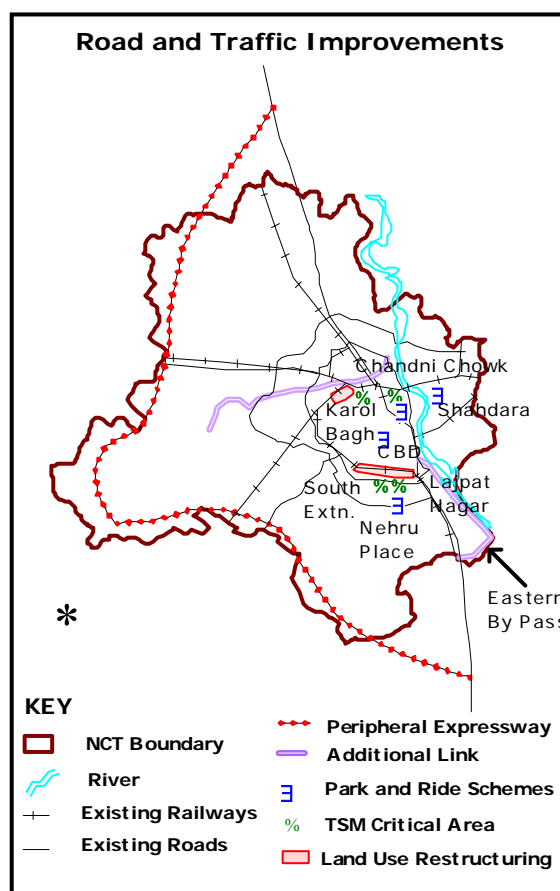
11.2.4 Interrelationship of Transportation and Land Use

An emerging issue in Delhi is property development by various agencies without reference to land use and environmental impacts. A number of land use and activity related decisions in contravention of the

MPD 2001 have generated traffic congestion at critical locations. Suggestions have been made from time to time to restructure land use by relocating inter alia district centers along the high capacity MRTS and Ring Railway. It is essential that strategic transport planning be based on open-ended plans with in-built flexibility in land utilisation and development intensity with respect to environmental and traffic impacts.

11.2.5 Road and Traffic Improvements

Delhi has a massive program involving road and intersection improvements. At a number of critical designated locations, construction of grade-separated facilities is oriented to meet predominantly the needs of cars rather than buses. Also, there is practically no dedicated infrastructure development for non-motorised vehicles. Proposals related to cycle tracks as stipulated in the MPD 2001, are yet to be fully implemented.



There are a number of missing links in the arterial road system of the city. Predominant missing links are the Sarita Vihar-Jamia Millia-Maharani Bagh (SJM) Bypass along the western edge of the Yamuna river, and the peripheral expressway. Comprehensive road network proposals for congested and central areas (by NDMC and Department of Transport Department) to improve traffic operations have been pending for implementation for over two decades. Options to provide road links as alternatives to planned schemes should be explored further with emphasis on environmental issues.

11.3 Traffic Management

11.3.1 Traffic Engineering and Improvement Schemes

There is a need to strengthen the technical capability of agencies to facilitate the preparation of traffic engineering and improvement schemes. The inherent deficiencies in traffic management in metropolitan Delhi are the absence of a clearly defined road hierarchy, lack of access control, inadequate traffic design and road equipment, and above all, the lack of road user discipline.

Some area-wide traffic management schemes have been commissioned in places such as Connaught Circus and India Gate. Based on the experience of SCOOT (Split Cycle Off-Set Optimisation Technique), implemented by Delhi Traffic Police for 50 intersections in New Delhi area with Central Computer Centre at Teen Murti, similar other areas with critical problems should also be covered with such systems. At a number of locations, pedestrian subways are not being used optimally due to poor siting and poor maintenance, actions are necessary to improve their utilisation

11.3.2 Parking

Increasing parking demand together with limited parking supply and absence of a parking policy is an impediment to the smooth flow of traffic, especially in and

around major commercial areas/activity centers. With the basic objective of reducing the parking demand (especially for personalised vehicles), parking pricing is a major tool for environmental improvement. Moreover, provision of 'Park and Ride' facilities, additional parking supply in critical areas with optimal private sector participation, employers participation in transport demand management, and stringent controls in zoned areas are key policy issues.

11.3.3 Enforcement

The traffic police have the difficult responsibility of managing and controlling traffic flow. Difficulties are made worse due to lack of co-ordination from local and road maintenance agencies. Local expertise is required to facilitate formulation of low cost and viable area-wide traffic management schemes. Vehicle pollution control from can be assisted through technological advances and strict enforcement of regulations.

11.3.4 Transport System for Special Areas

Preparation of a strategic action plan is needed for special areas and specialised markets to determine a framework for functional optimisation and relocation. Car-free zones with support from non-motorised vehicles and environment friendly medium capacity transport modes, like battery operated buses, should be established with the provision of parking at the periphery. To conserve the historic character of the walled city, pedestrian zones should be reinstated. Entry of vehicles for the servicing of shops and establishments would only be permitted outside certain entry timings, at night, for example, between 8pm and 8am.

11.3.5 Urban Transport Information System

For a scientific approach in planning for long term and short term measures it is necessary to have a database which will have to be continuously updated, this has been a long felt need. In the age of

information technology a centralised unit should be established in the transport department which should collate and update data information in various aspects of traffic and transportation. Facilities should be provided to make this data available to users through electronic media. Considerable amount of data (such as vehicle registration, traffic volume, trip information, parking, truck movements, public transport, pollution levels, norms and actions, traffic management and related information etc.) is available in various agencies and R & D establishments in this field in the Transport Department can form a base for further work. Various agencies and departments of GNCTD should be able to maintain and use this information system.

11.3.6 Institutional Framework

In order to ensure systematic and scientific development, management and operation of an integrated multi-modal transport system in the NCT, an institutional framework is a basic prerequisite. The focus will be on:

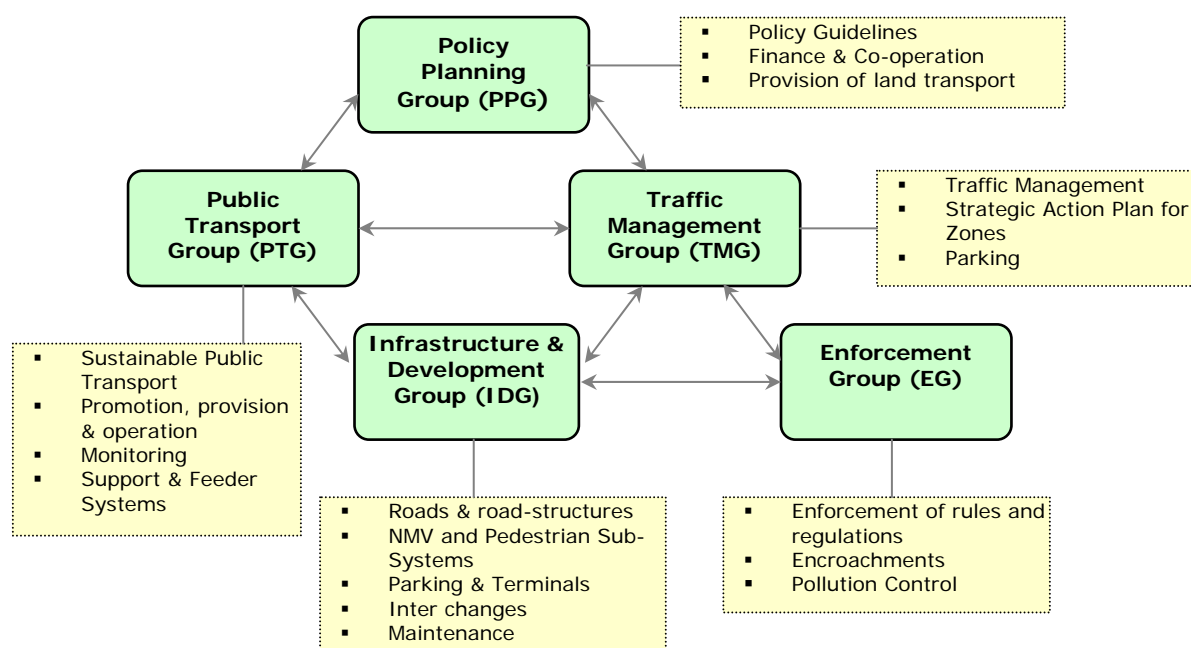
- Institutional strengthening and capacity building from within the available mechanism
- Horizontal and vertical linkages at all levels of government (Central, State and Local)
- Setting up an Urban Transport Information System.

11.4 Action Plan

11.4.1 Institutional Mechanism

Pending establishment of Delhi Unified Metropolitan Transport Authority (DUMTA), an arrangement to strengthen the institutional mechanism by drawing expertise/resources from existing agencies is suggested. A proposed institutional set up, to discharge functions of centralised strategic planning and decentralised implementation, is presented in figure below. It is suggested that the unifying metropolitan transport mechanism should consist of five groups with clearly defined roles.

PROPOSED UNIFYING TRANSPORT MECHANISM



Policy and Planning Group

A Policy and Planning Group (PPG) should be established to function specifically at the level of NCT to plan and co-ordinate with agencies at the level of DMA. This group should also take into consideration, the guidelines set out by overall spatial planning for the city by the proposed Metropolitan Planning Committee (MPC). This group should also ensure community participation. To be effective this group should be chaired by the CM (GNCTD). The main functions of this group are:

- To set out goals and formulate policy guidelines to facilitate preparation of a Strategic Transport Plan (STP) for the NCT and a multi-modal plan for linkages with the DMA / NCR.
- To co-ordinate activities of various groups / agencies at the plan formulation stage.
- To regulate allocation of funds to different agencies for co-ordinated development.
- To ensure provision of land with focus on identification, reservation and protection for development of transport related projects.

Information based innovative pricing strategies for transport with adequate legal backing should be formulated, and based on real costs. As part of the policy planning function an independent mechanism, on the pattern of Delhi Electricity Regulatory Commission, should be installed to appropriately price all items of transport, parking and accessibility. In this context there is a need to determine **pricing of all public and IPT modes on sound economic, system operation and performance basis**. The fares and tariffs, determined by the proposed independent mechanism, should be implemented in the entire DMA sub region. Any subsidies, should be contained and minimised and provided only to economically deserving groups.

Public Transport Group

Following the requirements of the STP, the Public Transport Group (PTG) will be

responsible to prepare an action program to achieve a sustainable and balanced public transport system and optimum multi-modal transport mix. The main agencies in this group will be Indian Railways, DMRC, DTC and private operators and Transport Department of GNCTD. Each agency will ensure provision of services, operation and management and maintenance of the system. The overall and contextual responsibility of each agency in the PTG is clearly defined ensuring functional independence.

Traffic Management Group

The Traffic Management Group (TMG) will prepare traffic management strategic action plans with emphasis on movement of people and goods. Area level traffic management schemes with active participation from peoples' group should be prepared for implementation according to time bound programmes.

Infrastructure Development Group:

The Infrastructure Development Group (IDG) will comprise of professional advisors and engineering experts from agencies namely the PWD, MCD, NDMC, DDA, Cantonment Board etc. This group will streamline construction and maintenance practices and formulate project based schemes with latest technological and management interventions. The activities of this group will be based, among other localised schemes, on the strategic transport plan.

Enforcement Group

The proposed Enforcement Group (EG) will have professional advisors, concerned officers from local bodies in addition to the traffic police and local residents and will evolve strategic action plans to ensure smooth and safe flow of all modes of traffic.

11.4.2 Actions

The action plan for different components of transport system is presented in the Table 11.4.2 and the relationships of different groups are shown in Figure above.

Table 11.4.2 Traffic and Transportation Action Plan

Components	Short Term	Medium Term	Long Term
Regional linkages	<ul style="list-style-type: none"> • Update study on integrated system and co-ordination • Improvement of EMU services to DMA towns with development of feeder service from stations • Pricing of personalised vehicles entering Delhi through fuel or licence taxation 	<ul style="list-style-type: none"> • Development of FNG and peripheral expressway around Delhi • Land-use structuring with special reference to transport activities to ensure corridor concept 	<ul style="list-style-type: none"> • Development of rail connections as per NCR plans and capacity augmentation • Development of expressways as per NCR plan
Ring rail	<ul style="list-style-type: none"> • Improvement of service using southern portion of the ring • Feeder service for stations to be improved by mass transport / IPT modes • Improvement of passenger facilities 	<ul style="list-style-type: none"> • Capacity augmentations in weak links • Integration with regional linkages through interchange points • Integration with MRTS and other mass transit modes 	<ul style="list-style-type: none"> • Land-use correction ensuring corridor concept for optimal utilisation of the system (Revision of Master Plan can take care of this)
Road based public transport system	<ul style="list-style-type: none"> • Improve DTC service with augmentation of own fleet as well as powers to acquire private buses through amendment required in STA Act • Strict control of operation of private buses • Improvement of service to DMA / NCR towns • Dynamic route planning with optimal public-private involvement for integration with rail based system • Freeze number of contract carriages and regulate their function 	<ul style="list-style-type: none"> • Private buses to be clubbed under 6 or 7 companies to operate in each zone • DTC to act as a regulatory body for controlling all bus operations through routing, scheduling and allocation of buses • Introduction of vehicle tracking system through GIS/GPS • Replacement of old polluting buses by environment friendly convenient buses 	<ul style="list-style-type: none"> • Linking of all depot and terminal functions through e-governance for optimisation in operation and maintenance • Ticketing system through Smart Card or other suitable mechanism
Intermediate public transport system	<ul style="list-style-type: none"> • Identification of areas, routes and parking facilities for mini buses, battery buses and phat-phats to operate as feeder services • Routing and operation of shared high capacity auto-rickshaws • Identification of areas and routes for operation of cycle-rickshaws 	<ul style="list-style-type: none"> • To continue actions so that operations become complimentary and supplementary to public transport system 	<ul style="list-style-type: none"> • To continue actions so that operations become complimentary and supplementary to public transport system
Green modes (cycles and pedestrians)	<ul style="list-style-type: none"> • Identification of exclusive cycle tracks and 'green routes' and implement • Provision of adequate pedestrian facilities along and across the roads at priority locations 	<ul style="list-style-type: none"> • To continue actions for safety and least interaction with vehicular traffic 	<ul style="list-style-type: none"> • To continue actions for safety and least interaction with vehicular traffic

Components	Short Term	Medium Term	Long Term
Personalised vehicles	<ul style="list-style-type: none"> • Strict parking regulation and pricing • Employer's role in providing transport 	<ul style="list-style-type: none"> • Introduction of area licensing schemes 	<ul style="list-style-type: none"> • Actions to continue to reduce vehicles on roads
Parking and terminals	<ul style="list-style-type: none"> • Establishment of differential parking norms and guidelines based on public transport service • Appropriate pricing with respect to real cost to discourage usage of personalised vehicles • On street parking in critical areas should be banned and on street parking in residential areas to be priced 	<ul style="list-style-type: none"> • New developments and regularisation of illegal activities to be approved through traffic impact assessment • Encourage private parking facilities and terminals in specific areas on BOO basis • Provision of parking facilities in critically deficient areas with introduction of 'Park and Ride' systems 	<ul style="list-style-type: none"> • Actions to continue to reduce parking demand • Discounting FAR/Ground coverage in area level computations
Road network	<ul style="list-style-type: none"> • Establishment of hierarchy of roads and capacity augmentation • Bus priority measures along selected corridors through traffic engineering and management • Improvement of roads having modal choice in favour of public transport as priority 	<ul style="list-style-type: none"> • Construction of missing links /additional links and demarcation of routes for trucks, cycles and cycle rickshaws • Construction of flyovers to be seen in the light of movement of more passengers rather than vehicles • Bus priority measures along selected corridors to continue 	<ul style="list-style-type: none"> • Construction of missing links / additional links • Development of city gate concept and provision of suitable interchanges
Traffic Engineering and Management / TSM	<ul style="list-style-type: none"> • Exclusive bus ways to be provided along selected corridors • Review and modification of norms, standards and designs to take care all movement types • Preparation of traffic management schemes to optimally utilise the total network through area specific / zonal plans and its integration with total system • Prepare proper signalisation, signage and marking plans • Provide better monitoring, regulation and enforcement 	<ul style="list-style-type: none"> • Implementation of TSM schemes to optimally utilize the total network through area specific/zonal plans and its integration with total system 	<ul style="list-style-type: none"> • Exclusive bus ways to be provided along selected corridors expanded
Environment	<ul style="list-style-type: none"> • Strengthen the public transport system • Enforcement of strict regulatory measures for pollution control 	<ul style="list-style-type: none"> • Modification of norms and standards for pollution levels • Control of polluting vehicles through usage of cleaner fuels and technological interventions 	<ul style="list-style-type: none"> • Actions to continue with strict enforcement measures

11.4.3 Priority Projects and Investment:

identified and presented in the following table 11.4.3 along with broad estimates for phase-wise investments.

Based on the action plans on various components the priority projects have been

Table 11.4.3 Traffic and Transportation Investments

No.	Priority Projects	Investment in Million Rs.		
		0 –5 Years	5 –10 Years	10 –20 Years
1	Construction of Delhi MRTS : Phase I * Phase II **	80000		170000
2	Revitalisation of Ring Railway \$	9000		
3	Construction of FNG Expressway(56 kms) in NCR		11000	
4	Strengthening of rail network within NCR @	5450	5450	10900
5	Urban Roads: -Construction of Eastern (SJM) Bypass -Construction of Peripheral Expressway -Construction of missing links -Construction of additional link along drains -Construction of five cycle tracks-Pilot Project -Traffic Engineering and Management Schemes including flyovers under construction -Provision of dedicated bus ways (200 kms) including pedestrian facilities	600 100 1500 1000	2500 19000 500 4000 1500 1500	500 2000 1500 1500
6	Improvement of public transport system and modernisation including replacement of buses (initially 1000), usage of IT for operation, depots, terminals and passenger facilities	2500	500	500
7	Construction of parking lots in critical areas, mechanisation of pricing and management of existing parking lots	200	200	200
8	Park and Ride systems	50	50	50
9	Traffic improvement in Walled City area	100	100	100
	TOTAL (indicative cost in Rs million)	100500	36300	196250
	TOTAL @@	6050	29850	6350
	Equivalent US\$ million	135	660	140

Source: DMRC, Northern Railway, NCRPB, DUAC

Notes :

- * Share of GNCTD is 15%
- ** Share of GNCTD yet to be decided
- \$ Share of GNCTD to be one third of the total amount
- @ Cost of rolling stock excluded. Cost sharing yet to be decided
- @@ Excluding railway projects and projects outside NCTD