

12.0 TRANSPORTATION

The period between 1981 and 2001 has seen a phenomenal increase in the growth of vehicles and traffic in Delhi. There has been a rise in per capita trip rate (excluding Walk Trips) from 0.72 in 1981 to 0.87 in 2001. Keeping in view the population growth, this translates into an increase from 45 lakh trips to around 118 lakh trips. The population of vehicles (four wheelers, three wheelers and two wheelers) has increased from 5.13 lakhs in 1981 to 32.38 lakhs in 2001, and the number of buses has grown from 8,600 to 41,483 during this period. The ratio of the registered vehicles to urban road length, which was 88 vehicles per km. in the year 1990, had increased to 131 vehicles per km. in 1999, even as the road length increased from 26500 kms. by 4400 kms.

Besides the above, Delhi has developed as a borderless city and an urban continuum comprising of a number of rapidly growing towns in Haryana and UP. This has added to the flow and movement of traffic within Delhi.

Despite measures by way of increasing the length of the road network and road surface space through widening, construction of a number of flyovers/grade separators and, launching of the Metro (which is estimated to be carrying 1.25 lakhs passengers per day on the 20.8 kms. track length operationalised till 30 September, 2004), the traffic congestion has continued to increase unabated. This has its inevitable consequences in terms of accidents, pollution, commuting time, and wasteful energy/fuel consumption.

Based on the rate of increase in the number of trips between 1981 and 2001, it is estimated that the total trips would rise to 280 lakhs by the year 2021, including 257 lakh motorized trips and 23 lakh non-motorised trips. In this context, it needs to be noted that roads already

occupy 21 percent of the total area of the city, which clearly limits the potential for increase in road length.

Apart from the problems and requirements of transportation at the macro level, there are special problems in specific areas, particularly the old city, which deserve special attention. Special requirements will also arise from the mega events such as the Commonwealth Games scheduled to be held in Delhi in 2010.

The Plan and strategy for transportation will have to be worked out in this background. The broad aim of this would be to ensure safe and economical commuting between place of origin and destination, convenient and quick access to all areas for all sections of the society, reduction of pollution and congestion, energy efficiency and conservation, safety for all sections of the road and transport users and, towards meeting these objectives, providing a significant increase in efficient rapid public transport systems and facilities with a corresponding reduction in individual private transport usage. This is in addition to pedestrianisation and properly planned use of non-mechanised transport systems in specific areas. The following strategy is proposed in order to meet these objectives:-

- i. Preparation and operationalisation of an integrated and mutually complementary multi-modal transportation and traffic plan comprising the Road, Rail and Metro-rail network.
- ii. Within this, to explore other options and possibilities such as, Light Rail/Tramway/Mono-rail systems.
- iii. Optimal use and utilisation of the existing road network and full development of ROW by removing all impediments.
- iv. Expansion and restructuring of the existing network through expressways, arterial roads, elevated distributors and relief roads with a view to creating-alternate access ways and reducing

congestion on the existing roads to the extent possible Urban Relief Roads are also to be identified to reduce congestion as an additional or alternative link roads, wherever possible.

- v. Planning of new road network in such a manner as to prevent possibilities of future congestion by modifying road sections to accommodate road side parking, and space for widening, expansion and provision of grade separators, etc.
- vi. Planned and targeted expansion of the Metro-rail network.
- vii. Expansion and strengthening / restructuring of the Ring Rail System.
- viii. Developing an integrated relationship between the road, rail and metro-system to provide for seamless multi-modal transport, through provision of additional stations, park and ride facilities, introduction of single multi-modal ticketing, etc.
- ix. Development of a comprehensive parking policy in line with the broad aims of the Plan for transportation mentioned earlier, including measures for linking new vehicle registration with owner parking facilities.
- x. Establishment of a quick and efficient transport network between the NCR and the NCT of Delhi.
- xi. Provision of directional Goods and Passenger terminals with adequate infrastructure.
- xii. Provision of arrangements for by-pass of through National Highway traffic without having to pass through the city
- xiii. Review of the licensing policy and systems, and effective arrangements for training of drivers / transport operators.

12.1 INTEGRATED MULTI-MODAL TRANSPORT SYSTEM

Keeping in view the diverse built up physical forms within the city, it is logical to state that a

single mode of transport cannot practically and effectively, serve the needs of the city. Accordingly, an Integrated Multi-Modal Transport System suitable for the overall structure of the city and at the same time interlinking the various sub-structures is necessary. It is envisaged that the future transport system shall consist of a mix of rail and road based systems which may include Metro Rail, ring rail, dedicated rail corridors for daily commuters, (IRBT/ RRTS corridors as identified in NCR Plan 2021), light rail, monorail, bus and high capacity buses and other public transport and Intermediate Passenger Transport (IPT), Non Motorised Transport (NMT) and private modes on selected corridors to be identified as per the needs from time to time.

12.2 METROPOLITAN TRANSPORT AUTHORITY

In order to enable and ensure this, the need of the hour is to have a single authority for planning/development of an integrated system and implementation and enforcement of the policies, which may be framed in that context. Inter alia, this would help to avoid wasteful expenditure and other problems that could arise from duplication, overlap and even mutually exclusive/and contradictory facilities. Therefore, a single unified Metropolitan Transport Authority, on the lines recommended by the National Transport Policy Committee, and the Master Plan-2001 needs to be established on priority.

12.3 ROADS

Delhi is planned on a ring – radial pattern with a hierarchical road network. Broadly, the road network is designed for regional, intra – city and local traffic. The proposed roads are classified taking into account the land use pattern and road system hierarchy with recommended right of ways as follows:

1. National Highways

The recommended minimum right of way (ROW) is 90 meters, wherever possible. However, within the city it shall not be less than 60meters. All the National Highways within the NCTD are to be access controlled upto the Outer Ring Road.

2. Arterial Roads

These include primary roads with access control and other primary roads.

- i) Primary Roads: Vehicular routes carrying heavy volumes of traffic will generally have free flow conditions. There will be access control on these roads. The recommended ROW in existing urban area is 60-80 mts. and minimum 80 mts. in the proposed urban extension. While designing roads with 80mts ROW and above, provision should also be made for public mass rapid transport system, which may include Road Based System, or Rail based system.
- ii) Other Primary roads: Vehicular routes carrying heavy volumes of traffic, mass Transport route may also be allowed on these roads. The recommended ROW in existing urban area is 45-60 mts. and minimum 60 mts. in the proposed urban extension.

3. Sub Arterial Roads

These include primary and secondary collector streets.

- (i) Primary Collector: These roads will connect major arterial roads and inter residential district collectors. The recommended ROW in existing urban area is 30-40 mts. and minimum 45 mts. in the proposed urban extension. In addition to this wherever possible a separate cycle track should be provided.
- (ii) Secondary Collector: These roads are intended to collect traffic from local streets within one residential district. The recommended R/W in existing urban area

is 18-24 mts. and minimum 30 mts. in the proposed urban extension.

4. Local Streets

These are intended for neighbourhood (or local) use on which through traffic is to be discouraged. The suggested ROW is 12 to 20 mts. in the existing and proposed urban area. As far as possible segregated pedestrian/cycle movement should be planned at the time of preparation of detailed layout plan at sector/neighborhood level by providing exclusive pedestrian pathways/cycle tracks. In existing areas like Rohini project, having plot sizes below 90 sq.mt., minimum ROW of 9 mt may continue.

As a matter of general policy, it is proposed that for all categories of roads the full cross section should be developed in future and no encroachments will be permitted on the existing road network. Further the development of roads should start from the extremes of the designated ROW.

12.3.1 URBAN RELIEF ROADS

In order to reduce congestion on the existing roads, it is proposed to identify some additional/alternative links and access corridors. Such links may be termed as Urban Relief Roads, which could be proposed subject to feasibility, along drains (including their covering), identification of new alignment, or upgradation/strengthening of an existing road/alignment or in the form of elevated roads/grade separators etc. All the options should be exercised for restoration of full ROW, including relaying of services etc if affecting ROW. Where all these options are not available, other alternatives like elevated roads, grade separators, alternative alignment etc. may be explored. On an indicative basis, the following priority stretches for provision of Urban Relief Roads have been identified.

- i. Shankar Road (for 105 ft. ROW road stretch) alternative elevated road may be explored.
- ii. Vikas Marg
- iii. Extension of NH-24 to join Mathura Road (near Humayun's Tomb)
- iv. Prem Bari Pul (Pitampura) to Outer Ring Road along disused Western Yamuna Canal
- v. Road between Nehru Place and Hotel Park Royal to be extended up to Lotus Temple and towards East of Kailash, if feasible.
- vi. Badarpur Border entry point,
- vii. Karol Bagh (new Rohtak Road) alternative alignment by extending Arya Samaj Road through Anand Parbat to connect existing roads leading to Patel Road and Shivaji Marg on ROB or RUB
- viii. More bridges on river Yamuna (at Geeta Colony, Mayur Vihar, etc. – alignments of Platoon Bridges can be considered.)
- ix. Along drains passing through Lajpat Nagar, Defence Colony, Sarai Kale Khan, Lodhi Road, etc.
- x. Sarita Vihar (Junction of Mathura Road and Road No. 13-A) to Okhla Industrial Areas (road between Ph I and Ph. II to be connected by ROB or RUB)

Few more stretches, missing links could be identified from time to time.

12.3.2 UNDERGROUND ROADS

Vehicular traffic is a major contributor to the air pollution in Delhi. This is in addition to the fact that certain areas such as Connaught Place, Chandni Chowk, ITO, etc. have much more traffic than the road capacity. They are also transit points between East and West and North and South. At times the level of pollution in such areas crosses the acceptable limits. In order to reduce road congestion and the level of pollution, the possibility of having Underground Roads or Tube roads in critical areas needs to be considered. Such measures, together with provision of Metro Services, will

also help to convert historically important areas like Connaught Place, Chandni Chowk and Karol Bagh etc. into pedestrian areas.

With advancement in technology, and a better climate for private participation and investment in infrastructure development, such proposals could be usefully explored. To begin with, a proposal for Underground/Tube Roads and parking under the Chandni Chowk area and connecting it to the existing Ring Road needs to be examined. Similarly, Underground roads on stretches like ITO, Connaught Place and Rajendra Nagar etc. may also be considered with a view to relieving congestion and facilitating East-West/North-South movement in the city.

12.3.3 GRADE SEPARATORS

The Master Plan studies indicate the need for intersections to be provided with grade separators. In case of existing grade separators the possibility of providing cloverleaf and direct interchanges, wherever necessary and feasible, may be examined in order to make the junctions below signal free. To provide uninterrupted traffic movement various other options such as elevated roads with supporting infrastructure etc. will also need to be explored.

In the proposed urban extension, space reservation is to be kept for provision of grade separators, cloverleaves and Left Slip roads at intersections of all roads of 30 mts. and above ROW.

Subways/ foot over bridges should be provided at appropriate locations at every grade separator for safe and smooth passage of pedestrians etc. For this, designs geared to maximum usage, considering past experience, will need to be developed.

An area of 1-2 Km radius around the grade separators should invariably have a specific traffic management plan.

12.3.4 FREEWAYS

Freeways are defined as divided arterial highways for motor traffic with full access control and provided generally with grade separation at intersections. A freeway network in the NCR should be developed so that the criss-cross movement through Delhi is lessened.

With such a network of Freeways, Highways, MRTS and EMUs a 2 to 3 hour movement network can be generated which will cover entire NCR. This will encourage interaction between Delhi and NCR towns in terms of employment and living.

12.4 MASS RAPID TRANSIT SYSTEM (MRTS) /METRO RAIL SYSTEM

The Metro Rail System is a major and, presently, one of the most important, if not the only component, of a Mass Rapid Transport System (MRTS) in the City. The Metro Rail network for the entire city has been identified in various phases, which comprises of a network of underground, elevated and surface corridors aggregating to approximately 250 Kms., and is expected to carry 108 lakhs daily passengers with an average trip length of 15 Km. by 2021. However, to make the overall city transport efficient, the following routes proposed by DMRC need to be fully implemented in the early plan period.

- i. Phase-I 62.16 km (likely year of completion 2005)
 - a. Vishwavidyalaya –Central Secretariat
 - b. Shahdara – Trinagar – Rithala
 - c. Connaught Place – Patel Nagar – Dwarka
 - d. Part of this network is already implemented and operational.
- ii. Phase-II 56.76 km (likely year of completion 2010)
 - a. Vishwavidyalaya – Jahangir Puri
 - b. Central Secretariat – Qutab Minar

- c. Indra Prastha – Yamuna Depot – New Ashok Nagar
- d. Yamuna Depot – Anand Vihar ISBT
- e. Shahdra – Seemapuri
- f. Kirti Nagar – Nangloi along Rohtak Road

Subsequent phases shall be worked out in detail in conjunction with the overall circulation plan for the city as part of the Master Plan-2021.

In MPD-2001, sub-cities like Rohini and Narela, with population of 1 million each were proposed. These projects are already under implementation and are inhabited. It is imperative to extend existing MRTS routes to these sub-cities on priority. Following extensions of routes are proposed:

- i. From existing Rithala Station upto Barwala (Rohini Ph.IV-V)
- ii. From Sanjay Gandhi Transport Terminal to Narela.

Considering the future needs of the city following additional links of MRTS, forming a loop for the existing MRTS network, are proposed:

- i. From Ambedkar Nagar to ISBT at Kashmeri Gate.
- ii. From Lado Sarai to Badar Pur in Planning Zone-J.
- iii. From Badar Pur to Okhla Depot of MRTS.
- iv. From Airport to Nehru Place.

It is expected that about 60% of the urban area will be within 15-minute walking distance from the proposed MRTS stations after its full development. Additional areas could come within easy access and connectivity with the Metro Rail through inter linkages with other transport modes. About 15% of urban area of Delhi is likely to be directly affected, and may undergo a dramatic impact and change. Further, due to development of economic activities

along the Metro Corridors and optimization of connectivity provided by it, the rider ship on the Metro is expected to grow substantially over time. Correspondingly, it is expected that vehicular trips will also progressively shift from road-based transport to MRTS, particularly, with reference to the longer trip lengths within the city.

To achieve the above potential impact of the Metro Rail System a number of measures will be necessary. This will include the following: -

- i. Preparation of detailed plans to facilitate and encourage direct pedestrian access to the Metro Rail System/Station.
- ii. Preparation of detailed multi-modal transport plans with reference to each major Metro Station, with particular reference to bus transport routes, which could provide inter linkages and feeder arrangements.
- iii. Parking arrangements at Metro Stations both for short and medium stay viz. for those who would travel for local level requirements such as shopping, etc. and those who would need parking by way of a Park and Ride facility.
- iv. Provision of Park and Ride facilities at identified points from where feeder bus services would be available, or convenient direct pedestrian access would be feasible.

12.4.1 SYNERGY BETWEEN TRANSPORT AND LAND USE

The concept of the Master Plan is based on a polynodal, polycentric, distribution of work centres, largely based on road transport nodes. A major fall-out of this has been distortion between infrastructure, transport and land use. What has actually happened is the development of a lopsided urban sprawl, fragmented development and an undue burden on the traffic and transportation system. Therefore, to achieve spatial balance, development should take place according to new corridors of mass

movement. This has implications in terms of land use planning along major transport corridors and the Mass Rapid Transport/Transit System. This would not only help to solve, to some extent, the enormous problems of mass transportation, but would also generate a dynamic potential for growth and employment. This is particularly true for the Metro Rail System. In this context the Metro corridors upto a certain depth would require selective re-development and re-densification/intensification of existing land uses based on site conditions. It is proposed that comprehensive redevelopment schemes of the influence area of MRTS stations be prepared.

12.5 BUS

Apart from the Metro Rail System, buses are the only other major form of public transport in Delhi. The Bus Transport system is presently estimated to carry around 23.40 lakh passengers per day (2002). Even after the introduction/expansion of the Metro, major dependence will continue to be on Bus Transport as a form of comfortable and convenient public movement within the city. However, keeping in view the limited road space and the existing/likely congestion on the roads it is necessary to take steps for rationalization of Bus Transport. This would entail action on the following fronts: -

- i. Bus connectivity would need to be planned to a considerable extent in the form of feeder services to the Metro Rail Stations and the Ring Rail System.
- ii. Park and ride facilities will have to be developed at important bus terminals.
- iii. The quality and design of buses would have to be significantly upgraded with a view to providing comfort to the riders and thereby make bus travel a part of an efficient mass public transport system which could also help to reduce individualised/ private vehicle usage.
- iv. Wherever possible, within the existing road right of way of arterial/primary

roads, dedicated bus ways should be developed which may be used for high capacity buses.

- v. Bus terminals/ centroids on the lines of central secretariat near MRTS stations or strategic locations need to be developed in Urban Extension.

12.6 BICYCLE/ CYCLE-RICKSHAW

Bicycle/ Cycle-Rickshaw could be an important mode of travel, particularly with reference to short and medium trip lengths. To the extent that it meets individual or public transport requirements, it is a non-energy consuming and non-polluting mode of transport. However, there are several issues, which have to be kept in view while planning in respect of these modes.

With a mixed type of fast moving traffic on the roads, safe travel by bicycle could be risky for the rider and use of rickshaws not feasible or desirable.

In so far as rickshaws are concerned, apart from other issues pertaining to the aspect of mixed traffic an important aspect also pertains to the fact that unlimited and unrestricted use of this mode has a direct relationship with migration into the city and the phenomenon of JJ Clusters/Slums.

In view of the above, the following action should be considered/ taken: -

- i. Wherever feasible fully segregated cycle tracks should be provided along selected traffic corridors with provision for safe parking in park and ride lots.
- ii. In new areas/ urban extension, as already indicated, cycle tracks should be provided at the sub-arterial and local level roads and streets.
- iii. In specific areas, like the Walled City / Chandni Chowk/Sadar Bazar / Karol Bagh/ Lajpat Nagar and Trans Yamuna

Area, the use of cycles/rickshaw as a non-motorised mode of transport should be consciously planned along with pedestrianisation.

- iv. Cycle Rickshaws should ply within the Residential areas only and not on major roads.

12.7 TRANSPORTATION FOR SPECIAL/ CRITICAL AREAS

Central congested areas of the Walled City, Sadar Bazar, Karol Bagh and other similar areas like certain Trans Yamuna areas are characterized by heavy traffic congestion. In order to address this problem a medium capacity Mass Transit system comprising of Light Rail Transit System (LRT) and battery operated bus system may be considered on selected routes based on feasibility.

For proper functioning of LRT a restraint on the use of private modes and provision of parking would be required. This would be necessary in order to revitalize the area and to improve its environment quality. This will also increase accessibility to such areas considerably.

After the operationalisation of Metro stations at Old Delhi, Chandni Chowk and Chawri Bazar in order to manage the additional traffic, the following management measures are required to be taken:-

- i. Need based Traffic circulation schemes integrating various modes.
- ii. Improvement of major road stretches and intersections like Ajmeri Gate, Fountain Chowk. Fatehpuri Chowk, Kaudia Pul, Khari Baoli, etc.
- iii. Encroachment removal from footpaths to facilitate smooth movement.
- iv. The movement of heavy vehicles will continue to be banned in the Walled City. However, for the services of this area Light Commercial goods vehicles may be allowed during the night.

12.8 RAIL

In the National Capital Territory of Delhi both intercity and intracity passenger movements are being catered to by the existing rail network comprising the Regional and Ring Rail Systems respectively.

In order to improve the ridership on Ring Rail, the following is proposed:

- a) Intensive land use around the following:
 - i. Anand Parbat
 - ii. INA Colony
 - iii. Pusa Institute
 - iv. Kirti Nagar
- b) Accessibility improvement and augmentation of infrastructure on ring rail stations:
 - i. Shivaji Bridge
 - ii. Bhairon Marg
 - iii. Kasturba Nagar (Sewa Nagar)
 - iv. Lajpat Nagar
 - v. Kirti Nagar
 - vi. Shakur Basti
- c) Provision of Halt Stations on ring rail at the following locations:
 - i. Moti Bagh
 - ii. Bhairon Road
 - iii. Hans Bhawan (ITO)
 - iv. Ganesh Nagar
 - v. Preet Vihar
 - vi. Shyam Lal College.

The interchange points of Regional Road, MRTS, Ring Rail and any other future rail network should be developed as interchange stations/convergence zone. The change over facilities should include approach roads, pedestrian walkways, shuttle services, wherever feasible parking, areas for various modes including feeder buses, and adequate public conveniences, etc.

12.9 MODAL SPLIT

The transport network is based on the modal split for Delhi to move 280 lakh trips by the year 2021 as given below:

1. Present Scenario

As per Modal Split (2001) among the vehicular trips, maximum 60% trips are being performed by buses, which include chartered and school buses. The personalised modes of transport are carrying about 35.9% of vehicular trips. The modal split projected for the years 2011 and 2021 is as follows:

Table 12.1 Modal Split Projections

Mode	Modal Split (%)	
	2011	2021
Public Transport (including Rail/ Light Rail/ MRTS/ IRBT/ Bus/ Tram)	70.25	80.0
Personal modes (including Personal Fast Modes / Hired Fast Modes/ Hired Slow Modes/ Bicycle)	29.75	20.0

12.10 INTERCITY PASSENGER MOVEMENT

On a normal weekday 56.46% of the commuters come to Delhi by Road, 42.67% by Rail and 0.87% by Air.

Table 12.2: Passenger Trips at Outer Cordons per Day

Medium	Total Passengers	Commuters
Road	1598687 (56.46%)	959212
Rail	1208252 (42.67%)	906189
Air	22570 (0.87%)	N.A.

12.10.1 RAIL

At present there are 43 railway stations in Delhi. The total passengers catered to at these stations in 2001 are 12.08 lakhs/day including about 9.06 lakhs commuters. Out of these stations in 2001 the major stations catering more than 1.0 lakh passengers daily are:

Delhi Junction	2,72,189
New Delhi	3,19,629
Nizamuddin	1,28,420
Sadar Bazar	1,00,380

To decongest the central area, five directional Metropolitan Passenger Terminals (MPT) have been proposed. These are:

- i. Anand Vihar, East Delhi
- ii. Bhartal in Dwarka, South-West Delhi
- iii. Holumbi Kalan in Narela, North Delhi
- iv. Tikri Kalan, West Delhi
- v. Hazrat Nizamuddin, South West Delhi

The New Delhi as well as Delhi main railway stations are to be integrated with the MRTS stations and the areas are to be developed as major interchange points for the passenger movement within the city. Integration of Inter State Bus Terminus with Delhi main railway station is proposed and the land to be made available by the shifting of IP University being run from earlier campus of Delhi College of Engineering. Since about 75% of the total passengers are commuters, therefore in order to facilitate improvement in their movement between Delhi and surrounding towns either of the following is proposed based on the feasibility by the concerned authorities:

- i. Extension of MRTS.
- ii. Provision of dedicated railway corridor with supplementary feeder bus services for linking with other modes of transport. (IRBT Corridors)

12.10.2 BUS

The total passenger trips per day catered by road based transport are 15.97 lakhs out of which about 9.54 lakhs (60%) are commuters. Majority of such trips are by bus.

Out of four new Interstate Bus Terminals (ISBT) as proposed in MPD-2001 yet to be developed as a part of Metropolitan Rail terminals, only one at Anand Vihar in East Delhi has been developed. The terminal at Dwarka (Bhartal) has also been included in Dwarka Project. The remaining two at Okhla (Madanpur Khadar) and Narela (Holambikalan) have not been developed. In order to cater to the additional passenger requirements, it is proposed to develop the following ISBTs each of 10 Ha area along the Metropolitan Passenger Terminals:

- i. At Bhartal, Dwarka
- ii. At Holambi Kalan, Narela Subcity
- iii. At Sarai Kale Khan. The existing Bus terminal is to be upgraded and to be linked to Hazrat Nizamuddin Railway Station.
- iv. At Tikri Kalan.

Apart from above ISBTs, it is proposed to identify exclusive bus terminal sites at the intersection points of NH and outer ring road/ ring road to cater to the passenger movement. These could be developed at:

- i. Dhaula Kuan
- ii. IFC Madanpur Khadar to relieve Intercity Passenger congestion at Ashram Chowk
- iii. Tikri kala to relieve Intercity Passenger congestion at Peeragarhi Chowk
- iv. Narela to relieve Intercity Passenger congestion at Outer Ring Road and G.T. Kernal Road Junction-Jahangirpuri Bypass

A smaller Terminal at Narela Railway Station and ISBT along G.T. Road may be considered. This concept can be applied wherever possible to intercept Intercity Passenger Traffic at Arterial roads.

12.10.3 AIR

The International and Domestic air passenger movement in Delhi is catered by Indira Gandhi International Airport and Palam Airport respectively. Both the Airports have been linked to other parts of the city and urban extension through the transport network to facilitate fast movement.

Table 12.3: Distribution of Daily Air Passengers

Airport	Number of Travelers	Number of Visitors, Staff	Total
Domestic Airport	12450 (82.0)	2650 (18.0)	15100 (100.0)
International Airport	10120 (77.0)	3000 (23.0)	13120 (100.0)
Total	22570 (80.0)	5650 (20.0)	28220 (100.0)

In view of the growing importance of the capital city at the international level, and general increase in air travel, it is anticipated that air travel will see a quantum jump. Therefore the concerned authorities should take appropriate measures to handle the future air traffic through augmentation of facilities within the existing airport sites and proposed new sites in the National Capital Region.

12.10.4 GOODS MOVEMENT

With the expansion of commercial and industrial activities in Delhi Metropolitan Area, the goods movement within urban area and outside has grown considerably leading to environmental deterioration in the city.

Table 12.4: Goods Traffic at Outer Cordons

Road	68808 vehicles/day
Rail	1463 wagons/ day
Air	644 tonnes/ day

1. Goods movement by Rail

Presently the goods are terminating as below: -
 Iron and Steel- Tuglaqabad (Bahadurgarh) thereafter by road to Naraina
 Food Grains- Delhi Cantt., Narela, Ghevra
 Coal- Badarpur Border, Rajghat, I.P.Depot
 Fruits and - Naya Azadpur
 Vegetables
 Fuel- Shakur Basti
 Cement- Shakur Basti, Naya Azadpur, Delhi Safdarjung

2. Goods movement by Road

Out of the total Goods traffic volume, major share is handled by the points at NH-8, NH-1, NH-24 and Kalindi Kunj. On an average day in 2001, 68,808 goods vehicles are entering and/or leaving Delhi.

Movement of incoming /outgoing Goods traffic on different highways and other major roads on average weekdays is given as under:

Table 12.5: Directional Distribution of Daily Goods Traffic in Delhi – 2001

Name of Location	No. of Goods Vehicles	Modal Share (%age)
South and South East		
Kalindi Kunj	9948	14.46
Badarpur Border (NH-2)	5993	8.71
North and North East		
Singhu Border (NH-1)	8542	12.41
Loni Border	4881	7.10
West		
Tikri Border (NH-10)	4460	6.48
South West		
Sirhole Border (NH-8)	9139	13.28
Dundahera Border	4933	7.17
East		
Ghaziabad Border (NH-24)	7914	11.51
Chilla Check Post	2101	3.05
Jhundupura	1376	2.01
Gazipur	2220	3.22

12.11 INTEGRATED FREIGHT COMPLEX

For the integration of goods movement by road and rail, Integrated freight complexes have been recommended. These would consist of wholesale market, warehousing, road (trucks) and rail transport terminals so as to curtail the movement of heavy vehicles within the complex (also refer section on wholesale markets under trade and commerce).

The freight complexes are to be located in the places where they intercept the maximum possible regional goods traffic entering Delhi. Based on the pattern of goods traffic movement in Delhi, the following four sites for integrated freight complexes (IFC) proposed as per MPD-2001 are presently at various stages of planning and/ or development and one more new site is proposed in Urban Extension area:

- i. Madanpur Khadar (NH-2)
- ii. Gazipur (NH-24)
- iii. Narela (NH-1)

- iv. Dwarka (NH-8)
- v. New site in Urban Extensions 2021 (Rohtak Road) Tikri Kalan

12.12 FUEL STATIONS

The environmental concerns have been constantly advocating identification of clean and environment friendly fuels. Presently, the main fuel types being used include: Petrol, Diesel and CNG. These fuels are being made available from Petrol Pumps and CNG stations. With the advancement of technology some new types of clean fuels may also be used in future. It is proposed that fuel stations may be permitted in all use zones except in Ridge/ Regional park, City/District Park and developed recreational areas and parks.

12.12.1 FUEL STATIONS IN URBAN AREAS.

At the time of preparation of layout plans of various use zones namely: residential commercial, industrial, PSP facilities and other areas the location of Fuel Stations should be provided as per the following norms:

12.12.2 DEVELOPMENT CONTROLS

The regulations for locating the fuel stations – cum-service stations, the development control and permissibility shall be governed by the policy / decision by competent Authority / Government Notification issued from time to time.

Table 12.6: Norms for Fuel Stations

S. No	LAND USE/USE PREMISES	NORMS
1.	Residential Use Zone	Two Fuel Stations (One Petrol Pump + One CNG station) per 150 ha. Of gross residential area
2.	Industrial Use Zone	Two Fuel Stations (One Petrol Pump + One CNG station) per 40 ha of gross industrial area
3.	Freight Complexes	Four Fuel Stations (Two Petrol Pumps + Two CNG stations) in each
4.	District Centres	Four Fuel Stations (Two Petrol Pumps + Two CNG stations) in each district centre
5.	Community Centre	Two Fuel Stations (One Petrol Pump + One CNG station) in each
6.	Public & Semi Public use zone	Two Fuel Stations (One Petrol Pump + One CNG station) in each PSP area.

12.13 PARKING

At the time of preparation of layout plans of various use zones namely: residential commercial, industrial, PSP facilities and other areas the location of Fuel Stations should be provided as per the following norms: With the phenomenal increase in personalized motor vehicles, one of the major problems being faced today is an acute shortage of parking space. In the absence of adequate organized parking

space and facilities, valuable road space is being used for vehicular parking. The problem of parking in the city can be broadly divided into the following categories:

- v. Along streets, which are commercialised.
- vi. In planned commercial centres.
- vii. In residential colonies.
- viii. In the large institutional complexes.

The MPD-2001 has stipulated parking norms. However, actual experience has shown that: -

- (a) The provisions relating to parking within the plot area are normally not adhered resulting in vehicles spilling over on to the roads and adding to congestion; and
- (b) The norms themselves appear to be considerably on the lower side keeping in view the actual vehicle use, both in terms of the multiple vehicle ownership in the same family and the pattern of individual private vehicle use.

In the above background, the whole subject of parking has become a matter of serious public concern and requires a carefully considered policy and planned measures to alleviate the problem to the maximum feasible extent in existing areas and for adequate provisioning with reference to future developments. Various suggestions have been made in this regard. In a report submitted to the Supreme Court by the Environment Pollutions (Preventive and Control) Authority for the National Capital Region; it was suggested that the approach should be focused more on demand management (restricting vehicle numbers) through parking control and pricing rather than only on increasing of supply of parking in the face of growing demand. This aspect will have to be kept in view at the policy level. In this background, the following measures are proposed: -

12.13.1 PARK AND RIDE

Apart from providing Park and Ride facilities with reference to integration between the Road and Metro Rail/ Rail Transport systems such facilities would also need to be provided with a view to reducing the problem of parking on main arterial roads in the context of identified work and activity centres which may not be directly connected by the MRTS and to encourage use of public transport.

12.13.2 PUBLIC PARKING

The major effort will, however, have to come through the creation of public facilities in designated commercial/work centres and other areas and corridors where significant commercial activity has developed by way of mixed land use. In the context of the latter, it would also need to be linked to pedestrianisation within the identified areas. In the above background following steps would be necessary: -

- i. All existing areas of Concentration of business / commercial activity, where absence of adequate parking and congestion is visible, should be identified and listed, and based on studies of vehicle volumes specific projects for multi level parking, using the latest available technologies should be formulated and implemented in a time bound manner.
- ii. Major corridors along which commercial activity has grown over the years by way of mixed land use with/without authorisation should be identified and taken up for redevelopment with a major objective being the identification and development of open areas for parking, green development and pedestrianisation.
- iii. In all new Commercial / Business/ Industrial centres, adequate parking on the surface as well as below and above the ground must be provided. Revised norms in terms of Equivalent Car Space (ECS) are being provided and would need to be strictly adhered to and enforced.
- iv. The development of multi level parking facilities may be taken up, wherever, feasible in a public private partnership framework, with private sector investment and involvement, for which incentives may be provided by way of land use and FAR etc.
- v. The use of basement wherever provided for parking, must be strictly adhered to.

- vi. Stringent provisions by way of fine and other penal actions need to be provided for violation of parking rules.
- vii. A graded parking fees structure should be evolved as of measure of parking demand management, and encouraging use of public transport.
- viii. Serious consideration should be given to evolve a policy linking registration of new vehicles to availability of owner parking facilities.
- ix. All encroachments on land earmarked for public parking should be removed. However Public Parking Areas may be used for Second Hand Car Bazar on payment basis only during holidays subject to meeting requirement / conditions of the concerned authorities.

12.13.3 PARKING FACILITIES IN DTC DEPOTS

The use of DTC terminals and depots for development of public parking alongwith parking of DTC buses, private buses and Chartered buses, should be explored and specific projects developed.

12.13.4 UNDERGROUND PARKING

Based on the site feasibility, parking facilities can be created under the open spaces without disturbing the green areas on the surface and surrounding environment. The approvals from the concerned agencies are mandatory before taking up such works.

12.13.5 PARKING IN RESIDENTIAL AREAS

Over the years a large number of the residential areas have also been experiencing severe problems of vehicular congestion and shortage of parking space. Most of the parking is, in fact, being done on the road, which significantly reduces the carriageway width. The problem has been exacerbated by the traffic congestion

generated by schools in gross residential use areas. Some measures required to alleviate the problem, to some extent, will be as under: -

- i. All the encroachments on residential streets in the form of kitchen gardens/roadside private greens, large projections/ramps, etc. need to be removed.
- ii. The road cross sections may be redesigned wherever possible to accommodate planned car parking along residential streets, and also create more surface movement space.
- iii. Other options, in selected areas, such as creation of underground parking below parks and open space will also have to be considered.
- iv. The RWAs will have to be called upon to participate in this process by raising contributions from the residents on the basis of objective criteria such as number of cars owned, etc.
- v. The problem of congestion arising on account of the traffic generated by schools have to be specifically addressed, and the main responsibility for putting up the required additional facilities has to be borne by the schools themselves. Policy guidelines will have to be evolved for this purpose.

12.13.6 PARKING STANDARDS

Parking being one of the utilities is permitted in all use zones except in ridge/ regional park, developed recreational areas and parks as per the approved layout plan. Parking standard have been prescribed in each use premises. However, where it is not prescribed, it will be followed as per standards given in Development Code section of the Master Plan. The standards given are in Equivalent Car Space (ECS) which include parking for all types of vehicles i.e. cars, scooters, cycles, light and heavy commercial vehicles, buses etc. Parking adequacy statement/study for large

projects like Stadia, Shopping Malls, Multiplexes will be desirable.

12.13.7 MULTI LEVEL PARKING

Multi level parking facility is to be preferably developed in the designated parking spaces or in the vacant areas/undeveloped green area, with the following Development Controls:

- i. Minimum Plot Size-1000 sqm (However specific proposal, which are technically feasible and viable, could be considered on a cases by case basis for smaller plots by the Authority.)
- ii. In addition to the permissible parking spaces (ECS) on max. FAR, 3 times additional space (ECS) has to be provided for parking component only.
- iii. Max. FAR permitted: 100
- iv. However, maximum ground coverage, FAR, height and setbacks to be permitted could be considered case-by-case basis subject to technical viability and feasibility.
- v. In case of comprehensive schemes, development controls including height shall be as per approved scheme.
- vi. Number of basements - No Limit subject to adequate safety measures.

12.14 REGISTRATION AND LICENSING

The aspects of Registration and training of transport operators / drivers needs to be viewed as an important element of the overall transport plan and policy.

12.15 BARRIER FREE ENVIRONMENT

A major consideration in the planning and design of outdoor and indoor movement should be that people with disability, older persons and people in wheel chairs could move about the without help from others. This requires that:

- Paths and pavement shall be flat, uniform slip-free and free from unnecessary obstacles.
- Orientation points and guide routes may be provided for usually disabled people;
- Information and warning signs must be understandable, clear and well lit.

Table 12.7: Development Controls for Transportation

S. No (1)	Category (2)	Premises (3)	Development Control (4)			
			Area under Operation (a)	Area under building (b)	FAR* (c)	Floor area that can be utilised for passenger accommodation. (d)
1.	Airport	All logistic and facilities related to Airport/Aviation Passengers as decided by Airport authority of India including watch & ward	-NA-			
2.	Rail Terminal/ Integrated Passenger Terminal Metropolitan Passenger Terminal	All logistic and facilities related to Railway, Passengers, operations, goods handling, passengers change over facilities, including watch & ward.	80%	20%	100	15%
3.	Rail Circulation	All logistic and facilities related to Railway Trucks, operational areas including watch & ward	-NA-			
4.	Bus Terminal / Bus Depot	All logistic & facilities related to Bus & Passengers, parking including watch & ward	80%	20%	100	N.A
	I.S.B.T		80%	20%	100	15%
5.	Truck Terminal/ IFC	Whole-sale market, warehousing, truck & rail terminal, garages, repair shops, all logistic & facilities related to truck terminal, IFC & drivers etc. including watch & ward.	80%	20%	100	15%

(1)	(2)	(3)	(4)			
			(a)	(b)	(c)	(d)
6.	Parking	Toll collection booth, all utilities, facilities & infrastructure required for functioning for parking lot.	-NA-			
7.	Road Circulation	All types of road, street furniture, Bus shelters, under ground & over ground services utilities, signals, metro tracks as part of r/w, sub-ways, under-passes, ROB & RUB including watch & ward.	-NA-			
8.	Metro Yards	Idle parking of coaches, watching & cleaning facilities, maintenance related facilities, watch & ward. Staff related facilities.	80%	20%	100	15%

* The F.A.R. is to be calculated on the Building Plot.

Development Controls for Metro Stations:

1. Metro Stations along with property development (composite development) up to a maximum area 3.0 ha shall be permitted in all Use Zones, except Recreational Use Zone.
2. This enabling provision of property development would have the following broad development controls:
 - i. 25% ground coverage and 100 FAR including area under Metro Station with no height restrictions subject to approval of the statutory bodies such as ASI, Airport Authority, DUAC etc.
 - ii. In addition to the requirement of parking for Metro Stations, parking for the commercial component will be @2 ECS per 100 sqm.
 - iii. The development shall be undertaken in a composite manner and DMRC shall obtain approval of all the concerned local bodies/ agencies.