Chapter IV: Service Delivery

Municipal Infrastructure

Urban growth both spatially and population wise puts heavy pressure on infrastructure, particularly water supply, sewerage, solid waste, sanitation, road network, traffic and transportation etc., unless infrastructure in improved, quality of life suffers. Most importantly, it impacts economic development of the city and investment climate. In this chapter, therefore, present status of infrastructure, gaps and future requirements strategies and investment requirements in the areas of water supply, sewerage, solid waste management, traffic and transportation are discussed.

4.1 Water Supply

4.1.1 Hyderabad Metropolitan Water Supply and Sewerage Board

The Hyderabad Metropolitan Water Supply and Sewerage Board (HMWSSB) is a statutory authority in charge of providing and maintaining water supply and sewerage facilities in Hyderabad and surrounding municipalities. HMWSSB was constituted on 1st November, 1989 under the provisions of Hyderabad Metropolitan Water Supply and Sewerage Act, 1989. The Board is an 'autonomous' body under the Act and is responsible for supply of potable water including planning, design, construction, implementation, maintenance, operation & management of water supply and sewerage system. The Board is stipulated to run on commercial lines by generating surplus through tariffs in a manner to meet operational costs, capital expenditure and debt servicing.

4.1.2 Current Scenario

4.1.2.1 Sources of Water

The main surface sources of water for the city of Hyderabad is from five impoundments of the following four rivers:

- Osmansagar on River Musi.
- Himayatsagar on Esi River
- Manjira River
- Krishna River

The total quantity of water that can be drawn from the above sources is 245 mgd. But the present drawl is 206 Mgd. In addition to the above 25 Mgd of ground water is also drawn through bore wells. The Phase-I Krishna Drinking Water Supply Scheme was commenced recently in April 2005, due to considerable reduction in the inflows to impoundments and rapid growth in the population. Since its implementation, the Krishna water supply project added expenditure to the board by the way of huge O&M costs.

4.1.2.2 Service Area

The present water supply service area of HMWSSB is 688.2 Sq.Kms which includes MCH area 169.3 sq.kms, ten (10) adjoining Municipalities 377 Sq.Kms, Osmania University Campus and Secunderabad Cantonment 44.1 Sq.Kms and ten (10) enroute villages 97.8 Sq.Kms along National Highway No.9 upto Sangareddy. The board is already providing water supply services to the two new municipalities, Patancheru and Ramchandrapuram. Currently, water supply operations for MCH area and surrounding 4 municipalities i.e., L.B.Nagar, Gaddi

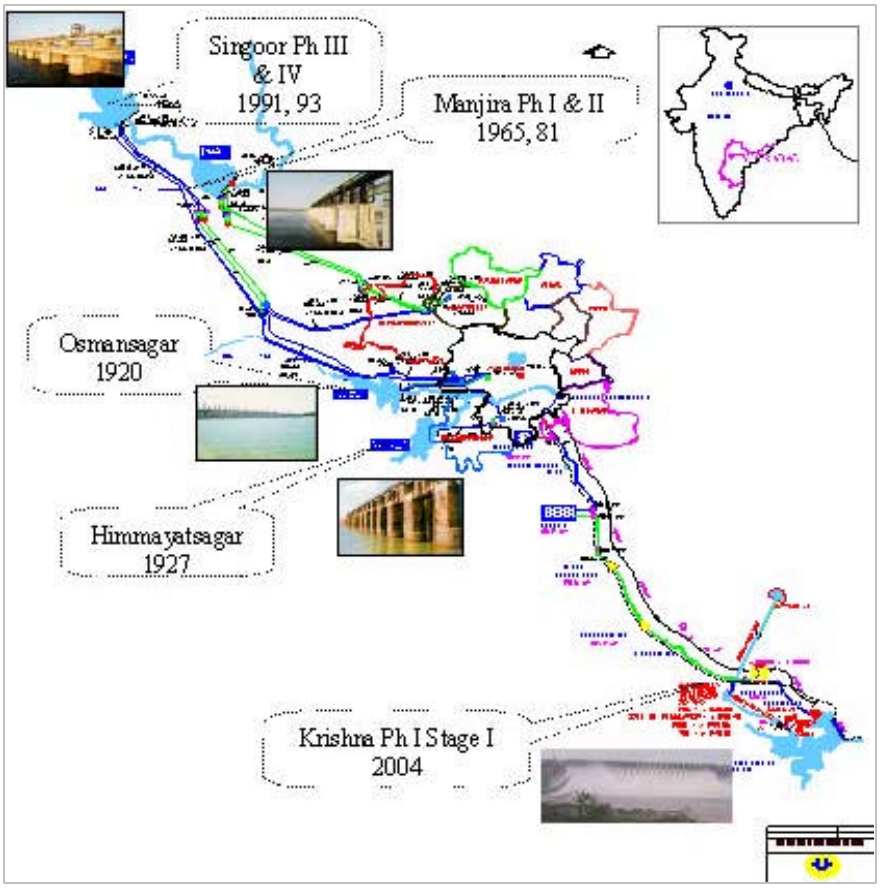
Annaram, Kukatpally and Qutbullapur are taken-over by HMWSSB and the rest will be relegated in due course.

Table 4.1: Details of Water Supply Sources

Source Name	River	Year	Impoundment Name	Distance from city "Km"	Capacity (TMC)	Drawls (Mgd)	Drawls (Mld)
Osmansagar	Musi	1920	Osmansagar	15	3.90	15	68
Himayatsagar	Esi	1927	Himayatsagar	9.6	2.967	11	50
Manjira – Phase I	Manjira	1965	Manjira barrage	58	1.509	15	68
Manjira – Phase II	Manjira	1981	Manjira barrage	59		30	135
Manjira – Phase III	Manjira	1991	Singur Dam	80	30.00	38	171
Manjira – Phase IV	Manjira	1993	Singur Dam	80		39	176
Krishna Phase I	Krishna	2004/05	Nagarjun Sagar Dam	116	1.50	58	261
						206	**927**

The details of sources of water supply to Hyderabad after commissioning Krishna Phase-I Project is presented in the Figure 4.1 and Table 4.1.

Figure 4.1: Sources of Water Supply



4.1.2.3 Existing Transmission, Distribution and Storage Capacities

The transmission mains carry water from the source to the water treatment plants and subsequently towards the Master balancing reservoirs at Hydernagar, Lingampally, and Singapur. The trunk distribution mains transmit water from the balancing reservoirs to the reservoirs within the city. The total length of the transmission mains is about 286 Km and the trunk mains is about 265 Km, comprising of CI, RCC, MS and PSC pipes.

The water distribution system for the MCH area is divided into 20 water distribution zones. The zones are further divided into 20-30 sub zones based on common ability and operational convenience. The sub zones are operated using control valves thereby making the operation of the system very complicated.

The total storage capacity available within MCH is about 390 ML comprising of ground level reservoirs and elevated reservoirs. There are 118 reservoirs in total, both ground and elevated, supplying water to all the localities in the City.

The present storage capacity is inadequate for the quantity of water supply available for providing as well as planning for continuous water supply. The total length of the distribution system is 1727 Km, comprising of pipes with diameter ranging from 75 mm to 700 mm of different materials.

4.1.2.4 Service Coverage

The total installed capacity of water from the four surface sources is about 245 mgd. Apart from the piped supply, about 25 Mgd (110 Mld) is also abstracted through borewells with power pumps and borewells with handpumps. The water allocated to Municipal Corporation area including 811 notified slums and industries is about 162 Mgd (736 Mld) and for the ten surrounding municipalities is about 44 Mgd (200 Mld).

As per the HMWSSB, over 90 % of population are covered with potable water supply in MCH area and 65% in surrounding municipalities. The city has over 3,72,960 water connections in MCH area and 1,94,600 in surrounding municipalities, the details given in *table 4.2* in Annexure. Percentage access to piped water supply in MCH area is around 70% and is much lower in surrounding municipalities, averaging to around 43%. In addition to that, the city has 8353 public stand posts (PSP) for water supply to the weaker sections of society, who cannot have individual house connections. Ninety five percent of connections are metered but majority are not working. The average per capita consumption of water is estimated as 162 lpcd, but in slum areas it is estimated to be much lower. Water is supplied for ½ hr to 2 hrs every alternate day in MCH area and 1 hr every third day in surrounding municipalities.

4.1.2.5 Water Demand and Deficit

Hyderabad's current estimated demand stands at 290 mgd. However, its installed capacity is merely 245 mgd, and this is made worse by draught conditions that constrict supply even further. The estimated ground water extraction that supplements water supply is 25 mgd which accounts to only around 270 mgd supply. As shown in *table 4.3* a huge gap is indicated between current supply and demand, and this is likely to widen by 2021, when the estimated demand will grow to 400 mgd.

Table 4.2: Performance Indicators

Indicators	MCH	Surrounding Municipalities
Total Population	36.33 lakhs	17.18 lakhs
Slum Population (appr.)	14.1 lakhs	6.98 lakhs
Network Coverage	90%	65%
% Access to Piped Water Supply	70%	43%
Average Per Capita Supply	162 lpcd	91 lpcd
Unaccounted for water	~ 40% (est.)	~ 60% (est.)
Duration of Supply	2 hrs alternate day	1 hr alternate day
Connections/1000 pop	102	39
% metered	Meters not working	
Average volume of water produced	162 Mgd	44 Mgd
Unit Production Cost	Rs. 14 /kl (Avg.) and Krishna Water – Rs. 18 / kl	
No. of PSPs	5092	3261
Water Tariffs Residential & Commercial Industrial	 Rs. 6/kl – Rs. 35 / kl Rs. 35 / kl	 Rs. 100
O&M Cost Recovery	~66% (without debt servicing)	NA
Basis of billing - Residential - PSPs - Commercial/Industrial	 Metered Free of cost Metered	 Flat rate Free of cost Flat rate
Mode of Payment	Cash, Cheques, DDs, Credit cards	Cash, Cheques, DDs, Credit cards
Private sector involvement	Billing, collection, leak repair, maintenance etc	Partly
Computerization/automation	Billing, accounting, complaint handling	Partly
Management Information System	Partly developed	-

Table 4.3: Deficit in Supply for Different horizon years

Year	Projected Population (in Millions)	Water Demand (in Mgd)	Present Water Availability (in Mgd)	Deficit (in Mgd)
2006	6.74	290	270	20
2011	7.72	320	270	50
2016	9.3	360	270	90
2021	10.9	400	270	130
2031	11.81	500	270	130

4.1.2.6 Tariff Structure and Consumer Mix

The main source of funding for urban water supplies should be tariffs. Though the average cost of production of water is estimated to be Rs. 14/kl, the tariffs and recovery rates in the board continue to remain critical. In MCH area, tariffs for metered connections are based on increasing block tariff whereas in the surrounding municipalities, it is a simple flat rate per month per household. The tariff structure of the water board for the MCH and surrounding municipalities is given in the *table 4.4* below.

Table 4.4: Tariff Structure Water Supply

Category	Consumption of water in kL per month	Rates in Rs. Per kilo Litres
1. All water supply connections other than covered by category below		
(A) Where the monthly consumption is 500 kl or less	Upto 30	6.00
	Above 30 upto 200	10.00
	Above 200	35.00
(B) Where the monthly consumption exceeds 500 kl	Entire consumption	25.00
2. Group Housing Municipalities, panchayats, local Authorities, cantonment and housing colonies	Upto the agreed quantity Above the agreed quantity	6.00 25.00

The total number of connections including the bulk water supply connections is more than 5 Lakhs. Of the total, 77% constitute domestic connections. The water supply connections to slums constitute to 20% of the total. The remaining 3% is distributed between commercial, industrial and others. The number of connections is presented in *table 4.5*.

Table 4.5: Connection Details

Category	*Connections*	*%*
Domestic	387,532.00	77.38
Slums	98,696.00	19.71
Commercial	13,451.00	2.69
Industrial	936.00	0.19
Others	194.00	0.04
Total	500,809.00	100.00

Even though, the water board consumer mix comprises around 80% domestic uses, 40% of revenue to the board comes from domestic consumers .This is basically due to incremental block tariff structure. And moreover, due to low tariffs and bill collection efficiencies, the O&M cost recovery is very low averaging to around 66% in MCH area.

4.1.2.7 Non Revenue Water

Non-Revenue water (NRW) due to commercial losses and physical losses in the system, lead to loss of revenue. Although a number of studies have been conducted by HMWSSB to quantify the NRW, reliable estimates of the same and the exact amount of physical and commercial losses are not available. The water system has high NRW levels averaging to 40% in MCH area and 60% in surrounding municipalities. Some efforts have been made to

replace transmission losses. These are compounded by commercial losses due to approximately 50,000 unregistered connections, 8350 public stand posts and inefficiencies in billing and recovery.

Key Issues and Challenges

- *Source security –Declining flows to Himayatsagar and Osmansagar due to increased usage of water upstream of the reservoirs for agriculture and other development uses.*
- *Lack of effective catchment management*
- *Limited network coverage and access to surrounding municipalities predominantly in slums.*
- *Frequency of water supply ranges from 1 ½ hrs to 2 hrs every alternate day in MCH area and 1 hr every alternate day in surrounding municipalities.*
- *Huge demand supply gap, which is likely to widen drastically in future.*
- *High non revenue water resulting in wastage of precious and scarce source*
- *High amounts of physical loses due to old transmission and distribution network*
- *Exorbitant Illegal connections.*
- *Public stand posts leads to inadequate measurement, and free (authorized) use.*
- *Inaccurate or absence of customer meters*
- *Lack of effective communication strategy*
- *Lack of efficient energy conservation measures*
- *Unregulated abstractions of ground water leading to falling of ground water levels*
- *Inadequate finances of the board leading to inability to mobilize capital for implementation of the projects.*
- *Lack of commercialisation and cost recovery approaches*
- *Need for tariff balancing as even lower slabs are below the threshold-paying limit of the poor.*

4.2 Sewerage System

4.2.1 Current Scenario

The Municipal Corporation of Hyderabad has underground sewerage system which is administered by the Hyderabad Metropolitan Water Supply and Sewerage Board. The Sewerage System for Hyderabad and Secunderabad cities was constructed in the year 1931. The system was meant to serve an area of about 54 Sq.Kms for a design population of about 4,68,000. The system is connected to main intercepting sewers one each on the North and South side of River Musi. In 1985 remodelling of the sewerage system was taken up by adding five major sewers to the system.

4.2.1.1 Network Coverage

The existing sewerage system covers only 70% of the MCH area (prior to 1994) and is overloaded due to the growth of population of twin cities. It is to be noted that the sewer connections covers 95% of the total water supply connections in the MCH area. However, in peripheral municipalities and urban areas, a large population is not covered by safe sanitation facilities due to lack of well-established sewerage system. Out of 10 municipalities, which form a major component of the HUA, only one municipality is connected to underground sewerage system, which accounts to around 20% coverage in surrounding municipalities.

Table 4.6 Performance Indicators

S.No.	Components	MCH Area	Surrounding Municipalities
1	Network Coverage	70%	20%
2	Access to Sewerage	63 %	NA
3	Total Quantity Generated	589 MLD	NA
4	Capacity of Treatment Plants	133 MLD	NA
5	Treatment & Disposal	23%	NA
6	Recycling / Reuse	3%	NA

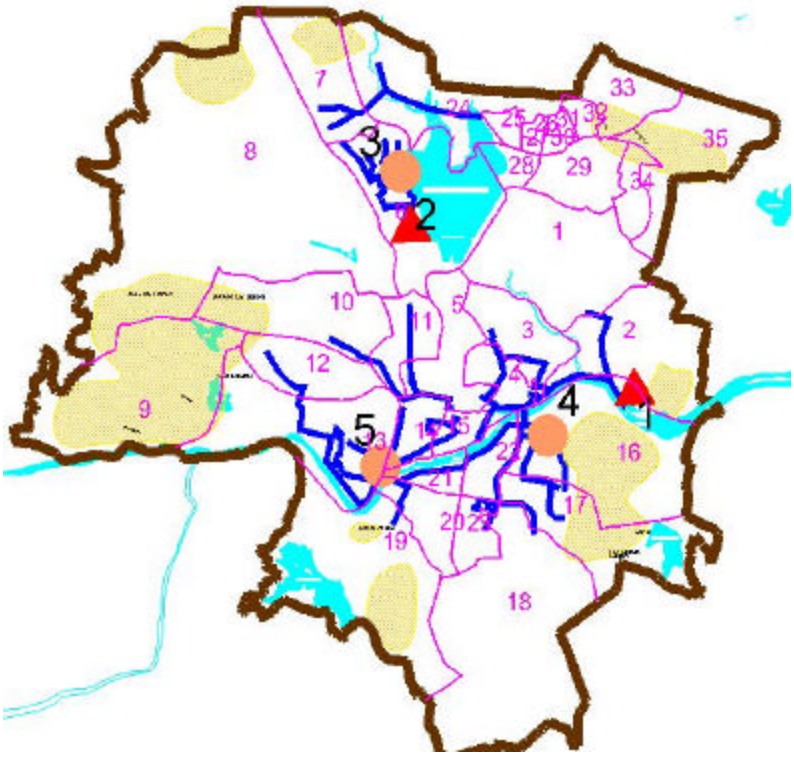
4.2.1.2 Sewerage Distribution Network

A large network of sewers of length 2400 km consisting of local and branch/main sewers covers the city. The local sewers constitute 67% of the total sewer length. The sewerage distribution network presented in *figure 4.2* infers that the City lacks adequate sanitation facilities. The treatment capacities being inadequate resulted in discharge of untreated sewage into water bodies, particularly River Musi and Durgam Cheruvu and other nallahs passing by the city.

4.2.1.3 Sewage Treatment Plants

A primary sewage treatment plant with a capacity of 113 MLD is in operation at Amberpet since 1985. Another STP at Hussain Sagar with a capacity of 20 MLD receives the flows from a mail and bulkapur channel. Combining the two, a treatment capacity of 133 MLD is currently available against the generation of 589MLD (assuming sewage generated to be 80% of the water supply), treating only 23% of the generated sewage. And only 3% of this sewage water is recycled and reused.

Figure 4.2: Sewerage Distribution Network



Key Issues and Challenges:

- *Implementation of comprehensive master plan for sewerage*
- *Low sewerage network coverage, predominantly in surrounding municipalities.*
- *Data on access to sewerage connections in MCH area and surrounding municipalities is not available.*
- *No comprehensive sewerage quality studies*
- *Lack of effective communication strategy*
- *Lack of efficient e nergy conservation measures.*
- *Inadequate sewerage treatment facilities resulting in discharge of untreated sewage into water bodies.*
- *Recycling and reuse of wastewater is negligible (3%).*
- *River Musi is highly polluted owing to discharge of untreated wastewa ter from mixing with sewage.*

4.2.2 Financial Status of HMWS&SB at a Glance

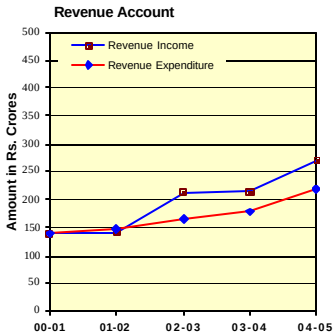
4.2.2.1 Introduction

This section details the financial performance of Hyderabad Metro Water Supply & Sewerage Board (HMWSSB) during the last five years. The Board has generated a surplus continuously from 2002-03 onwards due to the implementation of tariffs and policies and other measures such as increasing the number of connections and enhancing the collection efficiency. A brief summary of the income and expenditure account of HMWSSB from financial year 1999-00 to 2004-2005 is given in *table 4.7*.

Table 4.7: Summary of Income & Expenditure

		2004-05	2003-04	2002-03	2001-02	2000-01
	Particulars	**(Rs.Lakhs)**				
I	**Revenue Income**					
	Water & Sewerage Cess Demand	19,371.39	16,381.05	15,329.24	10,911.16	11,172.50
	New Connection Charges	6,768.62	4,311.69	5,237.62	2,684.75	2,462.07
	Other Income	917.43	868.02	666.13	580.05	226.67
	Interest	120.00	113.55	22.75	19.06	7.93
	Total	27,177.44	21,674.31	21,255.74	14,195.02	13,869.17
II	**Revenue Expenditure**					
	Staff Cost	6,741.63	6,082.96	5,786.60	5,878.64	5,578.02
	Power	8,034.47	4,830.83	5,123.01	4,952.29	4,696.19
	Chemicals	245.86	272.26	225.80	206.81	214.90
	Maintenance of Water supply & Sew System	5,785.18	5,289.65	4,062.42	2,560.53	1,903.71
	Administration & other Expenses	954.99	1,257.54	1,334.34	1,115.53	1,412.16
	Sub-total	21,762.13	17,733.24	16,532.17	14,713.80	13,804.98
III	**Surplus/Deficit, before Interest & Depreciation**	**5415.31**	**3941.07**	**4723.57**	**(518.78)**	**64.19**
IV	**Interest Expenditure**	**2,017.56**	**1,269.61**	**870.78**	**154.13**	**28.23**
	Depreciation	2,704.00	1,613.66	1,570.98	1,459.76	1,340.82
	Sub-total	4,721.56	2,883.27	2,441.76	1,613.89	1,369.05
	Total	26,483.69	20,616.51	18,973.93	16,327.69	15,174.03
V	**Surplus/(Deficit), after Interest & Depreciation**	**693.75**	**1,057.80**	**2,281.81**	**(2,132.67)**	**(1,304.86)**

During the last five years there has been substantial increase in the Operation and Maintenance costs such as cost of power, fuel, chemicals, implementation of salary revision, periodical dearness allowance increases, etc. However with the increase in the tariff from June 2002, the revenues have been improved which can be seen in the increase of water and sewerage cess from Rs. 111 crores in 2000-01 to Rs. 193 crores in 2004-05.



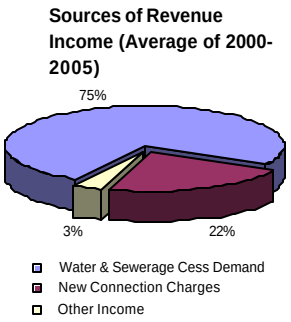
4.2.2.2 Income

Revenue income has increased substantially from Rs. 13869 Lakhs to Rs.27177 Lakhs, an increase of more than 95%. The major sources of income include water & sewerage cess and new connection charges which together almost contribute to 97% of the total income. The income of HMWSSB and its growth is presented in *table 4.8*.

Table 4.8: Revenue Income

S.No	Particulars	2004-05	2003-04	2002-03	2001-02	2000-01
		(Rs.Lakhs)				
1	Water & Sewerage Cess Demand	19,371.39	16,381.05	15,329.24	10,911.16	11,172.50
2	New Connection Charges	6,768.62	4,311.69	5,237.62	2,684.75	2,462.07
3	Other Income	917.43	868.02	666.13	580.05	226.67
4	Interest	120.00	113.55	22.75	19.06	7.93
	Total	27,177.44	21,674.31	21,255.74	14,195.02	13,869.17

The increase in the revenue income is due to improved efficiencies in generation of bills, distribution and consequent collection efficiency. There has been substantial increase in new connection charges by 95% and 57% in the years 2002-03 and 2004-05 due to provision and streamlining of new connections. The income also includes sewerage cess collected by HMWSSB as per the provisions of the Act. where the sewerage system of the Board exists.



4.2.2.3 Expenditure

The expenditure of the Board increased from Rs. 13804 Lakhs in 2000-01 to Rs. 21762 lakhs in 2004-05, an increase of 58% *(table 4.9)*. The major expenditure items are power, establishment and maintenance of the system. Power contributes to 37% of the total expenditure followed by establishment expenditure and maintenance of the system. A substantial increase in power costs is due to pumping of water as part of Krishna Water Supply Project-phase 1.

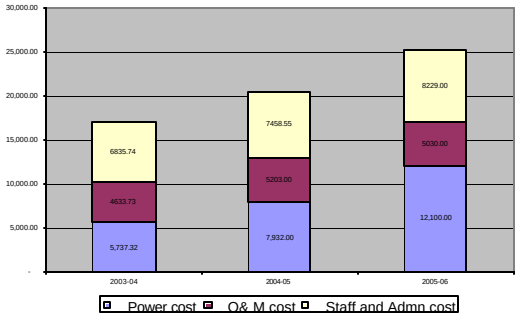


Table 4.9: Revenue Expenditure

S.No	Particulars	2004-05	2003-04	2002-03	2001-02	2000-01
		(Rs.Lakhs)				
1	Staff Cost	6,741.63	6,082.96	5,786.60	5,878.64	5,578.02
2	Power	8,034.47	4,830.83	5,123.01	4,952.29	4,696.19
3	Chemicals	245.86	272.26	225.80	206.81	214.90
4	Maintenance of Water supply & Sew System	5,785.18	5,289.65	4,062.42	2,560.53	1,903.71
5	Administration & other Expenses	954.99	1,257.54	1,334.34	1,115.53	1,412.16
	Total	21,762.13	17,733.24	16,532.17	14,713.80	13,804.98

The interest expenditure also increased from Rs. 28 Lakhs 2000-01 to Rs. 2017 Lakhs in 2004-05. The increase is mainly due to the implementation of Krishna Water Supply Project-Phase 1, for which the Board borrowed substantial amount.

4.2.2.4 Collection Efficiency

The collection efficiencies of the Board have increased substantially during 2000-01 to 2004-05. The monthly average collection has increased from Rs. 761 Lakhs in 2000-01 to Rs. 1468 Lakhs in 2004-05. The current collection efficiencies are well above 85%, the maximum during 2004-05 at 96%. The demand, collection and balance is presented in *table 4.10*.

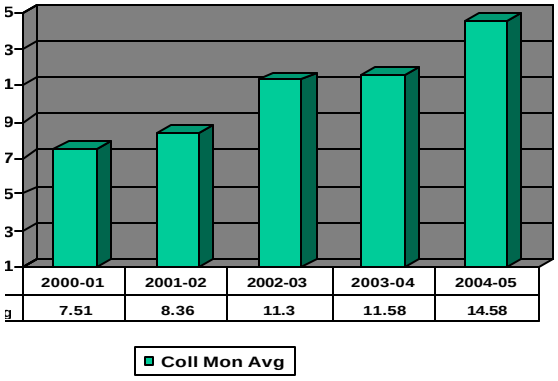


Table 4.10: Demand Collection and Balance Statement

Particulars	2003-04	2004-05	2005-06
	Rs. Lakhs		
Demand	15,749.79	19,017.91	20,654.68
Collection	13,909.83	18,305.63	17,610.88
Balance	1,839.97	712.28	3,043.80
Collection Efficiency (%)	88.31	96.25	85.26

4.2.2.5 Outstanding Loans

The outstanding loans as on 31st March 2005 is of the order of Rs. 51355 Lakhs and is mainly due to the implementation of Krishna Water Supply Project. The Board has restructured the loan portfolio by swapping the high cost debt with low cost options. Accordingly, the debt commitment of the Board is of the order of Rs. 294 Lakhs per month.

Key Issues and Challenges (Finances – Water Supply and Sewerage):

- *Revenue expenditure increased by 58% during the last five years*
- *Substantial increase in power costs due to pumping of water as part of Krishna Water Supply Project*
- *Non-existence of ring fencing of the accounts / finances.*
- *Current collection efficiency at more than 85%*
- *Increasing interest burden at Rs. 300 lakhs per month*
- *Need for a rationalistion of tariffs*

4.3 Storm Water Drainage

The drainage system in Hyderabad comprises of a hierarchy of natural and man-made drains and water bodies that ultimately discharge surface run-off into River Musi and Hussain Sagar. Numerous lakes and nallahs constituting the major storm water drainage system for the area drain the City. The nallahs are the major carriers of storm water finally disposing into the river and water bodies in the catchment.

Currently, storm water drains in the city are constructed and maintained by the Municipal Corporation and respective ULBs. Normally storm water drains receive the least priority and are constructed on an adhoc basis only, in response to localised problems.

4.3.1 Major Water Bodies & Drains

There are 87 water bodies in the City. The most important lakes are Hussain Sagar, Osmansagar, Himayat Sagar, Mir Alam Tank, Saroornagar Lake, Safilguda Lake, and Langerhouz Lake etc.

Primary Drains

Nearly all the major drains following through the city fall under the catchment area of Musi River. There are in all 44 major primary drains passing through the Municipal Corporation of Hyderabad. These primary drains or nallahs carry the storm water finally draining into either River Musi or the lakes located in the city. The length of the primary drains leading to Musi is around 139.33 km and is presented in *table 4.11*.

Table 4.11:Length of Primary Drains In The Catchments

S. N	Description	Length in Km.
1	Hussain Sagar Catchment	36.80
2	D/S of Hussain Sagar	18.22
3	N-E of Husain Sagar	7.79
4	N-W Hussain sagar	40.44
5	S-W Musi River	9.87
6	S_E of Musi River	26.21
7	Musi River	
8	Total	139.33

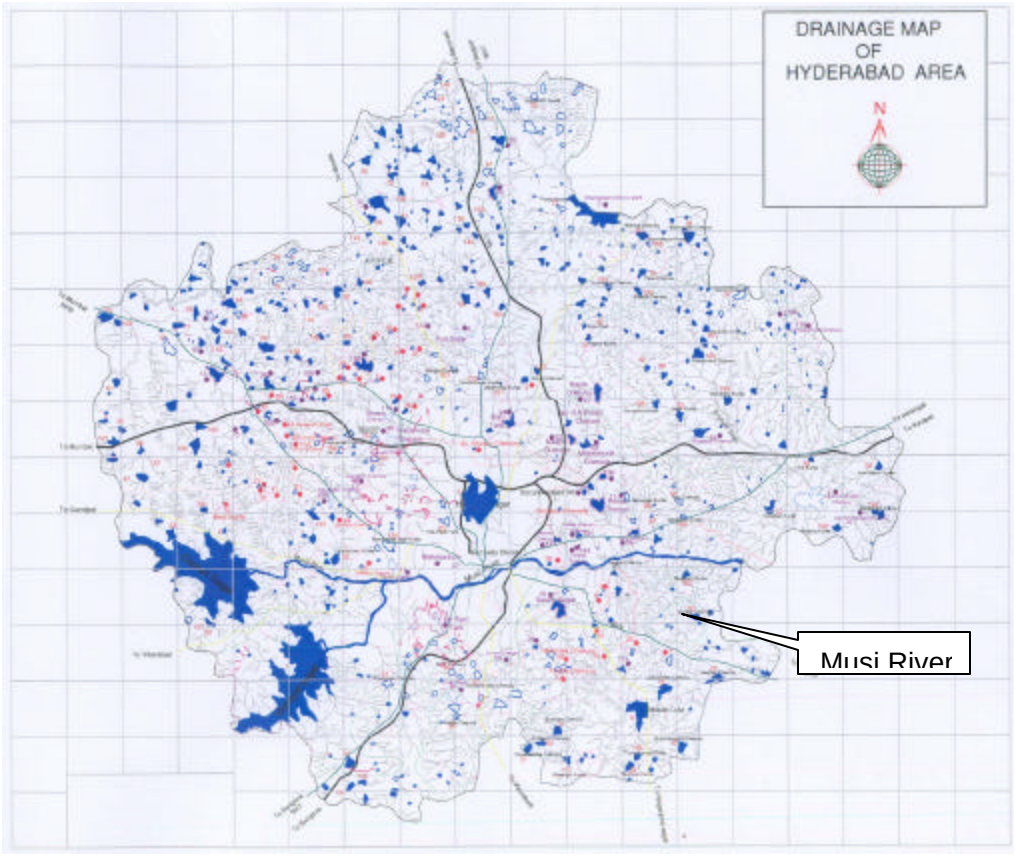
Majority of the drains lead to Hussain Sagar and are located in Hussain Sagar Catchment, D/s of Hussain Sagar, North-West of Hussain Sagar, South-West of Hussain Sagar, South-West of Musi and South-East of River Musi. Musi receives the drain water from primary and secondary drains and even the surplus water from the lakes within its catchment. The primary network of storm water drainage system is presented in Figure 4.3.1.

Tertiary Storm Water Drains

The tertiary drains are roadside drains discharging storm water into the primary drains and water bodies. The total length of tertiary drains In MCH area is about 800 Km, comprising 700 Km of pucca drains (lined with brick or stone masonry and pre-cast RCC sections) and about 100 Km of kutcha drains (un-lined). Incase of the surrounding Municipalities the Total length of around 710 km comprising of both pucca drains (lined with brick or stone masonry and pre-cast RCC sections) and kutcha drains (un-lined) Thus in effect only 30 percent of roads are covered by drains against a desired norm of about 130[1] percent.

[1] On an assumption 30 percent of major roads to have drains on both sides and the rest 60 percent to have drains on one side with proper gradient

Figure 4.3.1: Primary Storm Water Drainage Network



In addition to storm water discharge these drains are also being used to discharge sullage and septic tank overflows. Most of the drains are open and are choked with silt and garbage.

4.3.2 Flood Prone Areas in Hyderabad

The major flood prone areas in twin cities are the low lying areas in the catchment areas of Hussain Sagar, Saroornagar Tank, Erra kunta etc. The areas include the catchment of Balkapur Channel, Kukatpalli Nallah, surplus nallah of Hussainsagar covering Kavdiguda, Domalguda, Ashok Nagar, Himayat Nagar. In addition, the low lying areas Bhavani Nagar, Ganga Nagar, Begumpet, Madulguda, Langar Houz witnessed flooding in 2000 warranting immediate interventions to effectively contain the damage. The most important lakes that impact the storm water drainage are Hussain Sagar, Osman Sagar, Himayat Sagar, Saroor Nagar lake, Safilguda Lake,Banda Cheruvu,LangarHouz Lake,Kapra Lake ,Mir Alam tank and Few Other Category -1 Lakes . The key reasons for this situation are assessed as follows:

- ?? Inadequate drainage system, which was designed for the rainfall of 12 mm/hour.
- ?? Excessive concentration of flood due to breaching of tanks.
- ?? Disappearance of flood absorbing tanks.
- ?? Dumping of debris and garbage into the open Nallahs.
- ?? Illegal encroachment of natural water courses
- ?? Patta lands in the natural water courses.
- ?? Springing up of housing colonies in the foreshores of the tanks.
- ?? Sanctioning of layouts without reference in the ground levels.
- ?? Indiscriminate laying of service lines all along and across natural courses.

- Collection of building materials on the road sides resulting in excessive silting of drains.
- Diversion of natural water courses to accommodate habitations.
- Increased run off due to increase in impervious areas.

4.3.3 Improvements to Storm Water Drainage

The Municipal Corporation has undertaken a study to prepare a storm water drainage master plan to alleviate the problems of flooding by providing adequate measures. The study recommended deepening and widening of the nallahs for the sections affected by encroachments, critical sections for further improvement and a broad cost to carry out the improvements. The improvements proposed include:

- Deepening
- Widening
- Provision of retaining walls at critical sections
- Modification to cross drainage works and in addition suggested some soft measures such as prevention of dumping of waste into the nalllah to prevent clogging.

Key Issues

- *Low Coverage*
- *Low Capacity*
- *Lack of integrated drainage plan*
- *Encroachments*
- *Resulting in flooding and inundation*

4.4 Solid Waste Management

Solid waste management is an obligatory function of Urban Local Bodies (ULBs) in India. However, this service is poorly performed resulting in problems of health, sanitation and environmental degradation. With over 3.6% annual growth in urban population and the rapid pace of urbanization, the situation is becoming more and more critical with the passage of time. Lack of political will, inadequate financial resources, institutional weakness, improper choice of technology and public apathy towards solid waste management have made this service far from satisfactory.

Unless concerted efforts are made to improve the flow of resources to solid waste management and build up systems which incorporate the basic requirements of a proper waste management practice, the problem of urban waste will be further aggravated and cause environmental health problems.

4.4.1 Sources & Quantity of Solid Waste Generated

The HUA generates around 3379 tons of solid waste every day out of which MCH contributes to 2240 tons and surrounding municipalities contribute towards 1139 tons at a per capita generation rate of 600 gms/cap/day. MCH shows a collection efficiency of over 91%, whereas, surrounding municipalities shows a collection efficiency of 95%.

The major sources of solid waste generation in Hyderabad Urban Agglomeraton (HUA) are household domestic waste, commercial establishments, markets, hotels and restaurants, etc. The sources and quantity of solid waste generated in Hyderabad Urban Agglomeraton (HUA) is presented in *table 4.12*.

Table 4.12 Details of Solid Waste Generation in Hyderabad Urban Agglomeraton (HUA)

S. No	Source of Generation	MCH		Surrounding ULBs	
		Quantity/ day in tons	% to Total	Quantity/ day in tons	% to Total
1	House Hold – Domestic	1482.00	66.18	690.45	60.6
2	Street Sweepings & Drain Cleanings	173.55	7.76	148.595	13.0
3	Hotels and Restaurants	77.50	3.46	36.91	3.2
4	Markets	92.00	4.10	60.745	5.3
5	Shops, Commercial Establishments	347.10	15.51	112.25	9.9
6	Hospitals, clinics	35.00	1.56	6.74	0.6
7	Construction waste	20.00	0.90	22.725	2.0
8	Industrial Waste (Non-Hazardous)	12.00	0.53	60.7	5.3
Total		2240	100	1139	100

4.4.2 Characteristics and Composition of Solid Waste

Composition of waste is a major determinant in evaluating the disposal options. According to a recent study conducted by Centre for Environmental Studies of JNTU, Hyderabad, the compostable matter in Solid waste of Hyderabad ranges from 37% to 28%. A significant 10%

of plastics were also found in the samples collected from the disposal sites. The characteristics and composition is presented below*table 4.13.*

Table 4.13 Composition of Solid Waste in Hyderabad Urban Agglomeraton (HUA)

Constituent	Golconda	Yosufguda	Autonagar	Average
Physical Characteristics (%)				
Paper	8.00	10.00	14.00	10.66
Plastic	10.00	10.00	2.00	7.33
Metals	10.50	4.00	2.00	5.50
Glass	9.00	6.00	9.00	8.00
Sa+Gr+St	55.00	30.00	43.00	42.66
Miscellaneous	5.00	5.00	2.00	4.00
Moisture Content	11.00	17.10	12.00	13.36
Av. Bulk Density, kg/m^{3}*				369.00
Chemical Characteristics				
pH	8.30	8.10	8.20	8.16
Electical Conductivity	132.00	113.60	170.00	138.53
Organic Carbon	2.38	2.22	1.99	2.19
Organics	4.27	3.98	3.58	3.94
Total Nitrogen	0.10	0.99	0.12	0.40
C/N Ratio	23.00	22.00	19.00	21.33
Compostable Matter	37.00	29.00	28.00	31.33
Calorific Value , cal / gm	1000.00	1525.00	1145.00	1223.33

Source: Centre for Environmental Studies, JNTU, Hyderabad

As presented above, on an average the domestic solid waste in Hyderabad contains 10.55% of paper, 7.33% of plastics, and 8% glass. High percentage of these substances at all the three disposal sites indicates a low intensity rag picking activity in the city.

Similarly, the waste was found to have a low moisture content of 13.36 and an average calorific value of 1223.33 cal /gm just suitable for thermal chemical conversion and associated energy generation processes.

4.4.3 Present Practices of Solid Waste Management

MCH has won the Clean City award instituted by the HUDCO for the past six consecutive years. This has been possible due to a proactive approach and well planned out systems & methods in implementation.

Under the principle of users pay, beneficiaries' pay, and polluters' pay, MCH has introduced the scheme of collection user charges from bulk garbage generators in the city. 1700 establishments like Hotels, Restaurants, Function Halls, Hospitals, Markets, and Commercial Complexes etc., generating bulk garbage have been identified and classified into 12 categories for levying user charges. During the year 2003-2004, 20 transport work packages are proposed to be launched for providing door step collection arrangement to these establishments and collecting user charges to the tune of Rs.2.Crores.

Waste Storage & Segregation

The Urban local body is responsible for collection, transportation and disposal of Solid Waste except untreated Bio-medical waste and hazardous industrial waste. Storage and segregation

of waste at source is not very prominent in Hyderabad Urban Agglomeration. Only a few houses, large hotels segregate and store the waste in their premises.

Primary Collection

MCH and surrounding municipalities have presently a network of 3850 and 1631 primary collection points respectively for collecting waste from various generation points. The waste is collected through dumper bins and RCC bins. In addition to this the corporation has supplied rickshaws to resident welfare associations, under Voluntary Garbage Disposal Scheme (VGDS) wherein the people will deliver the waste to these rickshaw pullers, who in turn convey it to the collection points. Similarly around 360 commercial units under Door Step Solid Waste Collection (DSSWC) deliver the waste to the municipal vehicles directly for agreed amount and the waste is directly disposed off in the disposal site. The salient features are presented in *Table 4.14*.

Table 4.14 Salient Features of Solid Waste Management

Item	**Details-MCH**	**Surrounding ULBs**
Estimated Quantity of waste generation, t/ day	2240 T	1139 T
Quantity of waste collected	2038 T	1040 T
Collection Efficiency	91%	95%
Frequency of waste collection	Twice a day	Once/Twice a day
Garbage collection centers	3850	1631
Average spacing of dust bins, m	425	500
No of sweepers (excludes Jawans & Scavengers)	3541	3829
Number of Open Points	1240	610

Secondary Collection

The waste from the primary collection points are transported by the conservancy workers (ULBs or private) to the secondary collection points and dumper placers through wheel borrows and hand carts. From the secondary collection points, collection vehicles of capacities varying from 6 tons to 1 tons pick up the waste and transport to one of the three nearest transfer stations.

The exisitng transfer stations have been specially designed to minimise the multiple handling of waste. In order to achieve this objective the transfer station comprises of a platform where in the collection vehicles directly empty the waste into the disposal vehicle.

The waste is transported to three conveniently located transfer stations at Tank Bund, Imliban and Yousufguda, from where the waste is taken to the disposal point at Auto Nagar. The responsibility of collection and transport of waste to transfer stations has been entrusted to private contractors in 125 units (46%) of the total 267 solid waste lifting units in the city.

Processing and Disposal

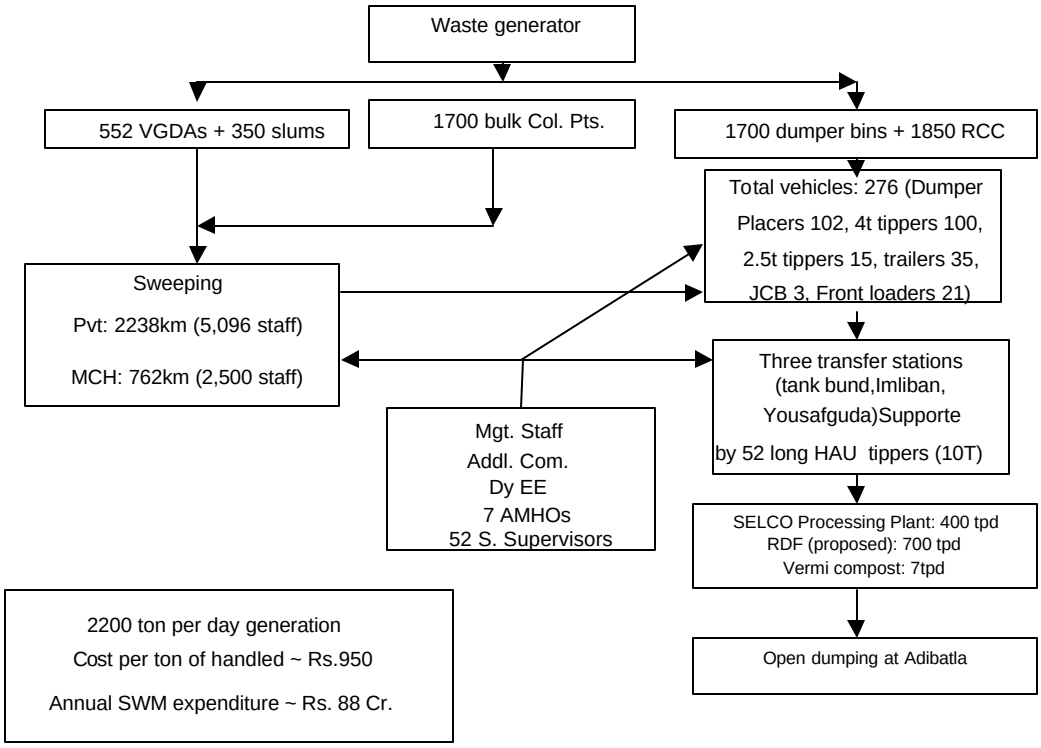
There is no engineered landfill site in Hyderabad Urban Agglomeration. However, the current dispoal facility is located at Jawaharnagar in Shamirpet Mandal of Ranga Reddy District and is located at a distance of 45 km from the city.

Since the modern practice is processing of Solid Waste rather than distancing and disposal, Municipal Corporation of Hyderabad is encouraging enterprises to setup processing plants. One such plant setup by M/s. SELCO International was commissioned in December 1999. This plant is designed to utilise 700 MT of unsegregated Municipal solid waste every day to generate 6.6 MW of electrical power. This plant reduces Green House Gas emissions equivalent to 47,705 MT of Carbon dioxides per year.

A vermi composting plant on a small scale utilizing 7 Mts of MSW per day is under operation with the involvement of Resident Welfare Associations.

The Biomedical waste generated in Hospitals and Nursing homes is covered under a special arrangement where the private agencies approved by the AP Pollution Control Board collect and transport the Bio-Medical waste to their Hydroclaving/ Autoclaving plants. The Biomedical waste is treated and finally disposed off at the plant sites. The firms collect the charges directly from the hospitals and Nursing Homes.

Figure4.4.1: Existing System of SWM at Hyderabad



4.4.4 MSW 2000 rules – Overview

After the publication of the Supreme Court appointed committee's report, which was applicable to only class-1 cities in India, The Government of India, Ministry of Environment have framed rules under the Environment Protection Act incorporating mandatory provisions for all the urban local bodies in the country for the management and handling of municipal solid waste. These rules are binding to all the urban local bodies in the country. Each city government is, therefore, required to comply with the provision of the rules in the given time frame.

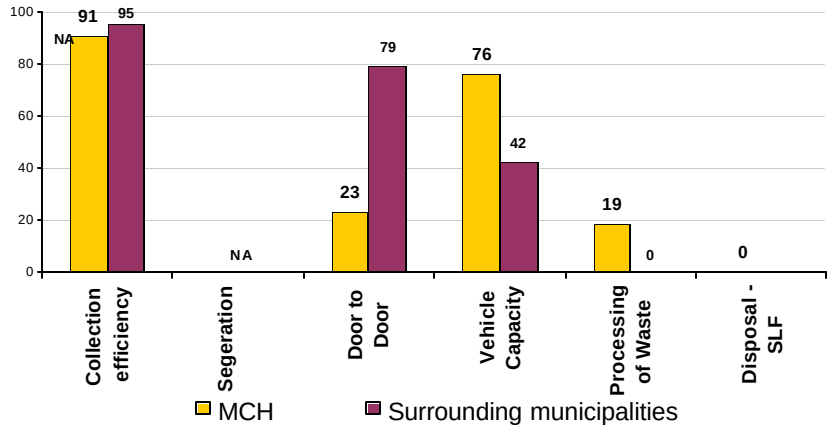
In October 2000, the Ministry of Environment and Forests notified the Municipal Solid Wastes (Management and Handling) Rules, 2000, which lay down the procedures/guidelines for collection, segregation, storage, transportation, processing, and disposal of municipal solid waste. The rules require that all cities should set up suitable waste treatment and disposal facilities by 31December 2003. A comprehensive manual on Municipal Solid Waste Management has been brought out by CPHEEO for the guidance of ULBs

- An effective waste management system includes the following:
- Waste collection and transportation
- Resource recovery through sorting and recycling of materials
- Resource recovery through waste processing by using composting or waste to energy approaches
- Waste minimization by reducing volume, toxicity or other physical/chemical properties of waste to make it safe for final disposal
- Disposal of waste in an environmentally safe and sustainable manner through land filling

The secretaries to the government urban development department and the district magistrates are made responsible to ensure the implementation of these rules in the corporations and municipal areas respectively and the state pollution control board is made responsible to monitor the implementation of the rules and adherence to the standards prescribed. This time limit is over and the cities and towns in the country have failed to implement the rules. The following chart clearly shows the negligence of the ULB's to comply with the MSWM 2000 rules

Components	MCH (%)	Surrounding municipalities (%)
Collection efficiency	91	95
Segregation	NA	NA
Door to Door	23	79???
Vehicle Capacity	76	42
Processing of Waste	19 (capacity)	NA
Disposal - SLF	No engineered landfill site	

Figure: Compliance with MSW 2000 Rules (%)



4.4.5 Future Generation Trends

There is no precedence of studies on per capita waste generation trends of the Hyderabad Urban Agglomeration. However, the projected generation of waste based on relevant assumptions are presented in Table 4.15.

Table 4.15: Projected Generation of Waste

S. No	Year	Population		Per Capita Waste (gm/cap/day)		Waste Generated (tons / day)	
		MCH	Surrounding ULBs	MCH	Surrounding ULBs	MCH	Surrounding ULBs
1	2001	3686460	1294612	607.4	517.9	2239.2	670.5
2	2006	4122370	2265241	651.44	556.1	2685.5	1259.7
3	2011	4497666	3159645	698.68	596.3	3142.4	1884.1
4	2016	4859148	3763325	749.35	657.7	3641.2	2475.1
5	2021	5197008	5090000	803.69	683.7	4176.8	3480.0

It is estimated that the MCH area will generate around 4176 tons of solid waste at 803.6 gm / cap / day, by the year 2021. In addition, the outer municipalities would be generating an additional solid waste of around 3480 tons per day 2021, which needs to be disposed of in a scientific manner.

Such a high volume of waste generation warrants a regional approach for disposal in addition to the need for initiating steps for Reduce, Recover, Reuse and Recycling strategies in Hyderabad Urban Agglomeration.

Key Issues

The analysis of existing solid waste managem ent practices of Hyderabad Urban Agglomeration indicate that the city has structured primary and secondary collection arrangements. However, the disposal arrangements of the city need substantial improvement. Integrated solid waste management requires the use of various instruments for improved service delivery. The range of issues that needs to be addressed as listed below.

- *Optimal distribution of functions and responsibilities*
- *Involving local governments in system planning and development and encouraging private sector participation in waste management*
- *Institutional strengthening and human resources development*
- *Effective public participation in segregation of recyclable waste and storage of waste at source.*
- *Effectiveness of awareness building or direct com munity involvement*
- *User Charges*
- *Waste Minimisation, Recycling*
- *Integrated Waste Treatment*

4.5 Traffic and Transportation

4.5.1 Transportation Scenario– Current Situation

Hyderabad City is experiencing rapid growth and transportation issues have assumed critical importance. Since the proportionate road length in the HMA area has been almost static, traffic congestion has increased leading to endless transportation gridlocks. Interestingly, there is a declining trend in the use of bicycles. The city's transportation requirement is largely met by the following modes of transport.

- Bus transport as the major public transport with modal share of 42% and merely 4% fleet.
- Rail based Multi Modal Transport System (MMTS) catering to 1.7% of the share of public transport.
- Three and seven seated autos acting as the Para transit contributing to nearly 10% of the transport demand.
- Private vehicles (two and four wheelers) mode share is about 50% of the total vehicular traffic.

Multiple agencies are involved in supporting and facilitating traffic and transportation mechanism in Hyderabad. Provision of road infrastructure is done by MCH and HUDA while the public transport is taken care by APSRTC, a parastatal agency and MMTS. The traffic regulation has been the responsibility of the police department. The NHAI, R & B, AP Transco, HADA, etc. are the other agencies that contribute to the facilitation of transport system. No single agency is solely responsible and accountable for traffic and transport management. This is giving rise to overlapping of functions and spatial and functional fragmentation.

4.5. 2 Traffic Flows and Travel Demand

Major transportation issue faced is the numerous commuters getting into the central core (MCH area) from its hinterland through a high capacity radial network with the low capacity carriageway in the core area being unable to accept the influx of these flows leading to traffic constrictions. The major travel patterns and the areas of trip attraction are presented in the *table 4.5.1* in the annexure.

Figure 4.5.1 O - D (Internal -to-External)

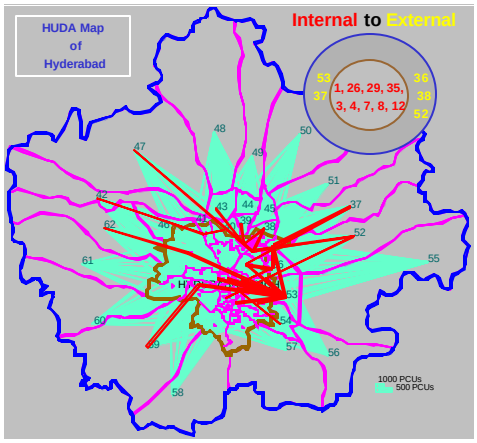
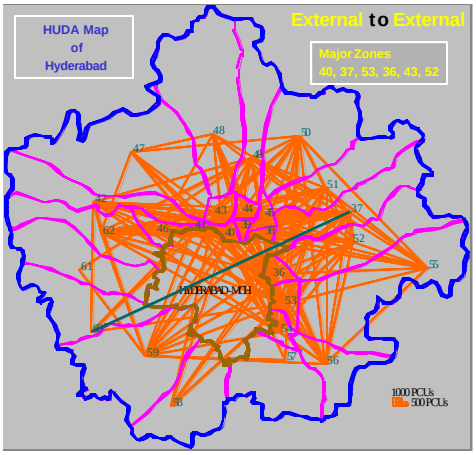


Figure 4.5.2 O - D (Eternal-to-External)

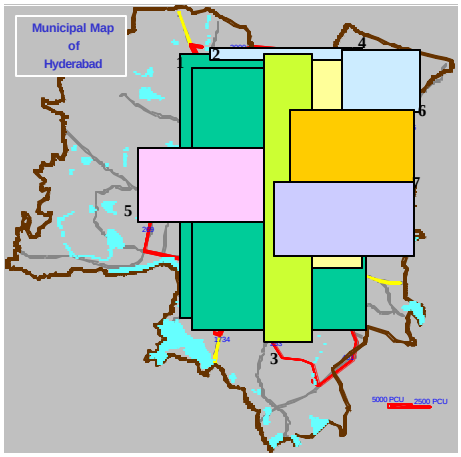


Explosive growth of the surrounding municipalities and the concentration of substantial economic activity within the MCH area has resulted in heavy radial flows being pumped into the central core which has limited road capacity leading to traffic bottle necks. This is clearly reflected in the following origin – destination (O – D) pattern in figure 4.5.1.

Substantial external-to-external flows across the core area are also being sponsored due to location of certain activity centres. In absence of convenient by pass roads, these flows are being funnelled through existing travel corridors of MCH area, thus accentuating the problem. This case can be visualised in the east - west flows as shown in the figure 4.5.2.

Peak hour flows on major travel corridors carry more than 9000 passenger car units that. Mixed traffic conditions present additional problems in maintaining lane discipline and hence the lane capacities are far less than those observed in car traffic flows. The peak hour volume along the major links is presented in the *table 4.5.2* in the annexure. This has resulted in the reduction of average speeds of the vehicles over a period of time. The present average speed is just 12 km per hour and it is still likely to reduce if there is no improvement in the situation. The high volume corridors identified based on the surveys includes the following and is presented in Figure 4.5.3.

Figure 4.5.3 Major travel corridors



- Portion of NH 9 between Sanath Nagar and Dilsukhnagar via Ameerpet, Pajnagutta, Khairtabad, Nampalli, Chaderghat and Malakpet
- From Ameerpet to Secundrabad (S.P. Road) via Greenlands, Begumpet, Paradise and Parade ground.
- From Paradise to Madina via Tankbund, Liberty, Abids, MJ Market and Afzal gunj
- From Secundrabad to Afzal gunj via Musheerabad, RTC cross roads, Narayanaguda, and Koti.
- From Tarnaka to Chaderghat via Osmania University, Hindi Mahavidyalaya, Barkatpura, Kachiguda and Moti bazaar
- Uppal to Afzal gunj via Ramanthapur, Amberpet, Chaderghat and Gowliguda.

Following are the characteristics of traffic problems in the city, specifically in these high volume corridors.

- Congestion, and very low average journey speeds, as low as 12 kmph
- Enormous delays at intersections due to non-standard configurations, and increased conflicts.
- Indiscriminate parking and general shortage of parking spaces
- Increasing volumes of three wheeled auto rickshaws creating additional problems due to their maneuverability, and indiscriminate stoppages to serve passengers.
- Increasing volumes of highly flexible two wheeled scooters and motorcycles
- Varying carriageway widths creating turbulence in traffic flows.

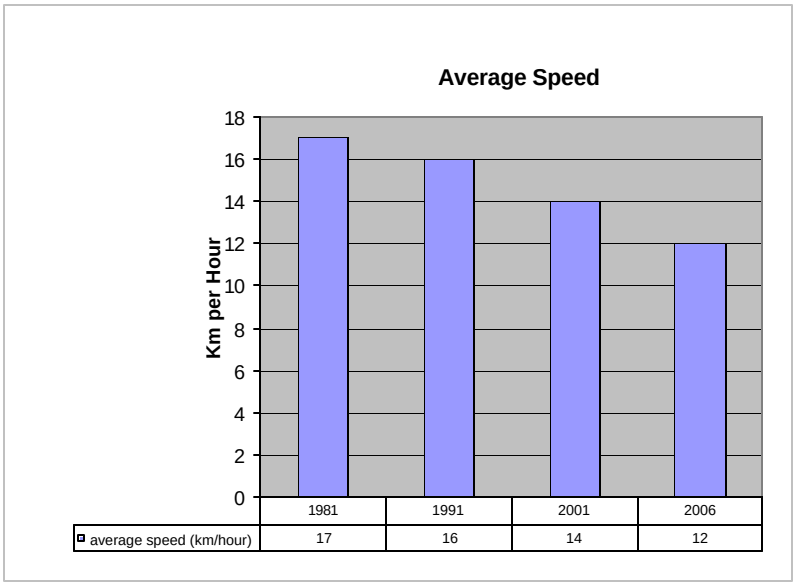


Figure 4.5.4: Vehicular Average Speed

4.5.3 Per Capita Trip Rate (PCTR)

The growing population and increase in the spending power of the residents has resulted in greater demand for travel. This is very well indicated by the increasing per-capita trip rate (PCTR) projections shown in *table 4.16*. The ever-increasing size of the city is also expected to result in longer trip lengths, which means that the total travel miles will increase faster than the PCTR and the population growth rates.

Table 4.16: Per Capita Growth Rate (PCTR)

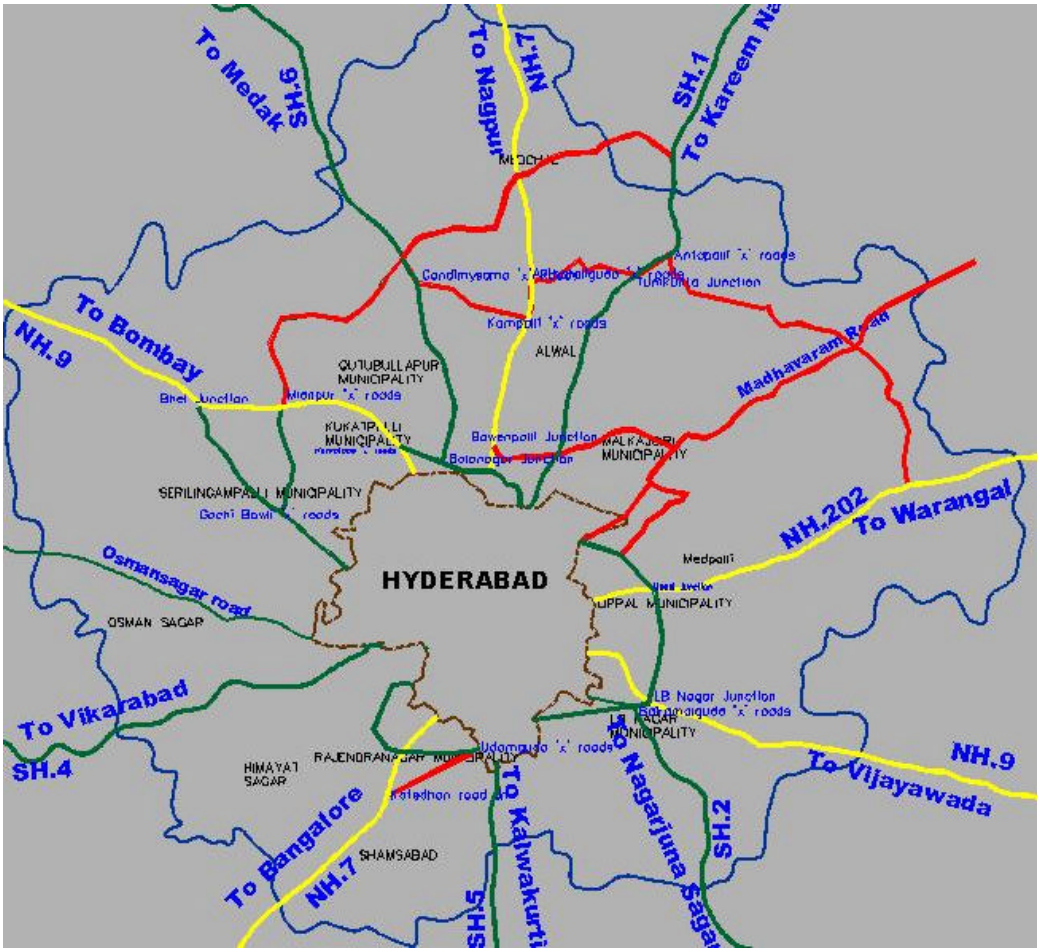
Year	Per capita trip rate (PCTR)
2003	0.84
2006	0.97 (assuming 75 lakhs population)
2011	1.05

(Source: L&T Rambol and DMRC reports)

4.5.4 Hyderabad Road Network

The city has radial and orbital form of road network development. The recent growth trend is more in the west / south directions of Hyderabad. Three National Highways, NH9 (connecting Vijayawada in the eastern side and Mumbai in the west), NH7 (connecting Bangalore in south and Nagpur in north) and NH202 (connecting Hyderabad to Warangal) pass through the CBD of the city. Five State Highways SH1, SH2, SH4, SH5 and SH6 start from the city centre and diverge radially connecting several towns and district head quarters within the State in all directions. The road network of Hyderabad is very dense and congested due to narrow roads, heavy encroachments, and high pedestrian and slow moving vehicle concentration. As per the existing land use plan, the area under roads is only 9-10% in MCH area and inadequate in HMA region as a whole with insufficient pedestrian and other road infrastructure facilities. The road network of the metropolitan area is presented in Figure4.5.4.

Figure 4.5.5 Major road network of Hyderabad Metropolitan Area



4.5.5 Vehicular Growth and Composition

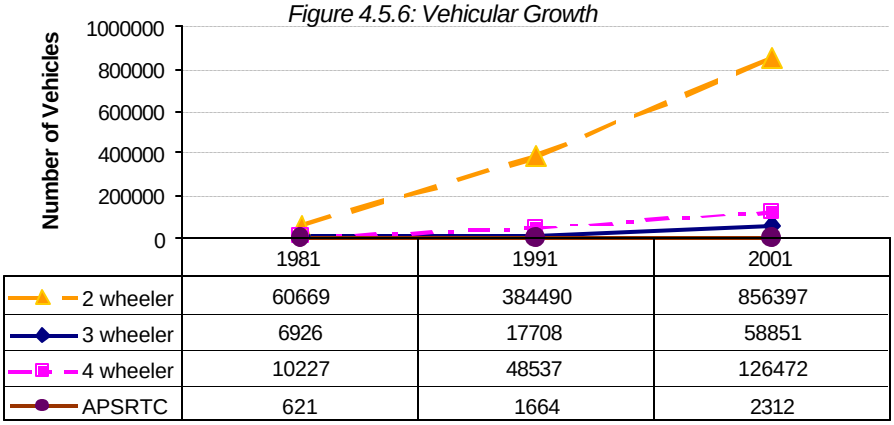
Commensurate with the growth in population, the number of vehicles also grew at a rapid pace within the urban area. Over the last decade two wheelers have multiplied (compounded annual growth rate – CAGR) by 13.9 percent, four wheelers 11.9 percent and three wheelers 10.4 percent. The growth trend of vehicle population in Hyderabad is given in the *table 4.5.3* in the annexure. The modal share of private vehicle (cars, jeeps & two wheelers) is about 50%. The deficiency in frequency of APSRTC buses and minimal coverage, poor frequency and information system of local rail services (MMTS) is one reason for the growth of private vehicles. Overall, there is an attitudinal shift of people to use private vehicle rather than public transport. The number of vehicles in the past two decades (1981-91, 1991-2001) presented in *table 4.17* informs that there is phenomenal increase in the two wheelers, motorcars and three wheelers.

Table 4.17:Vehicular composition and decadal growth rate

Category	1980-81	1990-91	2000-01	Decadal growth rate (1981-91)	Decadal growth rate (1991-2001)
Motor Cycles (2 wheeler)	60669	384490	856397	534%	123%
Motor Cars & Jeeps (4 Wheelers)	10227	48537	126472	375%	161%
Autos	6926	17708	58851	156%	232%
APSRTC	621	1664	2395	168%	44%

Source: ***www.aptransport.gov.in***

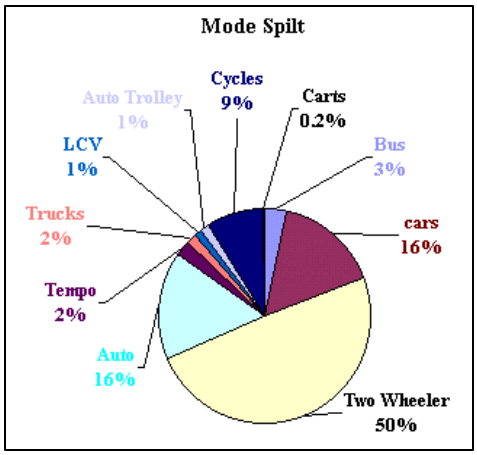
Figure 4.5.6: Vehicular Growth



While private and para transit modes have grown substantially, the growth of buses has not kept pace with the growth rate of population. This has resulted in proliferation of para transit modes such as 3 wheeled auto rickshaws with seating capacity of 3 and 7 passengers. All these vehicles are plying on a near static road length of 235 km in MCH area and about 365 km in the HUDA area resulting enormous strain on the road network and leading a situation of endless transportation gridlocks.

4.5.6 Mode Split and Modal Split

The analysis of volume counts at aggregated level gives the percentage share of each vehicle mode and the same is represented below. Nearly 44% of the rider ship is catered by Bus, while only 3.3 % is the mode share of bus. Another significant observation is that of the two wheelers, which shows that 29% of the trips hold 50% share of vehicle mode. The split share of mode and rider ship for Bus, Cars, Two wheelers, Auto, Tempo and Cycles is shown below.



4.5.7 Public Transport System

Public Transport System (PTS) in Hyderabad is primarily road-based bus transport, until the recent addition of rail-based multi-modal transit system (MMTS) train services in 2003. The current mode share of public transport in the city of Hyderabad is about 42% of the estimated 71 lakh person trips per day as against the desired 75% share (table below). APSRTC buses capture about 98.3% of all the trips made by public transport whereas MMTS serves the remaining 1.7% of commuting passengers. The total share of public transport is less than 44% against the minimum desired 80% share for Hyderabad, as per the guidelines issued by the Ministry of Urban Development, GoI in 1998 *(table 4.18)*. This is desired for effective traffic management.

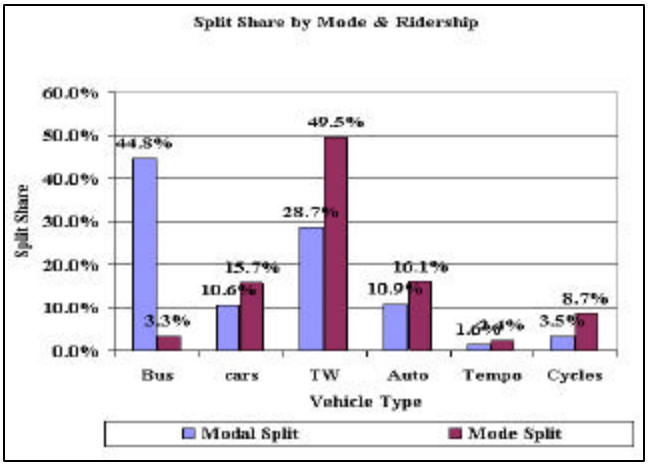


Table 4.18: Share of Public Transport

Sl.No.	City with Population in Millions	Desired Share of Public Transport (%)
1	0.5 – 1.0	25
2	Above 1.0 -2.0	30 – 40
3	2.0 – 3.0	50 - 60
4	3.0 – 5.0	60 - 70
5	5.0 plus	70 – 85

Source: "Traffic and Transportation Policies and Strategies in Urban areas in India", Ministry of Urban Development, GoI - 1998

Aware of this situation, the National Policy of Urban Transport (NUTP) recommends *"encourage and support investments in facilities that would wewan people away from the use of personal vehicles rather than build facilities that would encourage greater use of personal motor vehicles"* in order to promote sustainable development of the urban areas. The existing PTS may not be able to keep its present mode share under the current scenario unless pro-active policy changes in favour of public transport are implemented and complementing them with improved the PTS infrastructure. The NUTP document also further states that *"the Central Government would, therefore, recommend the adoption of measures that restrain the use of motor vehicles through market mechanisms such as higher fuel taxes, higher parking fee, reduced availability of parking space, longer time taken in traveling by personal vehicles vis-à-vis public transport, etc."*

4.5.7.1 Bus Transport

Currently, the city division of APSRTC has a fleet size of 2,800 buses and operates 2,669 schedules per day, making more than 36,000 trips across the city, covering 7.1 lakh vehicle kilometres each day. The buses operated are of three types - the ordinary bus, Metro-Express and the Veera luxury services, all of which have similar seating capacity and run on 'high-speed' diesel. All the buses ply on the same carriageway as that of other private vehicles and thus the level-of-service offered by the bus system is severely limited by the heavily congested road-network. This manifests in a situation where the bus system is unable to cater to the peak hour passenger demand, resulting in over-crowded buses, longer waiting times and slower speeds. While the mode split of APSRTC is around 3.5%, the modal split share caters to more than 42%.

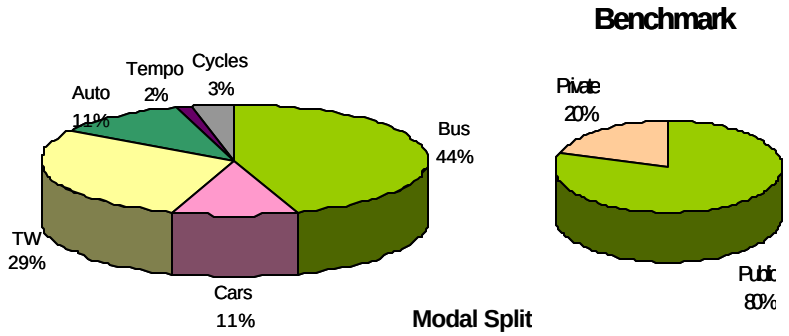


Table 4.19: Fleet and Number of passengers carried per day

Sl.No	Year	Bus Fleet	Occupancy Rate	No of passengers carried per day in millions
1	1995-96	2018	74	2.981
2	1996-97	2122	75	3.177
3	1997-98	2217	69	3.054
4	1998-99	2328	70	3.253
5	1999-2000	2425	63	3.050
6	2000-2001	2480	58	2.872
7	2001-2002	2605	59	3.068

Source: APSRTC

It can be observed that the patronage of buses has remained stable over the years while population is increasing each year. The important reason for this could be deteriorating service especially in the peak hours and a concomitant proliferation of seven seated Para transit modes providing convenient accessibility.

4.5.7.2 Para Transit

The para-transit operators, mainly in the form of auto-rickshaws (3-seater and 7-seater) have mushroomed in the recent years to capture the peak hour demand and are emerging as unhealthy competitors to the APSRTC buses. A total of 80,000 auto-rickshaws ply on the city roads and cater to an estimated 10% of the 71 lakh person trips each day. While a proper integration of para-transit can actually complement the bus system, this has not happened due to the very unorganised nature of the sector with too many independent owners of auto-rickshaws. The high degree of maneuverability of the auto rickshaws and frequent stopping on the carriageway to serve the passengers has resulted in severe problems to the free flow of road traffic in the city

4.5.7.3 Multi Modal Transport System (MMTS)

The local train operations in the city have been introduced under the banner of MMTS in a limited way as a joint venture between GoAP and Ministry of Railways (MoR) in 2003. The current network extends to about 50 kilometres with 26 stations, served by 10 rakes. Inspite of the severe demand for faster public transport modes, MMTS trains run very much below the actual carrying capacity and cater to about 35,000 passenger trips per day. This is primarily because of very low frequency of about 40 to 80 minutes between two successive trains during peak periods and lack of integration with the bus-system. MMTS system holds a huge potential to decongest the city road network and reduce pollution as well, if the operations are improved.

4.5.8 Traffic and Transport Safety

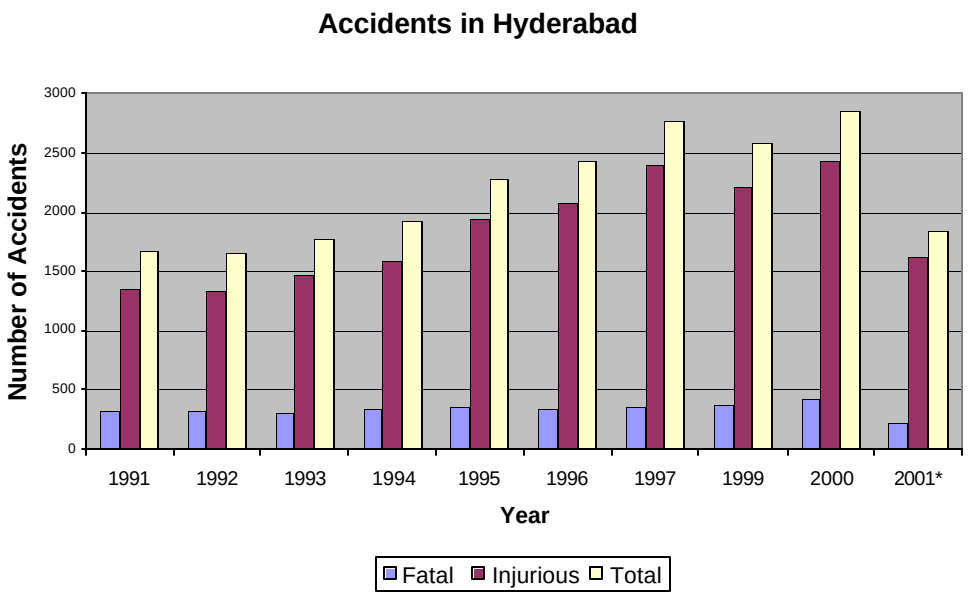
The transport safety is the important component of traffic and transportation mechanism. The table below shows the data related to road accidents during the years 1999, 2000 and 2001. About 12% of the accidents were fatal and remaining 88% were injurious. It was observed that about 40 % of the accidents occurring in the city involve pedestrians as the victims. This can be attributed to the poor pedestrian facilities in city road network. The fatal accidents involving pedestrians were observed to occur during the road crossings. It was observed that the maximum accidents occurred between 3 P.M and 5 P.M. Two wheelers / Cars were

involved in 50% of the accidents, while about 10% involves RTC buses/lorries each and about 15% involved auto rickshaws. The number of accidents that occurred in the last decade is given in *Table 4.20*.

Table 4.20: Number of Accidents within MCH during the past decade

Accident Type	1991	1992	1993	1994	1995	1996	1997	1999	2000	2001*
Fatal	330	312	310	337	347	342	357	380	425	214
	19.7%	18.9%	17.5%	17.5%	15.2%	14.1%	12.9%	14.7%	14.9%	1.6%
Injurious	1,347	1,339	1,463	1,593	1,932	2,080	2,404	2,210	2,422	1,620
	80.3%	80.3%	81.1%	82.5%	82.5%	84.8%	85.9%	85.3%	85.1%	88.4%
Total	1,677	1,651	1,773	1,930	2,279	2,422	2,761	2,590	2,847	1,834

Source: Traffic Police, Hyderabad



Key Issues and Challenges

- *Hyderabad city has experienced enormous growth in the past five years. This growth pattern is expected to continue into the future years due to the opening of an international airport, proposed FAB city, etc. that will fuel development of many international business centres in the city. The current road network and the Public Transport System (PTS) cannot handle such travel demand. Some of the key issues of transportation to address these issues are as under:*
- *Institutional Accountability*
- *Institutional mechanism and accountability is the crux of the total transportation system. There is no single agency that comprehensively facilitates the overall transportation mechanism. The present arrangement doesn't make any single institution accountable for providing qualitative and effective transport system. Formulating an integrated institutional mechanism is one of the major concerns of the sector.*
- *Declining Share of Public Transport*
- *For the efficient transport management and smooth traffic flows in the city like Hyderabad with around 7 million population, the ideal share of public transport should be minimum of 70 - 85%, as per the norms of the GoI. Utilization rate of* ***bus transport has come down from 74% (1996) to 59% (2002)****. Currently the share of public transport is around 44%, which is far below the desired. There is a huge opportunity and need to improve the share of MMTS that would eventually increase the public transport share. An integrated institutional mechanism is to be in place for the effective coordination of road and rail transport.*
- *Traffic Management System*
- *Decadal growth in vehicle population between 1991 and 2001 was 133% (Compound Annual Growth Rate - CAGR 9%) compared to 30% growth in population (CAGR 3%). The mode split of two wheelers is half of the total vehicles on the roads indicate the intensity of the traffic issue. Corresponding vehicle density is 720 vehicles/KM of road (Passenger car units per KM of road) compared to 290 (Chennai) and 240 (Mumbai), which is very high. The city lacks adequate parking as compared with the requirements and norms. On road parking that takes away the effective carriage way is the normal practice on the city roads. Sustainable solution to addressing these frequent traffic congestions coupled with parking is one of the major issues of concern.*
- *Inadequate Road Infrastructure and Safety Issues*
- *Though the number of road accidents has come down in the recent past, the number still remains high. The commuters don't feel it to be a safe transport in the city. It has bæn observed that pedestrians are victims in 40% of the accidents. This is contributed to poor and inadequate road infrastructure that has inadequate foot over bridges (FOBs), subways, footpaths, safe pedestrian crossings and inefficient traffic management.*