CHAPTER 9
DEFICITS IN NON-SOCIAL MUNICIPAL INFRASTRUCTURE PLANNING

Introduction
This chapter assesses the provision of non-social municipal infrastructure in cities and points out the deficits and probable causes of deficits. It especially highlights the planning deficits as one of the principal reasons for the kind of insufficiencies that emerge in cities.

9.1. Water
Water is the most important infrastructural requirement for a city. An ideal city would have universal coverage and water availability in sufficient quantity and quality. It would have to meet the needs of drinking, industrial, commercial and other household requirements within the overall water policy and priorities in usage that that water policy would mandate. In the Indian context, given the projected rapid rise of urban populations, this also means making adequate water available for meeting the demands of a growing number of citizens. A strategy, therefore, needs to be in place for integrating land use and water planning based on the principle of total water cycle management, along with a focus more on making sure that development does not compromise the quality of drinking water or the integrity of aquatic ecosystems. This would comprise drinking water, groundwater, storm water run-off, wastewater, waterway health and water reuse. Globally, in recent years substantial progress has been achieved in integrating urban water planning and management with land-use planning and development.

Looking at the issue on a wider scale, water resources may not be city-specific and would have to be shared with other human settlements in the region. Hence, in the context of regional urban planning, land use decisions need to take into account where the necessary water will come from, and at what cost (economic, environmental, and social). Land use decisions have to be coordinated on a large-landscape scale across jurisdictional boundaries. Land use planning would be mindful of water supply constraints, and prioritizes development that is most consistent with maintaining water quality and ensuring sustainable supplies. Such projections of water needs need to be based on more than simple population estimates. A comprehensive plan would require a hard look at the sustainability of anticipated water sources for proposed new development prior to approval. Since water is a limited resource, there would be a need to reduce overall demand and stretch existing supplies through rules and regulations that would mandate
conservation measures and incentivize these through suitable regulatory provisions. Ideally, how a State would plan water is shown in the following tabular representation:

**Chart No 9.1 Government of Western Australia, Department of Water**

9.2. Deficits in Water Planning

The following slide presents in a nutshell the status of services in regard to water and sewerage across urban settlements in India. *(India Infrastructure Report, 2010)*

**Chart No 9.2 Deficits in Water Planning**

<table>
<thead>
<tr>
<th>SERVICE</th>
<th>WATER</th>
<th>SEWERAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coverage</td>
<td>64 %</td>
<td>94 %</td>
</tr>
<tr>
<td>Duration</td>
<td>1 to 6 hrs</td>
<td>50 %</td>
</tr>
<tr>
<td>Per capita</td>
<td>37 to 298 lpcd</td>
<td>50 %</td>
</tr>
<tr>
<td>Non-revenue water</td>
<td>50 %</td>
<td>21 %</td>
</tr>
<tr>
<td>SEWERAGE</td>
<td>No network</td>
<td>94 %</td>
</tr>
<tr>
<td></td>
<td>Households covered</td>
<td>50 %</td>
</tr>
<tr>
<td></td>
<td>Waste water treated</td>
<td>21 %</td>
</tr>
<tr>
<td></td>
<td>Non-functional plants</td>
<td>46 out of 79</td>
</tr>
</tbody>
</table>
A study of regional plans in Maharashtra shows that such holistic thinking has not gone into their preparation. The Plans are usually in two parts. The first deals with surveys and data collection and some analysis of the same. The second is a set of recommendations. Regional consideration of water resource may be said to be peripheral. While it is not expected that the regional plan would delve into details of utilization within settlements, it is logically expected that questions of total water available for various uses, their proper distribution and threshold studies of how much population this water would support ought to be stated. It appears that from this point of view, a great degree of coordination among departments such as irrigation, agriculture, urban development, rural development, industries would be needed. This appears to be sadly missing.

It is quite clear that such a mechanism was the intention of the metropolitan planning committees envisaged by the Constitution. But these have not been fully translated on ground and the current mechanisms do not have adequate answers to the questions that developments in the region are raising. While the Regional Plan is prepared, that does not become a mandatory reference point for departments to follow. Industrial acquisitions, for instance, by state parastatals have put industrial zones in non-industrial zones and have not taken care to be in tune with the overall regional road network blocking arteries that then need to be reconfigured.

9.2.1 Water Conservation Planning

At the city level, it is extremely important that water conservation measures must be adequately reflected in DCRs. These would include regulations for roof top collection, storage and rainwater harvesting, recycling of waste water, use of ground water and groundwater recharge. While awareness is building to see that these aspects find place in the DCRs, these are happening too slowly. In the interim properties are coming up without adherence to these revised norms.

9.2.2 Twenty-four by Seven Water Distribution Planning

For potability, a twenty-four hour distribution system needs to be designed. However, we have shown in the previous chapter that Baramati is able to supply water for only one hour per day, Kolhapur and Nashik three hours per day and Pune five hours per day. There are other cities, especially the smaller ones that have alternate day supply of water or two to three days a week. Even in some of the cities that have been mentioned, water
supply may be far removed from the average quoted. In such a situation, water pipelines do have a tendency to suck in elements outside and contaminate drinking water. Potability of water therefore is a universal problem in Indian cities. As a consequence, no city in the country could boast of a system where water could be drunk from a tap with full guarantee that the person would not be affected by some water borne disease.

9.2.3 Road Planning and Water Planning
Since roads are immensely costly, initial designing that mandates ducts for road crossing of water lines and which would prevent destruction of roads are imperative. The DP and DCRs of the city appear to be inadequate in that laying of water pipe lines repeatedly leads to road-cutting. This is because the land use plan of the city does not indicate how the trunk pipes would be laid. The actual laying happens on one side of the road. As a consequence, properties requiring water connection on the other side of the road have to cut the road to access water lines. Since construction is a constant activity in Indian cities that are growing, and every structure constructed would be expected to seek water, road cutting activity becomes very frequent, leading to poor roads and hugely expensive and repetitive activity of road repairs and resurfacing. While it saves money initially through economies in water pipelines, it leads to enormous expenditure later as roads are the most expensive infrastructure item in a city.

Given this lack of non-integration, it would be safe to assume that the current planning practices at the regional level as well as the city level would fail to adequately answer water woes of cities and regions. Since carrying capacity studies, both at regional and city levels are firstly inadequate and secondly not factored into urban growth, these are bound to raise issues of sustainability.

Financial difficulties in the area of water also seem to be impacting the laying of pipelines and extending city water network. As a result, new city areas lack provision of water services. In Baramati only 43 per cent of households have water connections, in Kolhapur 78.6 per cent, in Nashik 43 per cent and in Pune 12.9 per cent. The pattern clearly establishes that the larger cities find it difficult to reach water services to the outer areas of the city. But irrespective of size, high systemic losses, low tariffs for water and poor collection of dues are observed across India, leading to unsustainable service delivery. Figures from the research cities confirm this. Whereas Baramati runs a deficit of 52.52 per cent, Kolhapur has a deficit of 37.72 per cent, Nashik 22.14 per cent and Pune 14.40 per cent.
9.3. Sewerage and Sanitation

9.3.1 Sanitation Planning Deficits
We have shown in the earlier chapter that public sanitation is not integrated in the Plan that is prepared for the cities. It is an essential item that needs to be comprehensively taken care of at the detailed planning and infrastructure engineering process. About one-fifth of urban houses have no toilet facilities. A very large number of urbanites depend on public toilet facilities and open defecation is rampant. Lack of water for toilets is compounded by no connection to the sewerage system. Serious health issues have been the result.

9.3.2 Sewerage Planning Deficits
Among the huge deficits that cities suffer from, sewerage is one of the largest. This is more on account of the high costs of treatment and very low recovery. It is clear that if cities struggle to receive water dues, recovery of sewerage dues is even more difficult. And in this situation, providing sewerage services is a far thought in the minds of urban local bodies.

The consequence is that most cities in the country have no sewerage network and many households do not have sewerage connections. Most sewage treatment plants are non-functional. In Baramati no property had sewer connections. In Kolhapur the percentage was 24 and in Nashik 88. In Pune, part sewerage cover that the Municipal Corporation provides, functions intermittently, the city is infamous for dumping its sewage into rivers and streams, thereby compromising the drinking water of human settlements downstream. Since densities of cities are increasing, the problem of sewerage is getting worse. The growing concern is best reflected by health figures. As shown in the previous chapter, of the 423 cities surveyed by Government of India, no city satisfied the norms of healthy and clean and 190 cities were found to be in a state of emergency.

9.3.3 Recycling Planning

In times when water shortages are going to be increasingly felt and hence recycling water is essential, most cities in the country do not recycle water. Neither do the planning norms of the cities mandate this. Of late, the Ministry of Environment, Government of India is making this compulsory in its environment clearance for all large projects that area taking off. However, it is doubtful that even if the planning norms were provided for and written into rules, city finances would permit the mandatory provision of sewerage networks.
The situation in regard to toilets was also very poor. In Baramati, only 74 per cent properties had toilets, in Pune 81 per cent, Nashik 81 per cent and Kolhapur 89 per cent. The rest depended on community toilets. The urban sanitation situation quite clearly is not healthy.

9.4. Solid Waste

The following slide presents in a nutshell the status of services in regard to solid waste across urban settlements in India.

**Chart No. 9.3 Solid Waste Management status of services**

<table>
<thead>
<tr>
<th>SERVICE</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOLID WASTE</td>
<td></td>
</tr>
<tr>
<td>Primary collection</td>
<td>30 to 99%</td>
</tr>
<tr>
<td>Segregation</td>
<td>33%</td>
</tr>
<tr>
<td>Transportation</td>
<td>32%</td>
</tr>
<tr>
<td>Scientific disposal</td>
<td>1%</td>
</tr>
</tbody>
</table>

*India Infrastructure Report, 2010*

Since the MSW Rules 2000 mandated by the Supreme Court, solid waste management has been at the top of the agenda of urban local bodies. However, despite the Rules, and despite the priority accorded to them, their enforcement has been poor. Waste collection itself is still struggling, segregation is still a far cry, transportation has a question mark and scientific disposal is almost completely absent.

In research cities, the previous chapter (Table 6.1) shows that none of the cities are able to do 100 per cent collection and transportation at the household level or for commercial establishments. In this context, the thesis presents some aspects of two western cities and its planning in regard to solid waste.

9.4.1 Global Examples of Waste Planning

In the city of Ottawa their plan (2001-2013) contains the zoning by-law that restricts the location of Solid Waste Disposal facilities to specific sites. Land within 500m of an operating or non-operating solid waste disposal site boundary is considered to be the
influence area of the site. However, where the City or the owner of the site, has determined through an Environmental Assessment, hydro-geological analysis or similar study that significant ground, surface or air-borne impacts occur at a distance greater than 500m the greater distance will establish the influence area.

Similarly, the comprehensive zoning regulations for Baltimore City provide for the citing and operation of a broad range of solid waste management facilities, including incinerators, landfills, recycling collection stations, materials recovery facilities, and other types of facilities. Generally, these solid waste facilities are confined to industrial and commercial districts, to ensure compatibility with other allowed uses. Commercial or municipal incinerators are conditionally allowed only in (heavy industrial) district. Sanitary landfills accepting mixed refuse as well as other waste are exempt from zoning regulations if they are to be operated by the City, and if they are established through a City ordinance. Otherwise, such landfills are not allowed anywhere within the limits of Baltimore City. Landfills not accepting mixed refuse are conditionally allowed in the M-2 (general industrial) and M-3 (heavy industrial) districts.

Solid waste acceptance facilities of any kind are not allowed to be sited within the City’s Critical Area, which is the environmental overlay zone in Maryland, 1,000 feet wide measured from the mean high tide around the Chesapeake Bay and its tributaries. The affected tributaries in Baltimore City include the Patapsco River, Gwynns Falls, Jones Falls and Colgate Creek. The siting of recycling facilities is also prohibited within the Critical Area. To facilitate recycling, small collection stations are conditionally allowed throughout the City, and larger processing centers are conditionally allowed in industrial areas. These uses were specifically defined and provided for in the 1989 zoning regulations. Materials recovery facilities, where recycling materials except ferrous metals can be mechanically processed and packaged for resale, are conditionally allowed in the M-2 (general industrial) district and the M-3 (heavy industrial) district with Board approval, and in the B-3 (community commercial) district with enactment of a City ordinance.

When located in the B-3 district, the recycling materials must be stored as well as processed indoors. Dismantling, processing and storing of scrap metal and discarded automobiles are conditionally allowed (with Board approval) in the M-3 (heavy industrial) district. These uses tend to require extensive outdoor storage of large items and include ferrous metal, and are therefore distinguished from materials recovery facilities. The City's comprehensive zoning regulations also accommodate facilities for managing
certain special categories of solid waste. Handling of radioactive waste is conditionally
allowed (with Board approval) in the M-2 (general industrial) and M-3 (heavy industrial)
districts. Handling and storage of hazardous materials as defined in Title 7 of the
Environment Article Annotated Code of Maryland are conditionally allowed (with
enactment of a City ordinance) in the M-3 (heavy industrial) district. Composting of
sewage sludge or yard wastes is provided for in the zoning laws by treating it as an
additional industrial use.

9.4.2 Solid Waste Planning Deficits

It is quite clear that the planning process in our country is oblivious to the needs of solid
waste management. The Indian situation is well summed up by the following paragraph:
“Solid waste management is a key function and a daily activity of all cities and of every
household and yet, this activity is not integrated either in the Development Plans or the
Development Control Rules of the cities. Nor is it planned at the household level and
within campuses and housing societies, leading to piling up of garbage on streets and in
public places. Surely, by no stretch of the imagination, can garbage be a matter of proud
public display! Similarly, long distance transportation of solid waste is increasingly
becoming a feature of large towns, because growing cities have failed to earmark land for
multi-nodal collection to make garbage clearance cheaper, faster and more hygienic.
Many more urban activities are conspicuous by their absence in the Development Plan.
As cities grow and services and technologies emerge, plans need to be flexible enough to
embrace them. Tragically, such pragmatic dynamism continues to elude Indian urban
planning.” (Siddiqui and Jha, 2000).

9.5. Urban Transport
The following slide presents in a nutshell the status of services in regard to urban
transport across urban settlements in India.
Transport may be defined as the movement of people and goods from one place to another. In its widest form, it comprises air service, rail and bus service, ferry service through water, taxi service and personalized travel by cars or any other kind. All such transport services that are not personalized fall into the realm of public transport. Services that are personalized move into the territory of private transport.

Urban transport may be treated under five heads. The first is the realm of an overall plan in regard to questions of transport. The second is the area of strategy in regard to implementation of the plan and various transport modes. Thirdly, the modal strategy needs to be backed by appropriate and sufficient infrastructure. Hence an infrastructure plan is essential. Fourthly, instruments have to be identified to locate resources to fund that infrastructure in a time frame. Lastly, a regulatory mechanism (laws, rules etc.) for regulation, operation and coordination must be put in place.

In Indian cities, transport is more or less synonymous with roads. Some of the mega cities have some rail-based transport services. Mumbai, Chennai and Kolkata witness the operation of suburban trains. These have been either joined or are being joined by the Metro, and several other cities such as Mumbai, Bangalore and Hyderabad that have
begun walking the path of greater engagement with the rail-based mode. Delhi has taken
great leaps in operationalizing a world class metro and is further expanding its reach
through subsequent phases.

9.5.1 Vehicular Growth

An area of major concern has been the phenomenal growth of motor vehicles. In larger
cities they have been rising four times as fast as population. In the six largest cities, while
their demographic profile rose by a factor of 1.8 between 1981 and 2001, their automobile
numbers rose over seven times in the same period. The two-wheeler segment largely
fueled this rise. The growth in vehicles was not matched by the equal addition of road
space. This rose only 1.34 times between 1971 and 2002. Intense clogging, soaring
pollution, an unacceptably high rate of road crashes and fearsome levels of noise have
been the concomitants.

These results have essentially come out of a misplaced emphasis on a plan for moving
vehicles rather than a plan for moving people. This has led to a neglect of public
transport. “For example, in Delhi, while the number of personal vehicles per 1000
population has expanded about 3 times (between 1981 and 2001), the number of buses
per 1000 population has increases only 2.3 times”. A more glaring neglect of public
transport is shown by the state of bus transport. A perusal of Table 2 below would show
that the share of buses in the total motor vehicle fleet was 11 per cent in 1951, it came
down to only 1.1 per cent in 2001.

9.5.2 Urban Poor and Transport Planning

For the urban poor, the cited transforming scenario is fraught with grave consequences.
The cost of traveling for them in search of livelihood opportunities within the city centre
is rising and the time spent on traveling is climbing as the poor get pushed out on the
periphery of cities and in the peri-urban areas. The cheaper modes of non-motorized
transport such as walking and cycling have become hugely perilous. Further, on account
of air pollution caused by automobile emissions, the poor suffer maximum exposure and
this severely impacts their health. Above all, they are subject to a maximum of crashes
on roads. These have risen sharply from 1.6 lakh in 1981 to over 3.9 lakh in 2001 and the
number of persons killed going up from 24,800 to over 80,000 during the same period. It
is quite evident that “the more we try to add infrastructure that merely aids private motor
transport, the more anti-poor the city becomes”.

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The driving philosophy behind a city’s transport policy must be to maximize mobility of the largest number of people in the shortest possible time in order to achieve the largest economic efficiency and the minimum adverse environmental impact. This is only possible if there is ‘optimum people utilization’ of all space available for mobility. This quite clearly points towards an efficient public transport system as the focal point of transport decisions.

The disastrous consequences of pushing vehicles instead of people are there for all to see. While ownership of a personal vehicle is the dream of an average middle class Indian and while current policies do not restrict the proliferation of such ownership, it is obvious that the allocation of more and more mobility space to private transport is against the overall interest of any city. A policy that prioritizes in favour of the public transport system is the call of the hour.

Public Transport System is an efficient user of space and energy, with reduced level of air and noise pollution. As the population of the city grows, the share of road or rail-based public transport should increase.

A more innovative concept in transport has been the bus rapid transit system. The benefits of a high capacity bus transit are substantial. Firstly, a BRTS forces the reallocation of road space in favour of public transport. There is hence improved road space utilization. Since the growth of the formal sector is accompanied by the growth of the informal sector, and the latter logging higher growth rates comprising low income households, a bus rapid system becomes essential to address the needs of large numbers of commuters from this sector. For a large mass of people, there is reduction in travel time and anxiety with clear economic benefits of having provided faster mobility to a large number of people. The city also gains through lower fuel consumption and cleaner air.

This BRTS improves the efficiency of bus traffic, the flow of cars, motorized two-wheelers and the safety for all commuters. Improvements in bus technology allow very comfortable, air conditioners and more efficient buses. What is more striking is that this is a system that could fit the pockets of many cities as its costs are 1/50th the cost of a metro.

Since the process of urbanization is closely linked to the creation of demand for transport, it would be wise if an integrated human settlement management approach could provide the needed framework for urban transport policy planning. This is because the demand
for transport and the ways in which it can be met depend, to a large extent, on how human settlements are managed.

Transport “is not a stand-alone component of urban infrastructure. It cannot be planned in splendid isolation, and needs a complete systemic integration into the overall city plan. In fact it needs even wider integration, because these systems cannot be cut off at merely city levels but need to take into account the entirety of the transport and communication networks that impact on the city and networks that the city impacts”. It has been seen in Indian cities that one of the primary areas in which cities are unable to respond is on the front of transport provision. This is because the road and other transport networks have not been integrated with the land use plan. This makes it extremely difficult at later stages to set right as developments overtake planning and virgin areas are not left to lay out roads and transportation networks.

Table 9.1: Total Number of Motor Vehicles In India (1951-2004) (In Thousands)

<table>
<thead>
<tr>
<th>Year (As on 31st March)</th>
<th>All Vehicles</th>
<th>Two Wheelers</th>
<th>Cars, Jeeps and Taxis</th>
<th>Buses</th>
<th>Goods Vehicles</th>
<th>Others*</th>
</tr>
</thead>
<tbody>
<tr>
<td>1951</td>
<td>306</td>
<td>27</td>
<td>159</td>
<td>34</td>
<td>82</td>
<td>4</td>
</tr>
<tr>
<td>1956</td>
<td>426</td>
<td>41</td>
<td>203</td>
<td>47</td>
<td>119</td>
<td>16</td>
</tr>
<tr>
<td>1961</td>
<td>665</td>
<td>88</td>
<td>310</td>
<td>57</td>
<td>168</td>
<td>42</td>
</tr>
<tr>
<td>1966</td>
<td>1099</td>
<td>226</td>
<td>456</td>
<td>73</td>
<td>259</td>
<td>85</td>
</tr>
<tr>
<td>1971</td>
<td>1865</td>
<td>576</td>
<td>682</td>
<td>94</td>
<td>343</td>
<td>170</td>
</tr>
<tr>
<td>1976</td>
<td>2700</td>
<td>1057</td>
<td>779</td>
<td>115</td>
<td>351</td>
<td>398</td>
</tr>
<tr>
<td>1981</td>
<td>5391</td>
<td>2618</td>
<td>1160</td>
<td>162</td>
<td>554</td>
<td>897</td>
</tr>
<tr>
<td>1986</td>
<td>10577</td>
<td>6245</td>
<td>1780</td>
<td>227</td>
<td>863</td>
<td>1462</td>
</tr>
<tr>
<td>1991</td>
<td>21374</td>
<td>14200</td>
<td>2954</td>
<td>331</td>
<td>1356</td>
<td>2533</td>
</tr>
<tr>
<td>1996</td>
<td>33786</td>
<td>23252</td>
<td>4204</td>
<td>449</td>
<td>2031</td>
<td>3850</td>
</tr>
<tr>
<td>1997</td>
<td>37332</td>
<td>25729</td>
<td>4672</td>
<td>484</td>
<td>2343</td>
<td>4101</td>
</tr>
<tr>
<td>1998</td>
<td>41368</td>
<td>28642</td>
<td>5138</td>
<td>538@</td>
<td>2536</td>
<td>4514</td>
</tr>
<tr>
<td>1999</td>
<td>44875</td>
<td>31328</td>
<td>5556</td>
<td>540@</td>
<td>2554</td>
<td>4897</td>
</tr>
<tr>
<td>2000</td>
<td>48857</td>
<td>34118</td>
<td>6143</td>
<td>562@</td>
<td>2715</td>
<td>5319</td>
</tr>
<tr>
<td>2001</td>
<td>54991</td>
<td>38556</td>
<td>7058</td>
<td>634@</td>
<td>2948</td>
<td>5795</td>
</tr>
<tr>
<td>2002</td>
<td>58924</td>
<td>41581</td>
<td>7613</td>
<td>635@</td>
<td>2974</td>
<td>6121</td>
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<tr>
<td>2003®</td>
<td>67007</td>
<td>47519</td>
<td>8599</td>
<td>721@</td>
<td>3492</td>
<td>6676</td>
</tr>
<tr>
<td>2004 (P)</td>
<td>72718</td>
<td>51922</td>
<td>9451</td>
<td>768@</td>
<td>3749</td>
<td>6828</td>
</tr>
</tbody>
</table>

* Others include tractors, trailers, three wheelers (passenger vehicles) and other miscellaneous vehicles which are not separately classified
@ : Includes omni buses  (P) : Provisional  ® : Revised

Source: Motor Transport Statistics of India, 2001-2002, Ministry of Shipping, Road, Transport & Highways, Government of India
Graph No. 9.1: Total Number of Motor Vehicles In India (1951-2004)
Graph No.9.2: Total Number of Two Wheelers

Graph No.9.3: Total Number of Cars, Jeeps and Taxis
Table 9.2: Share of Buses In Total Motor Vehicles In India

<table>
<thead>
<tr>
<th>Year</th>
<th>Total registered vehicles ('000)</th>
<th>Registered Buses ('000)</th>
<th>Share of buses to total (per cent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1951</td>
<td>306</td>
<td>34</td>
<td>11</td>
</tr>
<tr>
<td>1961</td>
<td>665</td>
<td>57</td>
<td>9</td>
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<tr>
<td>1971</td>
<td>1865</td>
<td>94</td>
<td>5</td>
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<tr>
<td>1981</td>
<td>5391</td>
<td>162</td>
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</tr>
<tr>
<td>1991</td>
<td>21,374</td>
<td>331</td>
<td>2</td>
</tr>
<tr>
<td>1996</td>
<td>33,786</td>
<td>449</td>
<td>1.3</td>
</tr>
<tr>
<td>1997</td>
<td>37,332</td>
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</tr>
<tr>
<td>1998</td>
<td>41,368</td>
<td>538</td>
<td>1.3</td>
</tr>
<tr>
<td>1999</td>
<td>44,875</td>
<td>540</td>
<td>1.2</td>
</tr>
<tr>
<td>2000</td>
<td>48,857</td>
<td>562</td>
<td>1.1</td>
</tr>
<tr>
<td>2001</td>
<td>54,991</td>
<td>634</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Source: Motor Transport Statistics of India, 2001-2002, Ministry of Shipping, Road, Transport & Highways, Government of India
9.6. City Roads
The following slide presents in a nutshell the status of services in regard to roads and storm water drainage across urban settlements in India.

Chart No. 9.5 City Roads status of services

<table>
<thead>
<tr>
<th>STATUS OF SERVICES</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROADS</td>
</tr>
<tr>
<td>Vehicle pop increase</td>
</tr>
<tr>
<td>Road network increase</td>
</tr>
<tr>
<td>Area as % of city area</td>
</tr>
<tr>
<td>SWD</td>
</tr>
<tr>
<td>Roads covered</td>
</tr>
</tbody>
</table>

*India Infrastructure Report, 2000*

With an increasing population and increasing number of motor vehicles, cities need adequate and well designed roads to allow smooth transit of people from homes to offices, homes to schools, to health facilities, to markets, hotels, recreation centres and to other cities.

9.6.1 Road Planning Deficits

However, road planning in Indian cities, from actual experience, appears to be in very poor shape. Roads are not able to take vehicular road, leading to frequent jams and more and more time consumed in travelling. Their quality is poor and there is constant digging. As a consequence, smooth road surfaces appear to be a rarity. Constant digging makes road repairs a continuous feature affecting smooth flow of traffic. Footpaths are also constantly in a state of disarray, with frequent breaks and the need to mount and dismount stretches of footpath, making it very difficult for the elderly to use them. Storm water
Drainage is a highly neglected item. Most roads in cities do not have storm water drains and the ones created are frequently choked rendering them ineffectual.

These problems lead us to conclude that these are largely on account of deficits in the planning of roads and delineation of roads in the land use plan. In view of the growing urbanization, adequate road space should be provided for in the land use plan. Road space as a total percentage of city area currently stands between 6 to 18 per cent. Quite clearly, the ones closer to 6 per cent are going to continue to struggle. The ones with 15 to 18 per cent are the cities that can be said to have adequate road space. Additionally, the hierarchy of roads and their interconnectivity also need to be properly established.

The reasons that lead road digging need to be avoided through the provision of ducts at intervals to allow for crossing of services. While this may look expensive to begin with, they lead to enormous savings in the long run and improved road surfaces, reduced repair work and more pleasurable rides on roads. Footpath design standards need to change so that there is minimum disturbance to pedestrians of all ages in negotiating stretches of footpath despite breaks in them to allow properties access to roads. Such designs are established in global cities and we could borrow a leaf from them.

Storm water drains are absolutely essential to drain water away from the roads so that their surfaces are not eroded. This is again an additional expenditure, but they protect the road and provide them longevity. In the long run, they save money and allow roads to provide smooth service.

Unfortunately, these are not adequately written into the rule books and therefore leave works haphazardly done. These deficits in the plan process need to be plugged. In their absence, cities will continue to have sub-standard non-social municipal infrastructure.

**Summary**

Indian cities appear weak in integrating land use and water planning on the principle of total water cycle management. Gaps also exist in inter-departmental coordination, in recycling and rain water harvesting. The sewerage deficits are very large and SWM Rules 2000 are only partially implemented. Cities are still struggling with collection, segregation and disposal. Non-motorized transport has been pushed out of cities and public transport has been sadly neglected.
REFERENCES

- Government of Australia, Department of Water
- India Infrastructure Report, 2000
- Ottawa City plan (2001-2013)
- Towards People Friendly Cities, Siddiqui and Jha, UNICEF, pg 226-227