URBAN GROWTH STRATEGIES

Mumbai Lessons

PRAKASH MADHUSUDAN APTE

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The phenomenal urban development in India is unfortunately not being well directed. This is mainly due to the rise in land prices and the huge profits that can be made by trading in land. The greed for land and profits, has not spared the defacement, dismantling and disfigurement of even a well-planned capital city like Gandhinagar, by 'town planners'. ~~pseudo~~ consultants, dishonest politicians and bureaucrats, have waylaid rational urban development.

Indiscriminate conversion of lands meant for public open spaces and civic amenities and gifting these to private enterprise and 'trusts', for profiteering, has undermined citizen welfare. The willful undertaking of unnecessary high-cost projects for the commissions they generate, while rejecting low-cost solutions, is rampant. Ironically, the average citizen is being sold the false concept that the glamour of cities like Shanghai or Singapore is, and should be, the end goal of urban development. Such propaganda makes it easier to undertake profit-generating megaprojects that are largely inconsequential to, and disconnected from, the urban civic needs of the average Indian citizen. Furthermore, it has enabled corrupt decision-makers to conveniently turn a blind eye to low-cost, optimal solutions for urban growth.

Fortunately for India, there are still many public spirited individuals and voluntary organizations that are fighting these battles.

I dedicate this book to all such individuals and organizations.

ABOUT THE AUTHOR

Prakash Madhusudan Apte, born in 1939, graduated in Architecture from M.S. University, Baroda, and completed the Masters Programme in Regional Planning in 1961, from IIT Kharagpur. He went on to study Urban Design at Naples University, Italy and also obtained a Diploma in Business Management from Bharatiya Vidya Bhavan, New Delhi. He is a Fellow of the Institute of Town Planners, India, as well as the Indian Institute of Architects.

Prakash had worked with Chandigarh Capital Project, Delhi Development Authority; and the Asansol Planning Organization. He designed the new capital of Gujarat, Gandhinagar. As Chief of Projects of Housing & Urban Development Corporation of India (HUDCO), he formulated its policies and executed housing projects. As a Senior Adviser to the Royal Government of Bhutan in 2003, he prepared a Shelter Strategy for the Capital, Thimphu. For the last 12 years he has been on the staff of the World Bank as a Consultant for the Mumbai Urban Transport Project II and the Emergency Tsunami Rehabilitation Project for Tamil Nadu.

He has been a Member of the Bombay Development Plan Advisory Committee, Maharashtra Housing & Area Development Authority (MHADA); the Housing Urban Renewal & Ecology (HURE) Board of the Bombay Metropolitan Region Development Authority: the Development Plan Committee for the Vasai-Virar Region; and Governor of the Delhi School of Planning & Architecture. He has chaired and addressed national and international seminars and served as Vice-President of the Institute of Town Planners, India.

He was invited as the Eisenhower Fellow from India in the field of Urban Management, by the Eisenhower Exchange Fellowships Inc USA. Prakash Apte can be reached at: apteyconsult@hotmail.com.

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PREFACE

For a few years, I taught at schools of Architecture. Given my seniority and experience, I was assigned to teach Architectural Design to the senior students. I declined, preferring to instruct beginners, since I believed that budding architects should be firmly grounded in the basic concepts of architecture. Starting with the exercise to design a house, I attempted to imbibe in them the perception that 'a house is not to be looked at; it is to be lived in'. If the occupants do not find a house comfortable, functional and safe to live in, its external appearance, however attractive to onlookers, is of little relevence.

I hold the same view about cities. Cities are for their citizens to work in conveniently, have a good place to live in, enjoy its offerings leisurely, and feel an affinity for its ethos. What really matters is that a city is 'livable' without burdening citizens with taxes and inconveniences; it is not important for a city to be glamorous or to look like any other metropolis. Take Mumbai for example. Given the present economic circumstances and fiscal constraints, the Maharashtra government (deep in debt, which it cannot service without getting deeper into debt), needs to concentrate on making Mumbai livable rather than making it look like Shanghai or Singapore.

Mumbai cannot become an international city by constructing the longest sea bridge or an elevated monorail or a plethora of sky walks and flyovers or tall skyscrapers. It can become a livable city if its citizens have access to a safe and rapid public transport system at low cost; encroachment-free roads to drive on and pavements to walk on; affordable and small, yet convenient houses to live in, and cleaner environment and sanitation facilities – in short, a livable city at optimal cost and not a glamorous city at astronomical cost.

This thought pervaded my mind during all the years in which I became acquainted with Mumbai, first as a visitor, and later as a professional, working with many of its institutions. My association with the city now spans half a century.

'Funny' Mumbai

My first visit to Mumbai, in 1947, was to see off my father, who was leaving for London. A year later, the family was in Mumbai again, to receive him. I remember staying at a relative's *kholi* (room), in a *chawl* (one-room apartment block), in Shivaji Park, and witnessing communal violence and police firing. My next visit to Mumbai was for three days, while I was still a school student in Baroda, sometime in 1953, staying with an uncle in Hindu Colony. Trams were in operation then and the ringing of the Mumbai tram bells is a sound that I have never forgotten. I also remember seeing the Cary Grant movie, *Monkey Business*, at the Aurora Cinema near King's Circle. The 'youth potion' that the hero of the film invents, is what is perhaps being administered now to Mumbai by enthusiastic politicians and the MMRDA. But it only serves to make Mumbai 'funny', like Cary Grant in the movie.

Visiting Mumbai again in 1961, after completing my post-graduation from IIT Kharagpur, I stayed for a few days in Shivaji Park. Thereafter, I took every opportunity to be in the city and remember visiting most of its tourist spots and beaches, before going abroad in 1963. Moving about in Mumbai then was still easy. The footpaths, though encroached upon, were available to pedestrians. The Shivaji Park area in the afternoons was calm and quiet. There was hardly a soul at Chowpatty (seashore), in the afternoons. In the evenings, one could see the ocean and people dotted on the beach – unlike today, when one has to make an effort to view the ocean through the gaps in the milling crowds on the beach!

After my marriage in 1965, I joined the Gujarat New Capital project. For six years, I had the most satisfying tenure, designing Gandhinagar, the new capital city. The challenging task over, I did not wish to get into routine work and left Gujarat to join the newly constituted Housing and Urban Development Corporation of India (HUDCO), as

its Chief Architect-Town Planner, under the Chairmanship of Keshub Mahindra and Managing Director, Vinod Parekh – both executives from the private sector. It was a totally different culture, discipline and work ethic – which I gradually imbibed. It helped me to evolve and put in place at HUDCO, a system that was flexible and responsive to the prevalent socio-economic conditions and in developing new technologies to deliver low-cost houses to the less advantaged millions in this country. Required to interact with all the State housing agencies and Municipal and Planning authorities, I acquired an overview of the urban development scenario in most states and the problems of cities. Maharashtra being a leading borrower of HUDCO, I frequently visited the state and Mumbai in particular.

After J.B. D'Souza, an IAS officer, joined HUDCO as its Managing Director, he reoriented its policies to be entirely pro-poor and disciplined the housing boards of different states to that end. Fortunately for me, being a man of great integrity and honesty, he admired and encouraged those qualities in his officers. I was soon his right hand in his crusade to build houses at costs affordable to the poor of this country. It may seem like a fairy tale, but it was at his urging that I designed and executed a housing project in Agra wherein a house on a 25 sq. mt. plot was built for INR 8000. This was the maximum cost HUDCO had prescribed for the houses for Economically Weaker Sections (EWS), whose household yearly income did not exceed INR 6000. Many public housing authorities in the state called the limit of INR 8000 'absurd' and 'nonsense'. But he wanted me (as chief architect), to demonstrate and prove it was possible, which I did, and he ever praised me for it.

Getting to Know Mumbai

In January 1975, MMRDA was created under a State Act. At the time, it was called the Bombay Metropolitan Region Development Authority (BMRDA), and had three functional boards, one of which was the board for Housing, Urban Renewal & Ecology (HURE). I was appointed a member of the board and Charles Correa its Chairman. I can thus claim to be the earliest 'planner' in MMRDA. There were monthly board meetings and I would fly in from Delhi to attend. I continued to be a member till the boards were abolished, sometime around 1979. We discussed the major problems of the city and often interacted with the Secretaries of the other two boards dealing with transportation and water supply. We also undertook field visits to many parts of the city.

As a result, I acquired first-hand knowledge of the city and its problems. Officers of the planning wing of MMRDA, attended the meetings and were most helpful, being deeply knowledgeable about the city. Vidyadhar Phatak, Kashinath Diwadkar and Suresh Pendharkar, all deserve special mention here. Their integrity, honesty and keen desire to make Mumbai a livable city, created a healthy professional bond between us that has endured through the years. After each of them retired from MMRDA, it was difficult to find equally competent and honest replacements. Probably as a result, MMRDA drifted towards the appointment of consultants for almost every issue faced by the city, which had earlier been tackled by members of the HURE board and the highly competent officers we had then. Currently, appointing consultants has become almost a mania with MMRDA – to the extent that the MMRDA officers now seem to function as support staff for the consultants.

Many of the projects that MMRDA initiated in those days, were not followed up later, due to the appointment of consultants. To protect their own interests, the consultants could hardly admit that the approaches already outlined by the boards (made up of government officials), were in fact, right for solutions to most of the problems. Thus, the boards' suggestions for improvements in the housing, transportation and services sectors, were shelved under the guise of making fresh assessments of the problems, to which end the appointment of consultants was recommended and finally approved by MMRDA.

During the time I was a member of the HURE board, we had extremely competent officers, mostly chief engineers of the state PWD, as Secretaries. The last was N.V. Merani, who did an excellent job with his studious approach and wealth of knowledge about the city. N.V. Merani greatly appreciated my initiatives and has remained a valued friend. He retired as Principal Secretary to the State Government but is still active as an Adviser to the Municipal

Corporation. Had his sagacious advice been acted upon, Mumbai might have been saved many of the severe problems afflicting it today, including bad roads and potholes.

During the period 1977 to 1979, I was appointed a Member of the Maharashtra Housing and Area Development Authority (MHADA), and so acquired in-depth information and knowledge about the urban development scenario in most of the towns in Maharashtra. During these meetings, I found that I was in fact more knowledgeable about the housing situation in Mumbai than many of the other members, because of my work in HUDCO. Maharashtra still had only a single housing board then. The Bombay building repairs and reconstruction board also constructed many projects of low income housing in Mumbai at the time.

In 1977, before constituting MHADA, the then Secretary to the State Government, S.S. Tinaikar, consulted me on the constitution of a unified state housing authority. Later on, during his tenure as Vice-President of MHADA, we had a very fruitful association. I remember him showing me a map of Mumbai and pinpointing lands available for public housing. According to him, over 3000 hectares of public land at various locations was available then, but could not be acquired by MHADA due to disinterest or vested interest, by the state government. He was a forthright, honest and enthusiastic officer and remained a good friend till his death.

Before J.B. D'Souza left HUDCO to join the Maharashtra Government as Chief Secretary, he created two senior positions – Chief Finance and Chief Projects. My erstwhile colleague, K.K. Sachdev, was appointed Chief Finance and I was designated Chief Projects. I had seven senior managers; four dealing with project approvals in the four regions of the country; one handling construction of model/demonstration projects; one addressing propagation of new technologies (this was V. Suresh, who later went on to become Managing Director of HUDCO, till he was summarily asked to resign by the Board of Directors); and one dealing with design and research.

After spending a year in Maharashtra, J.B. D'Souza returned as Secretary to the Government of India in the Housing and Urban Development Ministry. The then Hindustan Housing Factory, a loss-making venture under the central government, was under his jurisdiction, and he appointed my colleague, K.K. Sachdev, as its Managing Director. He was also instrumental in appointing H.U. Bijlani (then Chief Engineer in the much-maligned and corruption-ridden Delhi Municipal Corporation, on leave doing research at the Indian Institute of Public Administration, Delhi), as Chairman and Managing Director of HUDCO. Mr. Bijlani was very close to the then Minister, Sikandar Bakht, in charge of housing & urban development. Mr. D'Souza thus hoped to facilitate communication with the Ministry of Housing as he thought that the unpopular policies of HUDCO in prescribing what the housing boards called 'absurd' and nonsensical' cost limits on housing for the poor, could only be sustained through political support.

HUDCO Experience

Much later, after I left HUDCO to take up a job in the private sector, I happened to meet the Chairman of the Bangalore Development Authority, and he told me that there had been open talk at the time in HUDCO, about getting rid of D'Souza's men (Sachdev and Apte).

Whatever the reasons, one morning, the officers in HUDCO were shocked to learn that K.K. Sachdev had been suspended as Chief Finance, HUDCO, on charges of corruption. His deputy, was given charge. The Chief Vigilance Commissioner of the Government of India investigated the charges. The investigation went on for over four years. During that period, K.K. Sachdev's young son was struck down by a heavy vehicle and suffered multiple wounds. He was hospitalized for over a year and later put into a wheelchair. Sachdev's daughter was accosted frequently and he was forced to employ a bodyguard for her.

The courts cleared Sachdev of all the charges and HUDCO was ordered to reinstate him in his previous post. But on his return to the HUDCO office, (then located in the Jamnagar house barracks), he was told there was no cabin available to seat him. For days he went to the office on time and sat on a wooden stool outside any officer's cabin. He approached a court of law and the legal battle dragged

on. He finally quit in disgust and took up a job with an NGO. The first of D'Souza's men had indeed gone.

The Last Straw

It was clear to me that my days as Chief Projects, were numbered. Anonymous telephone calls were made to my wife saying, "*Bhabiji aj apke bacchhe schoolse ghar nahi ayenge*" (Madam, your sons will not return home from school today). We lived at Bengali Market and both my sons were schooling at Bharatiya Vidya Bhavan on Curzon Road. I would normally give them a lift on my way home for lunch. But I was often delayed due to work at the office and they would wait under a tree outside the school compound or just walk home. As the frequency of the threatening telephone messages grew and the tone became more menacing, my wife became panicky. Though the morning school session ended only at 1 pm, she would walk to the school in the blazing sun, reaching there much before closing time to ensure the children were safe.

The atmosphere at home became very tense, though my sons were fortunately unaware of it. On Saturdays, when the boys' school ended early, my wife, after fetching them home, would lock the apartment from outside and then go for her vocal music classes. She is an accomplished musician and disciple of the famed Vasant Thakar, who was a teacher at the Gandharva Mahavidyalaya, just across the railway line. From our house one could walk across in about 10 minutes. If one did not take this route, the road was circuitous, requiring a 30 minute journey by autorikshaw. She would go for her classes at 11 am and return at 12.30 pm by the same route.

One Saturday, while returning from her music class, she sensed being followed by some ruffians. As she was about to cross the railway line, two of the four ruffians caught hold of her from the rear. She shouted and tried to break free. At that time of the day, there was not a soul in sight. Two more ruffians arrived and began to pull her down the embankment of the raised railway line. Her clothes were torn and sari unwound. She continued to shout and cry out. Fortunately, some labourers in a makeshift tent nearby, heard her shouts and came to her rescue, armed with their work tools. The ruffians, sensing danger, ran away, shouting abuses at my wife. By that time, a gentleman from the nearby railway residential quarters had come running out. Looking at the condition of my wife, he offered her a bedcover to wrap herself in and then accompanied her across the railway track to the gate of our residence. She narrated the horrid experience when I returned from office and urged me to resign and leave Delhi.

Leaving HUDCO

Matters came to a head when, within a week of the incident, Just as I was settling down in my office cabin one morning, I was called by the Chairman and told that I was being posted as Officer on Special Duty (OSD), to Calcutta. I was asked to join duty within two days. It was many months after I left HUDCO and settled down in Bangalore that I was told by the Chairman of the Bangalore Development Authority, that a secretary in HUDCO spent a month travelling to every city in India that I had visited as Chief, Projects, attempting to collect evidence to prove any corruption charges against me. He drew a blank as it was not in my nature to accept gifts in the professional domain.

I had to take a decision within two days whether to shift to Calcutta as OSD or resign. I sought legal advice and was told that my transfer amounted to demotion, as my powers to recommend schemes for loan approval, would be naturally non-exercisable and such demotion without a show cause notice was untenable in law. I examined my options and telephoned my friend Ashok Bhat, who was the Minister for slum improvement in Gujarat. Hearing of my situation, he sent me a telegram appointing me as Housing Adviser to the state government and phoned to say I could stay in his bungalow in Ahmedabad till alternative arrangements were made. Simultaneously, another friend, P.C. Nayak, who was a Joint Secretary in the Ministry of Commerce in Delhi, told me he was seeking premature retirement from service and joining the well known company, Spencers, in Madras, where he offered me the position of Director of its real estate wing, Spencer Estates.

The next day, I submitted my resignation personally to the Chairman, giving a month's notice as required.

During the notice period, I met my architect friend, A.J. Talati, in Ahmedabad. He had worked with Le Corbusier in his studio in Paris. I sought his advice on starting my own architectural practice in Ahmedabad or Baroda. On learning the background to my resignation, he wondered if I would ever be allowed to have any clients. For the same reason, he advised me not to join the Gujarat government as an Adviser, as those responsible for my ouster from HUDCO, could force the state government to get rid of me there as well. The only option left was to accept the job with Spencers and shift to Bangalore, where the Managing Director, P.C. Nayak, had his office.

Before vacating the house rented by HUDCO for my residence, I handed over the telephone instrument to the telephone department and possession of the apartment to the owner, who had, with great foresight, worded the agreement to state that the apartment was rented to HUDCO for the residence of P.M. Apte, till such time that he was in the employment of HUDCO. I was therefore within my legal rights to hand over possession of the house to its owner. HUDCO, however, on the grounds that I had not handed over the telephone and apartment to it, withheld the payment of my provident fund, despite the law in force that the provident fund of an employee of a public undertaking cannot, under any circumstances, be withheld. It led to a legal battle in a Delhi court for two years. Finally the court ordered the provident fund amount to be paid to me. Despite the court order, it was not. The amount was paid many years later, at the intervention of the then Managing Director, S.K. Sharma, an IAS officer, who in my presence asked the administrative officer why the amount had been withheld in contravention of the law. But the officer had no answer.

On relocating to Bangalore in the middle of the school year, we found it difficult to get school admissions for my sons. In Delhi they had been under the Central Board of Secondary Education (CBSE) and in those days, apart from central schools which were meant primarily for wards of Indian Administrative Service (IAS) officers, there was only one other school in Bangalore offering the CBSE syllabus. I went to see the school Principal. He asked me, "Mr. Apte, do you remember me?" In HUDCO I used to meet people from all over India, literally in the thousands and did not recall this particular meeting. When I did not respond, he said, "I had accompanied Mr.X, when he visited your office in Delhi. While he was in your cabin, you heard that I was accompanying him but was waiting outside, so you asked your peon to call me into your cabin and offered me a cup of tea while my friend completed his business. So, how can I not give admission to your sons?"

It is an incident I will never forget. For what I considered normal courtesy extended to him, he remained ever so grateful. In the context of the trauma and inhuman treatment that my family and I had suffered at the hands of those in power in HUDCO, his kind gesture helped me retain faith in 'human' qualities and values.

While working in Bangalore, I met the MHADA Chief Engineer, M.A. Chavan, who was dining at a Spencers restaurant with the Vice President of MHADA, Anil Gokak, an honest and upright IAS officer. It was over the lunch that Mr. Gokak offered to appoint me as a Consultant to MHADA. The offer was that I would visit Mumbai for a week every month and guide the officers of the housing boards under MHADA, in Formulating bankable housing projects. It was 1982, and I had made up my mind to return to Baroda, where a real estate developer had offered me a job to oversee construction of over 3000 apartments and bungalows in the Race Course area. I shifted to Baroda and started working with the developer who agreed that I could go to Mumbai for a week every month. That is how I started visiting Mumbai again regularly and reestablished my contacts with MMRDA and my old friends there.

Oh! To Be In Mumbai

In 1984, I left the employment in Baroda and shifted to Mumbai. Since then I have been involved in many projects that have given me an insight into the problems of this city. I worked as a Consultant

to MHADA for over eight years. During 1987-88, I was a Member of the D'Souza Committee to review the development plan for Mumbai. During a year of its intensive working, we reviewed the Mumbai Development Plan, ward by ward; studied the suggestions and objections received; and frequently made field visits to assess the issues. Between 1989–91, I was appointed a consultant to the National Housing Bank and visited Delhi frequently for the work. In 1996, I was appointed a member of the Planning Review Committee for the Vasai-Virar development plan and similarly reviewed the development plan of the northern suburbs of Mumbai. Working with private consultants, I was involved in the assessment and planning of suburban rail routes to Panvel. I was also involved in an Indo-German collaboration project for an (partially overhead) underground rail link from Chatrapati Shivaji Terminus of the Central Suburban Railway to Churchgate and Cuffe Parade. Working for an NGO, I designed a township in Dindoshi, in the northern suburb of Goregaon.

During all these activities, I was formulating low-cost proposals for the problems of Mumbai, while the state government and the MMRDA were busy formulating high-cost solutions that would transform Mumbai into Shanghai. I worked as a Consultant on the staff of the World Bank for about six years for the Mumbai Urban Transport Project II, looking after the rehabilitation and resettlement project, wherein over 39,000 residential tenements were built.

It is my nature to always review all solutions to see if there are low-cost options that would serve equally well. Instinctively, I go for optimization of available resources rather than suggesting high-cost solutions requiring large scale investment. I try to find solutions that are flexible and amenable to course correction over time, with changing circumstances and the environment.

Blinded by Dazzle

I realized that the high-cost solutions often adopted were not necessarily from a genuine desire to mitigate the problems. Quite often, there existed ulterior objectives. Sometimes, the solutions so dazzled the technocrats, that they became blind to the glaring flaws in them or other options available.

Take the example of the elevated monorail under construction in Mumbai. It costs over INR 220 crore per km (INR 2200 million or US$ 40 million). Instead, if the same raised platform (with its massive pylons that occupy a traffic lane width), were to be demarcated as a dedicated lane for buses to be operated as a Bus Rapid Transit System, it would cost INR 2.5 crore per km or one-tenth of the cost of the elevated rail; and yet it would carry the same number of passengers. But blinded by the glamour of an elevated monorail, the planners forgot they were, in fact, taking away over 4 mts. width from the road on the ground, which if converted into a rapid bus transit route, would have cost a fraction of the elevated rail project and served the same purpose. Reluctantly, I arrived at the conclusion that for technocrats, bureaucrats and politicians, it must be to their benefit to spend INR 220 crore per km. (of which at least 20% will allegedly flow back into their pockets), rather than a reasonable spend of only INR 2.5 crore per km. From this realization emerged the now oft quoted 'Apte Principle' that, 'projects in Mumbai are undertaken for their propensity to generate kickbacks for technocrats, bureaucrats and politicians and any benefit accruing to the people is incidental and unintended.'

Low-Cost Solutions

During 14 years of professional visits to Mumbai and 28 years as a permanent resident of the city, I studied most facets of the basic issues that confront the city and suggested low-cost solutions in my various articles, speeches and letters to newspapers. While some of this data may need updating, the issues basically remain the same and so do my solutions. This book is a collection of those articles and letters. The statistical data in the various articles relates to the time when those were written and hence may not be consistent. The articles are not intended as criticism of the governmental approach, but present positive suggestions which are workable, though perhaps not eye-catching, newsworthy or glamorous.

Many of these suggestions have struck a positive chord in the minds of right thinking intellectuals, who unfortunately are not the decision-makers. But some are. For example, an erstwhile Minister for railways, during one of her visits, actively supported my suggestion to have double-decker coaches for the suburban rail service. The Regional Transport Office (RTO) has been receptive to my suggestion to allow new registration of cars only if the owner can give proof of night parking within his premises. My suggestion to start a water transport along the coast to the mainland has found favour with MSRDC. Recently, MMRDA finally accepted that its proposal for an elevated monorail was not cost effective and has shelved it after the completion of the first phase costing INR 4250 crore! (See the reproduced new item)

But many of my suggestions, such as locating the new international airport south of Thane (instead of in Navi Mumbai), scrapping the construction of the trans-harbour bridge, and resettlement of hawkers, have fallen by the wayside. It is so because the investment in these projects that are contrary to what I have proposed, is astronomical (in case of all works related to the new international airport, the total amount is currently estimated at INR 11,000 crore). There the 'Apte Principle' operates: 'Projects in Mumbai are undertaken for their propensity to generate kickbacks for Politicians, Bereaucrats and Tecnocrats and any benefit accruing to people is incindental and unintended'The following is a synopsis of the solutions to the various issues that confront the city of Mumbai. Each issue and its solution are described in the chapters of this book. These solutions are lessons that similar cities in India and the developing world can learn from and apply to in their own cities/countries.

Disastrous Vision Plan

Many big cities have vision plans. But these are not mere colourful dreams! They are the shortest statements in fulfillment of which the cities can constantly explore options. The latest among Mumbai's vision plans is one by a Singapore consultant, Surbana. The plan projects a slum-less city in 2052! It proposes building up the saltpan lands for development. Were the consultants ignorant or willfully ignored the fact that the salt pans are also the 'holding ponds' for the runoff from the built-up areas of the city? If those are also built up, the rain water runoff from the city will be blocked, and during high tide, the city can get inundated as it happened in 2005. saltpan lands must not be used for development until this issue is resolved by experts.

The consultants propose using the Thane creek lands for development. It will not only add to the population, but will destroy the only true open 'green' expanse in the centre of the city. Instead, the proposed new airport for Mumbai could be located there. As for its densification proposals, the argument to reclaim lands at Nariman Point and shift the city centre back there is contrary to the plans so far followed by MMRDA and the heavy investments already made in Bandra Kurla Complex (BKC) as a district employment centre. The argument to shift back to Nariman Point presupposes the construction of the Nhava Sheva bridge across to the mainland. All these proposals are detrimental to the organic development of Mumbai. A new development plan for Mumbai must have a radically different approach.

A Model Regional and City Development Plan

The Mumbai Metropolitan Region was created sometime around 1967. However, the validity of its geographical boundaries was not tested by basing them on specific criteria and norms. To achieve its own balanced growth and not retard or kill growth of other urban potential nodes in the region, the presently defined MMR needs to be segregated, *firstly*, into an immediate influence zone of Mumbai that may comprise of the city and its suburbs; and *secondly,* the region comprising of Thane, Navi Mumbai, Pen, Alibagh and other smaller growth centres.

How will the suburbs develop if the Trans-Harbour Link facilitates further concentration at the southern tip of the island city?

In terms of a transportation plan, therefore, Mumbai with its suburbs, needs to be divested from the rest of the region and both planned independently as self-sustaining urban regions. The trans-harbour

link needs to be scrapped if the mainland area is to develop as a self-sustaining entity and not become a dormitory area for the island city. Instead of a bold, original, innovative, down-to-earth and out-of-box approach, the MMRDA regional plan merely makes arithmetical projections for the distant future, without really being futuristic – it is neither perceptive nor realistic.

Similarly, Mumbai's city development plan should set out the directions and contours and identify the thrust areas for development. It must suggest alternative routes, strategies, and interventions for bringing about the change. It should lay down a framework and vision within which projects should be identified and implemented. It ought to establish a logical and consistent framework for evaluation of investment decisions. It is important to focus on the development of economic and social infrastructure, and map strategies that deal specifically with issues affecting the urban poor. Of equal significance is strengthening of municipal governments and their financial accounting and budgeting systems and procedures. No plan is complete without the creation of systems for bringing in accountability and transparency, and eliminating legal and other bottlenecks that have stifled the land and housing markets.

A model plan is one which would provide a basis for Mumbai to undertake urban sector reforms that will help direct investment into city-based infrastructure. Most important of all, the plan must have a built-in mechanism to ensure public participation at every stage of its evolution. A new development plan for Mumbai will not succeed unless it adopts a radically different approach. It must be an assemblage of local-level citizen-oriented projects. To start with, micro development plans for each ward based on fullest possible public participation must be prepared. This is achievable only by scrapping the top-down approach followed so far. These plans can then be coalesced at the city level keeping in mind the 'vision' for the city…and then broken up again in projects for each ward of the city.

Impact of Liberalization

The impact of the liberalization policy being followed by the Maharashtra Government, like SEZ (Special Economic Zones), and development of new townships, will lead to the exclusion of the poor and to their further impoverishment, destruction of the environment and the ecological balance, and paucity of land for agriculture, horticulture and vegetable farming, rendering these commodities scarce for city-dwellers. It will lead to displacement of a large Adivasi (aboriginal) population, which may be forced to migrate to cities, adding to the slums. Deforestation will result in climate change. There will be increased vehicular traffic to existing cities from these townships for work, strain on education and medical facilities, and create serious imbalances in the urban economy, leading to crime and lawlessness.

The purpose of this liberalization, it would seem, is to create more problems or accentuate existing ones, making life miserable in urban areas. All this will provide opportunities for politicians to direct bureaucrats and technocrats to prepare blueprints to undertake new projects like flyovers, metro rails, sea links, and multistoried housing, which are perennial sources of commissions.

Sustainable Urban Development Model

The now defunct mill lands of central Mumbai could hold the key to the future 'model' for the city's development. A large number of mills, occupying over 150 hectares, are almost contiguously located at the nodal point in the city centre (at the proposed joining of the Bandra-Worli Sea Link, with the proposed Shivree-Nhava Trans-Harbour Sea Link through J. Bhatankar Marg). Irrespective of the use or apportionment of this land among the owners and/or statutory bodies, it is imperative that all these mill lands are assembled for an integrated urban development model by either framing a Town Planning Scheme or declaring it a special planning area under the Maharashtra Regional & Town Planning Act (MRTP), or making it obligatory under development control regulations, to prepare an overall layout by the Municipal Corporation of Greater Mumbai (MCGM).

Thereafter, a structure plan needs to be prepared for this area, incorporating mass rapid transit terminals on the periphery with road-rail interchanges, multi-storied automobile parking adjoining these terminals; and a mass transit system encircling the area, complete with a nature park with a lake for water harvesting and fishery, among other things.

This entire area can then be made into a model of sustainable development by providing a desalinization plant/rain harvesting for potable water requirements, and harnessing solar and sea wave energy for generation of electricity. The plan should include sewage treatment plants in each building to recycle water for growing fruit and vegetables by hydroponics on terraces, making the ground area automobile-free for pedestrian movement (as in Bogota, Columbia). This 150-hectare model urban development project can be made self-sustaining with little dependence on the existing physical infrastructure services of the city.

Remodeling Slums like Dharavi

Dharavi, the biggest slum in Asia, contains the attributes for environmentally and socially sustainable settlements. Its use of local materials, walkable neighbourhoods, and mix of employment and housing, add up to 'an underlying intuitive grammar of design that is totally absent from the faceless slab blocks that are still being built around the world to 'warehouse' the poor.

It may be rational just to give land tenure rights to the existing Dharavi residents to redevelop the area themselves and upgrade its physical environment, through self-help efforts by registering their land ownership and availing of institutional finance. Remodeling should envisage the provision of low-rise, high-density development for the existing families engaged in crafts like leather tanning, leather goods and pottery, so that each house with a ground plus first floor, has a terrace and courtyard that will afford proper space for their work place. Alternatively, stilt plus three-floor small apartments can be built with the entire ground floor under the building and the terrace free for carrying on occupations that require large open areas. Any plan for a Dharavi-like slum must consider the workplace relationship developed over the years so that it does not destroy the existing social structure that has sustained the local economy. Area-wise divisions of Dharavi proposed in the state government initiated Dharavi redevelopment plan that would segregate land uses, is evidence of the insensitivity of the top-down approach to planning. The involvement of the concerned population in the planning process is imperative if the redevelopment is to be successful from a human and urban perspective.

Low-Cost Shelter Projects

I designed a project for a site in New Mumbai to demonstrate that it is possible to do this kind of *in situ* development of slum areas. It is a low-cost, low-rise, high-density project, where most ideas described in this book have been clearly demonstrated. An informal layout, mixed land use, integrated community development and estate management, are salient features of what is perhaps the lowest-cost project ever designed in Mumbai.

Resettlement of Hawkers

Another challenging task is to find a solution to the problem of hawkers. It's a catch 22 situation – how to avoid uprooting street hawkers from their existing locations and yet prevent encroachments in the city. Therefore, instead of a shopping line prescribed in the development control regulations, a solution may be found in allowing construction of shops within the plots abutting the roads, but restricting their land coverage and height. In short, the hawkers could be resettled within the plots adjoining the streets. This will free the pavements for pedestrians and the properties along the street will derive income. The hawkers would have a legal tenure, access to water supply and electricity and become a productive constituent of the city community, rather than being looked upon as encroachers on the busy streets.

Rain Water Harvesting

In simple terms, rain water harvesting means putting back rain water into the soil, to be stored in natural underground reservoirs and aquifers. We need a rain water harvesting system that is sustainable, replicable and economically viable. Practical experience has established the socio-economic impact of rain water harvesting at plot scale. If it is promoted at the city scale and gains wider acceptance, the associated social, economic, and environmental benefits will contribute substantially to improving the quality of life in Mumbai. I have examined the role of GIS in promoting such a system as well as the methodology for rain water harvesting and data requirements to enable its large scale adoption in cities.

Mitigating Urban Floods

Some simple but mandatory measures can go a long way in arresting urban floods. Among these are: sweeping the city every day; removing the garbage immediately (instead of doing it just before the monsoon); either covering roadside drains or cleaning these every day; making it obligatory for all building premises to be paved only with perforated tiles to allow water percolation and harvesting; paving all footpaths with perforated tiles only; keeping the mandatory recreation garden (RG) unpaved (and in one location, not in small bits and pieces); and providing an open dug well of minimum 5 mt. diameter to let rain water percolate and accumulate. Other measures include: not allowing basements over the full plot area but only under the building footprint; removing debris and obstacles to the flow of storm water drains; widening and keeping free from encroachments the mouths of all main storm water courses joining the sea; creating holding ponds near the mouths of all the creeks and rivers to hold the run-off in a deluge (the kind that took place on 26/7 2005 in Mumbai).

Public Transport Strategy

The strategy should be to build on the current strengths of the existing transportation network; optimize its utilization and shun the temptation to undertake grandiose projects like trans-harbour sea links, elevated light rail or sky bus projects. The only rational alternative is to optimize available infrastructure that can double the capacity of suburban trains by introducing double-decker coaches and bus services with dedicated bus lanes (that can transform into light rail tracks in future). There is a need to restrict the entry of private cars into the city by area licensing and initiating 'park and ride' schemes at suburban rail stations and bus depots. The strategy should aim to facilitate pedestrians and two wheelers for east-west traffic and to construct elevated pedestrian walkways as extensions to the foot over-bridges at railway stations. The government should reconsider construction of the Trans-Harbour Link bridge and use the money instead to create employment opportunities on the mainland and to create a 'calm sea channel' along the west coast to facilitate the plying of ferries all the year round. What is essential for decongestion of roads is a satellite air terminal in south Mumbai;

New International Airport for Mumbai

The second International Airport must be located close to existing and proposed work centres in Mumbai and Navi Mumbai. Such an ideal location is the vast undeveloped tract of land north of the new Thane Creek bridge. It is bound to the south by the rail and road link from Kurla to Vashi, to the west by salt pans, to the east by coastal wet lands; and stretching up to the proposed road link from Airoli in Navi Mumbai to the Eastern Express Highway to the north. This area is about 6,400 ha., including the existing Thane creek. It is ideally situated as it gives linkages to the entire state by road and rail from Thane. Moreover, a suburban rail ring is already in operation.

Metro and Skywalks

Are so many skywalks required, usable and necessary?

Have any other options, both for the Metro and the Skywalks been examined and evaluated?

Was any need/pedestrian traffic volume and 'desire lines' study conducted before embarking on the construction of the skywalks?

Judging by the scant use of the constructed skywalks and the fierce opposition by residents of the areas, it would appear that most of these were or are being constructed not out of necessity, but perhaps to make the city look modern and benefit the builder-bureaucrat-politician alliance.

All the monorail links are 'east-west' links. Has the need for such east-west links been established by any origin-destination survey to determine the daily volume of projected traffic? Do the volume and the carrying capacity of the elevated rail justify its construction at a cost of about INR 220 crore per km.? A modern low-carriage bus would cost less than INR 1 crore and carry the same number of people. It means that the elevated rail is 200 times costlier!

A very low-cost solution is possible by earmarking special bus lanes for a bus rapid transit system. The expenditure, apart from the bus, will be just for marking the special transit lane. Alternatively, more double-decker buses can be plied on the east-west routes.

Even at this late stage, when construction for the elevated rail system is in full swing, has the option of converting these elevated rail tracks into elevated roads been considered? The width is adequate to carry minibuses and will save on the special rolling stock of the rakes that constitute about 50% of the cost or about INR 110 crore per km.

Extravagant Elevated Monorail

The elevated Monorail proposed under construction is not economically viable. It is too costly, technically extravagant and socially a disaster. The cost of such a project is about INR 220 crore per km. A 15-km stretch of such a line (for example Versova-Andheri), will cost around INR 3300 crore. It will take away a minimum width of 4mt. from the centre of the road over which it is constructed. This space below the rail, because of the widely spaced heavy pillars, cannot be used for road traffic. It will most probably be encroached upon and will become a slum or hawkers' paradise. All this gives rise to the suspicion that the project is politically motivated. (A report in *Hindustan Times*, dated 20 September 2011, says that the MMRDA has realized that ….it is not cost effective. So MMRDA is likely to abandon construction of further routes having already spent over INR 4,170 crore!)

The space which would otherwise be made unusable by the overhead light rail, can serve as a dedicated road lane if the rail track is not constructed. The entire cost of the overhead structure can be avoided. This dedicated two-lane road can be used for bus rapid transit system (BRTS) and like the present local trains, buses can run on it every 3/5 minutes. Its carrying capacity, in terms of passengers per day, would be double that of the light rail and yet the only additional expense would be for the buses. It is estimated that for an equal carrying capacity per day, the rapid bus transit system will cost only INR 2.75 crore (1/80 of the cost of the light rail system)per km. The total cost of the project for a 15 km stretch would thus be only INR 41.25 crore as against INR 3300 crore, for the light rail system.

A New Light Rail Connection: CST-Churchgate

The two suburban rail lines in Mumbai – Western Railway and Central Railway – have their originating points at Churchgate (on the western suburban rail line), and CST (on the central suburban rail line), respectively. There is a large concentration of offices and commercial areas south of these stations, which are not served by any rail routes. This results in a great exodus of commuters from and to these two rail heads, travelling to and from the southern tip of the city at the World Trade Centre, mostly by road transport, buses and taxis. Location of the main state government offices, the World Trade Centre, and other private corporate offices, at the southern tip of the city, generates heavy commuter traffic.

A proposal was mooted in 2001, to join these two rail heads by underground rail and extend it at grade up to the World Trade

Centre at the southern tip of the city. This proposed Light Rail Transit (LRT) line from CST–Churchgate to the World Trade Centre, was investigated in a report and found to be potentially bankable and financially feasible. This project, called SMART (Selection of a Mass Rapid Transit System for Mumbai), was a technical co-operation project between the Republic of India and the Federal Republic of Germany.

Making Cities Livable

Certain administrative measures can help improve livability in Mumbai.

Hygiene: efficient solid waste management. This can make a great difference to the visual aspect as well as help in better health for the residents.

Traffic and Transportation Management: removal of roadside parking, traffic discipline, and pedestrianization of streets, can make life easier for the common residents.

*Relocation of Hawkers***:** it could restore the footpaths to pedestrians, prevent their walking on the streets, speed up vehicular traffic and reduce road accidents.

Noise pollution: loudspeakers, festivals, crackers, social and religious processions on streets, home improvements/repairs – all create noise pollution. A complete ban on the use of loudspeakers, except on large grounds; banning of all noise making firecrackers; except those that create visual effects; banning processions on streets or major traffic arteries; and a ban on *in-situ* building works, like cutting of stones and tiles, will greatly reduce noise pollution.

A vigilance force of cooperative housing society members: to implement such measures a vigilance force of members from cooperative societies could be created with certain police powers.

VIP Movement: movement of VIPs has become a great menace in Mumbai. Their movement, as far as possible, should be by helicopter, so as to create the least hindrance to road traffic.

Initiating public address and information system through radio, TV: the administration should use TV channels and FM broadcasts extensively to inform people and give news about traffic jams, restrictions, sudden outbreaks of violence, and other emergencies.

In the following chapters, I have dealt with all these aspects in detail, making constructive suggestions for urban growth strategies derived from lessons in Mumbai, in order to make cities livable at low-cost. Such low-cost solutions, not being grandiose, eye-catching or news-worthy, are usually discarded as unviable or too short-sighted. They are neither.

FOREWORD

The problems of megacities like Mumbai, which is the financial capital of India, are quite complex and have been compounded by frequent changes in government policies, inspired by politicians, in the so-called interests of the people. The problems of Mumbai, with its limited land mass of 437 sq. km, for an ever-increasing population of over 15 million, with sea surrounding it on three sides, and multiplicity of organizations handling its growth, call for long term coordinated planning and implementation for the future of the city. The problems of housing and slums, transport, water supply and drainage, health and recreation, hawkers, environment, and so on, have all reached unbearable limits requiring an urgent review and course correction.

P.M. Apte's book, *Urban Growth Strategies: Mumbai Lessons*, is a study in that direction. Mr. Apte, having worked as Chief of Projects in HUDCO, New Delhi, as member of several important committees, the Housing, Urban Renewal and Ecology Board of MMRDA, consultant with the World Bank, and as an enlightened professional citizen of Mumbai, has acquired a rare insight into the city's problems and the solutions being attempted by different authorities concerned.

The book induces one to think out-of-the-box, leading to simple, cost-effective and novel solutions to the several problems of cities like Mumbai, being tackled presently in a conventional way, such as mass transport by optimization, rainwater harvesting, redevelopment of large slums in an integrated and sustainable manner, rational relocation of hawkers, mitigation of flooding problem, new plan for city mill lands as a model for sustainable development, and so on. It could be that certain suggestions made may not find acceptance with some, but at least these can provide to all concerned a new vista to think about future plans of action.

It is hoped that the book will be of interest and benefit to the authorities concerned as well as to the enlightened citizens of Mumbai and other megacities

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Principal Secretary, PWD (Retired)
Government of Maharashtra
30 June 2012

Chapter 1 A CITY'S VISION PLAN

Fallacious Visions

Most 'visions' by bureaucrats emphasize the role of economic growth to mitigate poverty. But the moot question is: can economic growth in the services sector alone lift millions out of poverty in cities like Mumbai? The services sector, by definition, comprises trade and commerce. However, the millions living in poverty lack the necessary skills and education; in effect, the wherewithal, to engage in such activities. The 'vision', therefore, is fallacious and doomed to failure.

It is true that many large cities have vision plans. But these are not merely colourful dreams. They are proper and pithy statements that contain options for cities that can be constantly explored to fulfill goals. For instance, Singapore's vision is a long-range land use and transportation plan spread over the next 40-50 years. London's vision is a spatial development strategy to make London a better city for people to live in. The vision of Paris is to alleviate social tensions in the inner suburbs and revitalize the metropolitan economy of the city.

Crystal Gazing

The latest among Mumbai's vision plans, is one by a Singapore consultant, Surbana. Their Plan projects a slum-less city in 2052. Neither the planners nor the bureaucrats, nor the politicians, and least of all the current adult population, may be alive till that year. Considering the galloping pace of techno-economic development and globalization, a vision plan 40 years hence and that too, for a large metropolis, can at best be only crystal gazing. The arithmetic of population, jobs and traffic projections may be right today, but could go devastatingly wrong over the years in a fast changing national and world scenario. Provision will have to be made in the plan for options, alternatives, and ~~of~~ course correction/change, to achieve the final goals, should the circumstances so demand – which they certainly will. Such a long term plan can thus become an exercise as futile as an astrological prophecy, fraught with great and grave pitfalls. It can best be termed 'an escape from intellectual helplessness', as the Mumbai Metropolitan Region (MMR), is larger than the one (Mumbai Municipal Area) to whose problems we have already failed to find a solution.

Vision Plan for Mumbai by Surbana

Leave the Saltpans Alone

In recent years, politicians and developers have been eyeing the saltpan lands on the east coast of Mumbai for development. Firstly, these are not merely saltpans. These lands are the 'holding ponds' for the run-off from the built areas of the city. Once these are built up as well, the rain water run-off from the city will be effectively blocked and during high tide the city can get inundated, as happened in 2005. Saltpan lands must not be used for development until this issue is resolved by experts.

Instead of using the Thane creek lands for development, as suggested by Surbana, the proposed new airport for Mumbai could be located there. The vast, undeveloped tract of land north of the Thane Creek bridge is an ideal location for the new airport. The area is about 6,400 ha., bound to the south by the rail and road link from Kurla to Vashi, to the west by saltpans, to the east by coastal wet lands and stretches up to the proposed road link from Airoli in Navi Mumbai and to the Eastern Express Highway in the north. It includes the existing Thane creek, which carries part of the run-off of the Ulhas river. The area is ideally situated as it gives linkages to the entire state by road and rail from Thane. The ministry of Railways has very recently conceived a plan to develop Thane as a terminus for long distance trains. A suburban rail ring is available and already in operation. This location can accommodate the necessary direction and lengths of runways and the aircraft approach funnel area. Prima-facie, the location is suitable for an International airport and the creek may be bridged over only to the extent of the requirement of the runways.

If this eminently feasible proposal is not implemented now at this location, this area, highly vulnerable to the pressures of future development, is bound to get urbanized, endangering the coastal wet land's flora and fauna, as well as the entire drainage system for Mumbai. Thus, an opportunity to build a new airport in Mumbai will be lost forever. This location for the airport, with green vegetation all around, will help preserve the character of this area and also contain noise pollution. The proposal for locating the international airport here was submitted by me to the Planning Committee appointed by the State Government, to review the Regional Plan of the Mumbai Metropolitan Region in 1990. A detailed proposal with maps is available elsewhere in this book.

As for densification, the argument to reclaim lands at Nariman Point and shift the city centre there is contrary to the plans so far followed by MMRDA and the heavy investments already made in Bandra Kurla Complex (BKC) The argument to shift back to Nariman Point presupposes construction of the Nhava Sheva bridge to the mainland.

Radical, Local Level Planning

It has been claimed by politicians, and artfully supported by MMRDA and the planning community, that the bridge will open up the under-developed areas of Raigadh and the mainland, by providing easy access to Mumbai. For politicians, this is bait to the people of the mainland. The Trans-Harbour link will, in fact, ring the death knell of development on the mainland. In reality, it will cause a gigantic migration wave to Mumbai from the mainland that will create new slums all over the city, only helping the politicians to create vote banks and support their argument of not shifting government offices to Navi Mumbai. The real purpose that this link serves is to give quick access for a select elite, to their workplaces in Nariman Point, so they can build lavish homes on the mainland (that will cover about 12000 hectares being acquired ostensibly for SEZ, at about 100 hectares per home, that may accommodate a private swimming pool, golf course, and heliport).

The purpose of a link between the mainland and Mumbai is already being served by the existing ferry service. It is only necessary to increase its frequency, modernize the equipment and ensure its continuous service throughout the year, including the monsoon months.

A new development plan for Mumbai needs to be radically different, shunning an exploitative approach. An ideal plan would be the assemblage of local level citizen oriented projects. In effect, we ought to first prepare development plans for each ward, based on the fullest possible public participation (which could be readily forthcoming as the people in each ward can comprehend and

perceive the development of the area they are familiar with and are interested in), completely scrapping the top down approach followed so far. At the city level, the plan should be perceived not as land use or zonal planning, but as a redevelopment of urban pockets to minimize land coverage without increasing FSI; and thus maximizing open spaces. These plans can then be coalesced at the city level by 'experts', keeping in mind the vision of the city and then broken up into projects for each ward.

Shortchanging City Planning

In a developing country like India, the forces shaping our cities are not municipal agencies and city-planners but private organizations, real estate developers, bureaucrats and most importantly, politicians, who are the chief players on the urban scene. In a developing economy, though civic consciousness among citizens is low, city planning is important. Urban development should be implemented by the public sector in partnership with the private sector. In reality, a vision of the future city is being dictated by the marketplace, by avaricious politicians, conniving bureaucrats and so-called city-planners.

In India, the simple truth is that successful (profitable) city-building is less about public welfare and safety, and more about profiteering from the sale of urban land by indiscriminately increasing land-to-floor space ratio and taking up high capital investment projects that do not necessarily benefit the people but bring in substantial commissions.

The motives are so transparent and the objectives so obvious, that it's not really funny. The existing infrastructure is destroyed to award new contracts (with kickbacks in mind); the environment is assaulted in the name of benefitting the urban poor to create a land mafia (to benefit politicians and bureaucrats); unnecessary, high-technology projects like the monorail are taken up when the objective could as well be achieved by low investment options like BRTS; flyovers and skywalks are built without user surveys…the motive being to award contracts and generate commissions.

Chapter 2 REGIONAL & CITY DEVELOPMENT PLAN

Unclear Rationale

It is not clear on what considerations the present area of the Mumbai Metropolitan Region (MMR) was notified. The MMR was declared by a government notification sometime around 1967. There appear to have been no studies made or criteria examined to define the geographical boundaries of the region. Neither was it based on any established theoretical norms for defining a Metropolitan region such as:

- Daily commuting
- Mumbai's sphere of influence indicated by its economic/ social zone of control
- Wholesale/retail trade area
- Goods movement or information flow
- Communication and transport exchanges

The basic issue, before making any plans, is to either establish the validity of the geographical boundaries of the present MMR or to redefine them, based on specific criteria and norms. A re-examination of the delineation of the region is now called for as a planning unit. To boldly re-examine the givens is the first and fundamental step before plunging into physical planning.

Re-delineating MMR

If the basic objective of the Mumbai regional plan is to achieve a balanced growth and not allow Mumbai to retard or kill the growth of other urban potential nodes in the region, the geographical area of the presently defined MMR needs to be segregated into:

i. Immediate influence zone of Mumbai that may comprise of the city and its suburbs
ii. Region comprising Thane, Navi Mumbai, Pen, Alibagh and other smaller growth centres

The extended suburbs – the Vasai-Virar belt and the Pen-Alibagh area – is projected to increase between 2.5 to 20 times in population; and as a result, its total population of 22.2m. may be over 75% of the region's projected population of 34m. It is, therefore, logical to consider the two areas as independent entities and prepare a separate plan for both. Just because MMRDA historically defined for itself a region on the mainland covering an area double that of Mumbai and its extended suburbs, is it logical to attempt a unified plan for this area?

Genesis of Imbalance

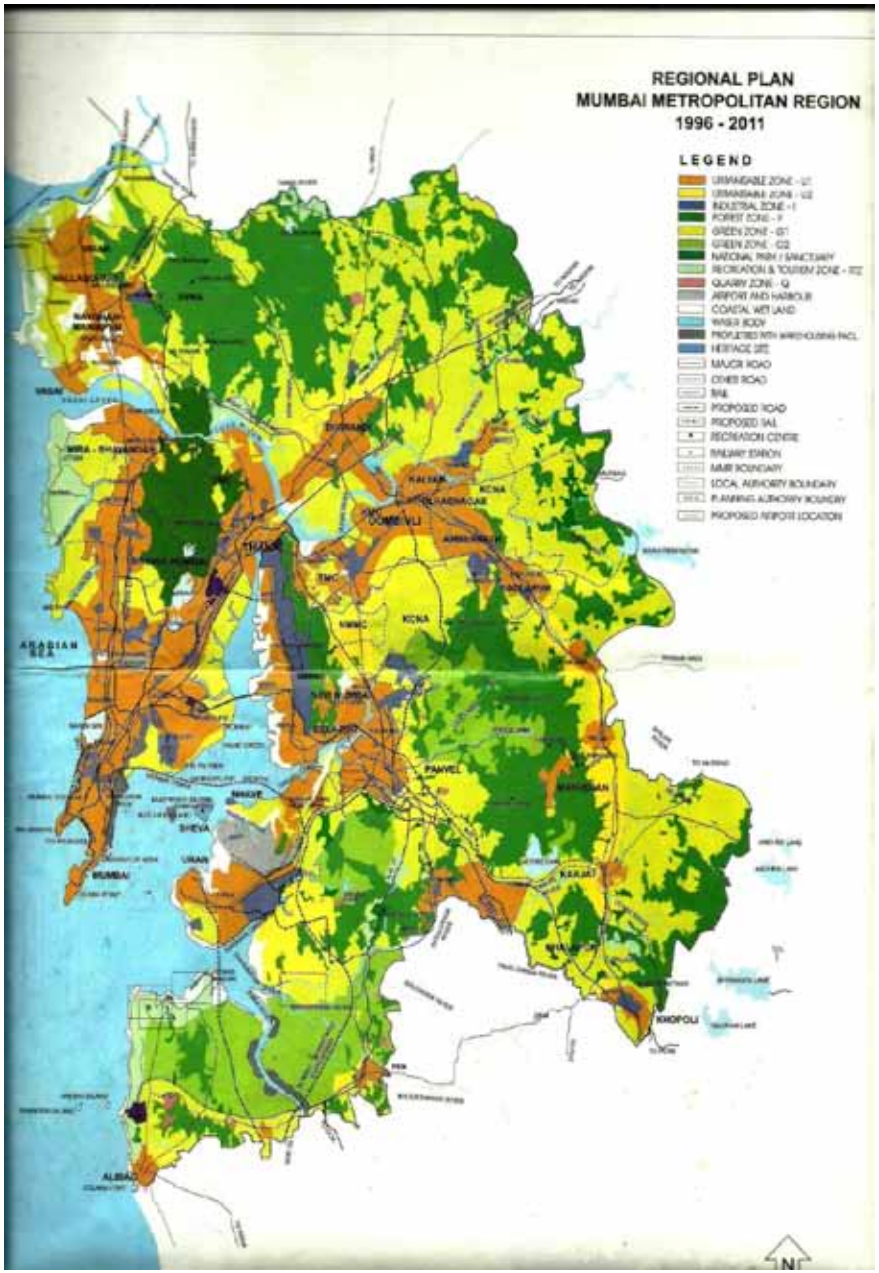
Town or Regional Planning is not arithmetic. It is a social science and any intervention to correct a perceived imbalance in one area can cause a chain effect of more imbalances that could be worse than the remedy. Take the example of the Trans-Harbour Link. It has not been specified exactly what traffic or transport problems it is supposed to solve. But a mass transport link from a relatively underdeveloped mainland region to the heart of Mumbai by road and rail can, instead of opening up underdeveloped areas on the mainland, as claimed by politicians and planners alike, generate a reverse flow of migration into Mumbai and break its already overloaded socio-physical infrastructure

How will the suburbs develop if the Trans-Harbour Link facilitates further concentration at the southern tip of the island city? Or is it an attempt to deliberately add to the island city's problems so that more capital intensive projects like flyovers, metros and sky buses can be taken up, with its opportunities for kickbacks?

Aggrandizement Fever

The Bandra-Kurla Complex(BKC) and other district centers, were envisaged to *shift* jobs from the southern tip of Mumbai to the suburbs, to achieve a more even geographical distribution of employment and reduce the one way traffic load of commuting from north to south in the morning, and a reverse flow in the evening. As the government as well as the private sector failed to shift jobs from the south, the MMRDA, in order to recover its large fiscal investment in creating the infrastructure there, sold land to whoever could buy it and thus ended up creating new jobs. As against the proclaimed objective of shifting 1,27,000 jobs from Nariman Point to BKC, it has ended up creating over 2,00,000 new jobs and will add an equal number now by enhancing the FSI of BKC from 2 to 4. Having realized that there is a good demand for developed land and that BKC can be a golden-egg-laying-goose, the state government has already started increasing the FSI for the centre. This will increase the built-up area fourfold, with resultant addition to traffic, housing requirement and social infrastructure. Moreover, it will attract migrants from the mainland over the Trans-Harbour Link, further burdening the already stretched resources, and inevitably impacting the quality of life in the city.

In terms of a transportation plan, Mumbai with its suburbs needs to be divested from the rest of the region and each ought to be planned independently as self-sustaining urban region. There's a dire need to scrap the Trans-Harbour Link if the mainland area is to develop as a self-sustaining entity and not become a dormitory for the island city. The New Mumbai SEZ can genuinely be a SEZ (and not a camouflage for real estate development), if it is developed with an emphasis on the manufacture of goods and services based on rural or agricultural produce on the mainland. This will help control further urbanization and retain the rural character and economic base of the Pen-Alibagh area of the Raigad district. This sweet (though bitter to the politicians) medicine should be administered instead of the grandiose schemes with astronomical financial outlays, which have been attempted nowhere in the world to date.



Mumbai Metropolitan Area Development Plan prepared by MMRDA

Flexible and Evolutionary Plan

In essence, instead of a bold, original, innovative and down-to-earth and out-of-the-box approach, the MMRDA Regional Plan merely makes arithmetical projections for the distant future without really being futuristic. Instead, a flexible and evolutionary Regional Plan for the mainland (Thane, Pen, Alibag and Navi Mumbai), could consist of:

1. a strong transport and communication structure and a rural/agricultural mosaic as the physical depiction of the plan;
2. proposals for absorption of immigrants within the fabric of the small towns in the region, without economic and social disruption;
3. easy access to services for all;
4. policies with quantifiable parameters for industrial location and creation of jobs;
5. policies for taxation and revenue generation to make regional administration a financially viable proposition;
6. receptivity to new technologies for infrastructure advances;
7. integration of historic resources;
8. concern for the environment;
9. enforceable standards of performance.

Too Distant a Future

Considering the galloping pace of techno-economic development and globalization, preparing a physical plan for a quarter of a century hence (2031), and that too, for a large region (4355 sq. kms.), is like writing a prophecy. The arithmetic of population, jobs and traffic projections, may be right today, but could go devastatingly wrong over the years in a fast-changing national and world scenario. If at all such a long term plan is to be prepared, provision must be made for options, alternatives, or course correction/changes, in order to achieve final goals, should circumstances so demand. Such a long term plan can therefore become an exercise as futile as an astrological prophecy, fraught with great and grave pitfalls. It can best be termed as an escape from intellectual helplessness as the area (MMR) is safely larger than the one (Mumbai municipal area),

to whose problems we have failed to find a solution.

Counterproductive Trans-Harbour Link

It can be rationally argued that the Trans-Harbour Link will retard self-sustaining economic and urban growth on the mainland as it will lead to:

- a flood of population migration from the mainland to Mumbai in search of employment, market and services;
- result in covert conversion of island city residential areas into work places by further increasing the FSI;
- decelerate or even retard growth of BKC and other district centres;
- create further influx of traffic to downtown (Fort and Colaba), jamming the north-south transport corridors and nullifying the amelioration measures proposed;
- give rise to slums in the island city and increase crime and density;
- retard the self-sustaining growth and development of Pen, Alibagh, Navi Mumbai and other towns on the mainland;
- defeat the very purpose of regional planning, which is to achieve a balance between the magnet (Mumbai) and the hinterland.

Transportation of the Future

There seems to have been little thought given to the most important mode of transport of the future – air travel. In the next 25 years we will need fast air transfers from the domestic/international airports to various residential/work areas. There could be air taxis, even space mobiles and vertical take-off aircraft. Does the plan provide for it? Instead, by locating more and more airports away from the metropolis, it will give rise to greater intra-city traffic by road and rail (no thought having been given to air taxis), further aggravating traffic problems. A bold proposal to locate an airport over the Thane creek, so that it connects conveniently the island city, extended suburbs and the mainland centres by road as well as through the existing rail network connecting the whole country through Thane, does not appear to have been considered. At the other end of the spectrum is the most affordable, environment-friendly mode of personal transport – the bicycle or the Segeway type of personal transporter getting so popular in the USA. But it has been ignored.

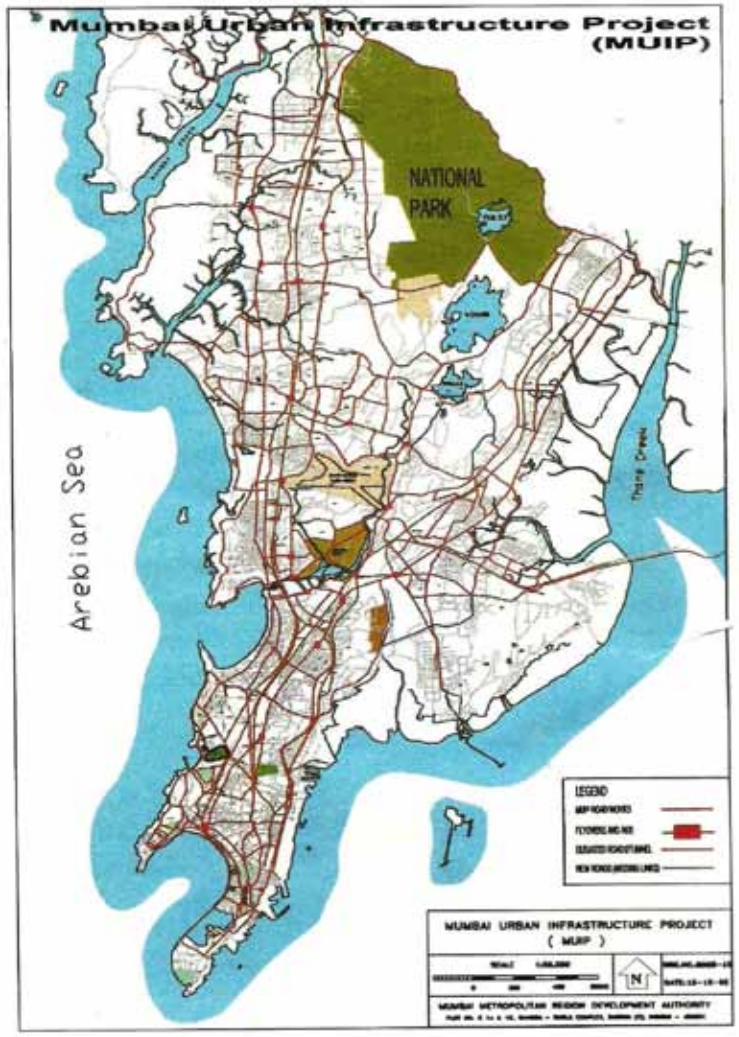
Quixotic MMRDA Transportation Plan

If there is to be a rethink on the delineation of the region itself some innovative, low-cost solutions can be included, such as:

1. planning the transportation network for Mumbai and the hinterland independent of each other, and providing only for interface if and when necessary;
2. scrapping the Trans-Harbour Link which will create far more problems than it will solve;
3. a new airport over Thane creek, at the nodal point linking the hinterland, the state and the country, through fast rail transport and new terminals for air taxis for all city wards;
4. an all-weather ferry service along the east and west coasts with termini and parking facilities;
5. high-capacity rakes or double-decker suburban trains (instead of an elevated monorail which costs 12 times more per km than surface rail);
6. reintroduction of tramways, and providing dedicated bus lanes by providing a Bus Rapid Transit System (BRTS);
7. removing private vehicles (that carry only 8% of traffic), by introducing car-free days in a week and/or area licensing;
8. more effective utilization of existing road widths by removing encroachments to adequately cope with future traffic volumes and increase speed of flow;
9. creating elevated vehicle parking in suburban station areas to facilitate park and ride;
10. special lanes for bicycles and Segeway type (motorized) personal transporters;
11. increasing pedestrianization of work/commercial areas.

This is not utopia. Some of these suggestions (6, 7 & 11), have

been implemented in Bogota, Columbia, Sao Paulo, Brazil and other South American countries.



Mumbai City Infrastructure Development Plan prepared by MMRDA

Mumbai Development Plan

Mumbai's City Development Plan needs to be a vision for future development as well as address the current stage of the city's development. It has to set out directions and identify thrust areas. It ought to suggest alternative routes, strategies, and interventions for bringing about the change. It should provide a framework and vision within which projects can be identified and implemented. The plan should establish a logical and consistent framework for evaluation of investment decisions.

The following foci are essential.

1. Development of economic and social infrastructure;
2. Strategies that deal specifically with issues affecting the urban poor;
3. Strengthening of municipal governments and their financial accounting and budgeting systems and procedures;
4. Creation of structures for bringing in accountability and transparency;
5. Elimination of legal and other bottlenecks that have stifled the land and housing markets;
6. A basis for Mumbai to undertake urban sector reforms that will help direct investment into city-based infrastructure;
7. A built-in mechanism to ensure public participation at every stage of its evolution.

A brief survey of the vision, objectives and mechanism of implementation of the development plans of some of the leading cities in the world is given below, to understand how Mumbai's Development Plan can be evolved.

Singapore Concept Plan

The concept plan is a long-range land use and transportation plan that provides the broad directions to guide Singapore's physical development over the next 40-50 years. The objective is to ensure that there is sufficient land to support future population and economic growth, while maintaining a good living environment. Although not a statutory document, the concept plan expresses the government's

long-term planning intentions. It serves as a tool to guide large-scale public developments such as the building of new towns and industrial estates and the reclamation of land. When reviewing the concept plan, other government agencies are consulted and public feedback is taken into consideration.

The statutory master plan translates the strategic vision of the concept plan into detailed planning guidelines that will shape the physical development of Singapore over the next 10-15 years. It provides the basis for the day-to-day regulation of land use by specifying zoning (ie. permissible uses such as residential, commercial or institutional); maximum development intensity (ie. ratio of built-up area to site area); and building height limit for individual plots of land. Conservation areas and nature reserves are clearly demarcated. The competent authority reviews and updates the master plan every five years, adopting the same open consultative approach taken on the concept plan reviews. The most recent review was done in 2008.

The primary tool for the implementation of the master plan is the development control system. Through a system of permits, the government keeps a tight control over the development of all land in Singapore. Specifically, the construction of new buildings, change of use of buildings or land, subdivision of buildings or land, substantial additions or alterations to existing buildings and all works within a conservation area, all require prior permission.

New York

The Department of City Planning is a governmental agency of New York City, responsible for setting the framework of the city's physical and socio-economic planning. The department is responsible for land use and environmental review, preparing plans and policies, and providing information to and advising the Mayor of New York City, Borough Presidents, the New York City Council, Community Boards, and other local government bodies, on issues relating to the macro-scale development of the city. The department is responsible for changes in the city map, purchase and sale of city-owned real estate and office space, and the designation of landmark and historic district status.

London

The Department of Planning and Transportation administers the Town and Country Planning legislation within the city on behalf of the Common Council and advises on the formulation, implementation and monitoring of planning policy and guidance.

The plan is a spatial development strategy for the Greater London area and has five objectives as below.

1. Accommodate London's growth within its boundaries without encroaching on open spaces.
2. Make London a better city for people to live in.
3. Make London a more prosperous city with strong and diverse economic growth.
4. Promote social inclusion and tackle deprivation and discrimination.
5. Improve London's accessibility.

Stockholm

Prior to beginning work on a comprehensive plan, the Plan Commission has to verify that the Town Board has adopted written procedures designed to foster public participation in every stage of preparation of the comprehensive plan. These written procedures include open discussion, communication programs, information services and notified public meetings. These written procedures provide for wide distribution of proposed, alternative or amended elements of a comprehensive plan and afford an opportunity for written comments to be submitted by members of the public to the Town Board and for the Town Board to respond to such written comments.

Paris

In order to alleviate social tensions in the inner suburbs and revitalize the metropolitan economy of Paris, several plans are currently underway. The office of the Secretary of State for the Development

of the Capital Region, was created in March 2008, within the French government. Its office holder is in charge of overseeing plans for the creation of an integrated Grand Paris (Greater Paris) metropolitan authority, as well as the extension of the subway network to cope with the renewed growth of population in Paris and its suburbs, and various economic development projects to boost the metropolitan economy such as the creation of a world-class technology and scientific cluster and university campus.

In 2008, an international urban and architectural competition was launched for the future development of metropolitan Paris. Ten teams, bringing together architects, urban planners, geographers and landscape architects, offered their vision for building a Paris metropolis of the 21st century in the Kyoto Protocol era and to make a prospective diagnosis for Paris and its suburbs that will define future developments in Greater Paris for the next 40 years. The goal is not only to build an environmentally sustainable metropolis, but also to integrate the inner suburbs with the central City of Paris through large-scale urban planning operations and iconic architectural projects.

Sydney
A new City Plan is being prepared for the City of Sydney.

As a result of the amalgamation of new council areas with City of Sydney Council, the city now has several different sets of planning controls. The Council is reviewing these existing plans in order to develop a comprehensive and consistent City Plan.

The new City Plan will be a package which includes a single Local Environmental Plan (LEP) and Development Control Plan (DCP) and supporting information that will apply to the whole City of Sydney for the whole Local Government Area (LGA).

There will be public meetings, forums and presentations provided to involve the community on specific projects. Exhibition of material related to some projects will also occur and give opportunities for the community to provide input and feedback.

The City of Sydney Capacity Study 2008 analyzes the additional capacity of properties across the city. The Study looks at the current floor space provided on a property and the maximum potential that may be achieved using the Floor Space Ratio control under existing planning instruments. The Study will be used to reform planning controls in the City Plan Review.

A draft Design Excellence Development Control Plan (DCP), aims to guide significant high-density development to achieve superior urban design to create places with character and visual interest. The draft DCP will complement the new City Plan structure and provide objectives and provisions to achieve design excellence for significant development in urban renewal areas and other large development sites in the City of Sydney.

Vancouver
In 1997, the Community Visions Program was launched to bring the City Plan to the neighbourhood level. This programme entails communities working with City staff over a two- year period to create their visions for the future, based on City Plan directions and community needs and aspirations.

Hong Kong
The development plan focused on three key issues.

1. Renewable Energy: to have between 1 and 2% of Hong Kong's total electricity supply met by power generated from renewable sources by the year 2012.
2. Solid Waste Management: to reduce municipal solid waste.
3. Urban Space Planning: to regenerate older urban districts by taking full account of the need for economic viability, while emphasizing the importance of open space provision and retaining local socio-cultural characteristics and heritage buildings. Guidelines are prescribed governing sustainable urban planning and design, with special regard to issues such as buildings affecting view corridors or restricting air flow.

Shanghai

The Shanghai municipal government has put technological innovation capacity at the top of the agenda for the development plan vision.The city is also to optimize industrial structure by giving preference to the manufacturing and service industries,

The city will turn to a recyclable economy in the future and gradually eliminate enterprises consuming too much energy and causing too much pollution. The city will continue to deepen reform and opening-up, and work to balance the relationship between the government, enterprises, market and society.

Tokyo

The development plan has set 2025, as the next target year. It prescribes the following.

1. Urban development concepts and targets;
2. A new urban structure that includes area wide co-operation including business, housing, industry, distribution, disaster prevention and culture;
3. Zoning strategy to realize city structure;
4. Deployment of policy guided urban development;
5. Co-ordination of urban development with industrial policy;
6. Realization of a functional transportation network;
7. Creation of a prosperous city environment;
8. Creation of a city that co-exists with the environment;
9. Securing city safety;
10. Attractive urban development through resident participation;
11. Deregulation measures to guide urban development;
12. Effective urban development making efficient use of limited financial resources;
13. Reorganization of control to promote urban development;
14. Fostering love of Tokyo as a place to live and work.

Mumbai Development Plan: Desirable Constituents

Represented by ward or area committees, Mumbai's development plan should be an assemblage of the felt needs of the entire populace. The selection and organization of the area committees should be a very important and basic task of the planning authority. The final plan can thus be far more action oriented, having emerged from the felt needs of the people and not a restrictive document of a planning proposal prepared by a group of specialists.

Even after its emergence, the development plan proposals have to be widely publicized, and all sections of people actively encouraged and motivated to discuss its ramifications in all its facets. Legal sanction can be sought for such a document only after such wide and grassroots level involvement of the people is enlisted in deciding development options for their own immediate environment.

This proposed mechanics of preparation of Regional or Development plans, by its very approach ensures a total bias for 'development through planning', rather than the present approach of 'planning restrictions in the hope of development'. In short, it is necessary to work out the mechanics by which the Development Plans that emerge, are action plans rather than restriction plans. It is important that they motivate and facilitate development rather than lead to speculation and freezing of development. The plans should define a strategy for the hinterland rather than lead to 'no-man's land' situations. It is essential that these plans clearly indicate how resources can be raised to achieve the intended actions rather than only state pious objectives, oblivious of the realities of the situation in terms of the city's capability to raise resources for the intended development.

The private sector ought to play an important role in achieving developmental objectives, rather than relying heavily on the public sector. But even if a public-private partnership model is envisaged, it is necessary to ascribe a co-ordinator role to public agencies – that of primary investors.

Historically, the physical form of cities has been shaped by the economic, social and political forces of a society. The degree of

awareness of a people about their living environment and their urge to modify it to suit their requirements, forms the substance of a city plan. Unfortunately, in the current scenario, the real plan for a city is the standards prescribed by the DC (Development Control) regulations. The building and development controls that regulate the developments on land in Mumbai are guided by the maximum quantity and the minimum quality the DC regulations allow. The city councillors themselves neither have a vision for the city nor feel the need for one. Their primary interest seems to be to maximize the use of land by indiscriminately increasing the FSI at the cost of the citizens' welfare.

A new development plan for Mumbai should ideally have a radically different approach and be an assemblage of local level citizen-oriented projects. First, development plans need to be prepared for each ward based on the fullest possible public participation, which could be readily forthcoming as the people in each ward can comprehend and perceive the development of the area they are familiar with and are interested in. This would entail completely scrapping the top down approach followed so far.

At the city level, the plan should be perceived not as land use or zonal planning, but as redevelopment of urban pockets to minimize land coverage without increasing FSI and thus maximizing open spaces. The plan can then be coalesced at the city level by experts, keeping in mind the vision of the city and then broken up again into projects for each ward. To avoid pitfalls while preparing the development plan for Mumbai, the city councillors could ensure that the General Development Plan for Mumbai organizes and coordinates the complex relationships between urban land uses at the ward level.

In addition, the plan should chart a course for growth and change for each ward and express the aims and ambitions of the community at the ward level. Moreover, it must delineate the form and character it seeks to achieve at the city level and reflect the policies by which these goals may be reached. It is of utmost importance for planners to be responsive to change by a continual review and not a time interval review, thus maintaining validity in time and space and not a mere revision every five years by law.

The city planners should realize that the context for physical planning decisions has much to do with the points below.

1. The future of construction and infrastructure technologies
2. Innovations including photonics (light/laser paths to replace electrical wiring and cabling).
3. Biotechnology (using new, inorganic materials for technological purposes).
4. Microelectronics (to expand and replace human intelligence).
5. Applications like factory produced modules (to replace on-site structural systems for buildings).
6. Pre-programmed, 3-dimensional people movers (to replace vertical /horizontal systems of elevators and escalators).
7. Self-contained, biotechnological waste disposal systems (to eliminate plumbing and sewer systems).
8. Automated personnel and group transport systems (to replace fossil fuels).

Given the accelerated rate at which new technologies are being absorbed into the mainstream, there will be significant changes in infrastructure requirements of the central business districts of cities over the next 20 to 30 years. Even today, in developed countries, there is a growing reduction in clerical and middle-management workers commuting to CBDs. Employees are opting instead for home-based computers connected to large data processing units, and communicating to other home-based workers by computer, modem and facsimile.

The implications of such future technologies for the physical planning and urban design process need to be understood by city councillors. What may be considered an absolutely essential infrastructure requirement for the development process today, may well be out-of-date soon. The era of the master plan with fixed and designated land uses, densities and transportation relationships, needs to give way to flexibility in all long range planning, integrating the old and new in a continuum of change, with possibility of stable phases at every stage of development and continual updates for adjustments with changing circumstances.

New development proposals cannot be approved without an assessment of the potential environmental impacts and costs for mitigation. These costs should be calculated and built into the sanction process for development and into the long range plans for infrastructure. The context for a flexible and evolutionary development plan framework for Mumbai at the city level could consist of:

a. a strong transport and communication structure and open space mosaic as the only physical depiction of a master plan: a possible network of regional linkages, main arteries for mass transport routes, pedestrian areas, air-rail-road transport terminals to define the basic structure for the city;
b. proposals for the absorption of immigrants within the fabric of the city without economic and social disruption and easy access to services by all: a well defined very high density low technology residential area reserved for absorption of immigrants to the city along the mass transportation routes and termini to ensure flexibility in planning and development;
c. self-operating building and development codes based on incentives in terms of extra development rights: defining plot packages in terms of the possible building envelope may obviate the need for elaborate building codes and rules, combined with incentives in the form of additional floor space for amenities and services provided for the city;
d. Policies with quantifiable parameters for industrial location and creation of jobs: clear policies on location, specific parameters for building space for industries and offices, that will result in creation of jobs.
e. Policies for taxation and revenue generation to make city administration a financially viable proposition: clearly defined policies on taxation based on performance, load on city services and disturbance to the living environment rather than ratable values of properties, taxation for non-development leading to speculation, taxation of all vacant or built properties on the basis of accessibility to city level services and amenities, unearned income sharing and performance standards for city administration in terms of percentage of revenue spent on developmental and non-developmental expenditure.
f. Concern for the environment: protection of the environment through environment impact assessment of all developmental works and the costs for their mitigation.
g. Receptivity to new technologies for infrastructure advances: a continual review of city level services in their technological context to assess quantifiable and visible benefits to society and not to a chosen few in the city (like concreting of roads).
h. Enforceable standards of performance: clear definition and documentation of enforceable standards of performance in all activities carried on in the city, including area licensing for personal vehicles.
i. Integration of historic resources: creation of symbols, landmarks and spaces easily identifiable with the city to create a sense of belonging and pride in the city.

Mass Public Transportation

Measures to improve traffic and transportation in Mumbai should be three-pronged:

1. discourage private transport;
2. improve bus transport and usability of roads;
3. increase the capacity of the existing rail transport network.

Measures like non-registration of new vehicles without proof of parking facilities, has been discussed earlier. Assuring rapid transit bus lanes is another solution which requires improving the usability of roads.

Currently the roads, by and large are used to 50% of their capacity because of permanent roadside parking of all types of vehicles and usurping of road space by pedestrians as the sidewalks have mostly been encroached upon by hawkers.

Hawkers and pedestrians occupy over 50% of the road area, making it look narrow. The real width (which is adequate to carry the current load of vehicular traffic), can be seen for what it really is,

during *Ganesh Visarjan* (immersion), when the roads are cleared of hawkers and pedestrians.

Roadside parking during the day (6am-11pm), should be banned. Hawkers can be reassigned spaces within the compounds of properties abutting the roads, by allowing the property owners to allow the building of booths within their compounds. Hawkers can be charged rent but provided with electricity and water. The sidewalks could thus be made available to pedestrians, freeing the space on the roads. It is estimated that by these two measures –removing parking and encroachments by hawkers – the road capacity can be increased by at least 33%, so that not only rapid bus lanes can be created, but investment on road widening can be postponed for another 20 years.

The objective of increasing the capacity of the existing rail system can be achieved by providing double-decker suburban rail coaches that will increase the capacity by over 66%, taking care of future traffic increase till the year 2020.

Chapter 3 IMPACT OF LIBERALIZATION ON URBAN DEVELOPMENT

Liberalization or Largesse?

The *Oxford English Dictionary* gives one of the meanings of the word liberal as ‘generous’. An overview of the current scenario in the physical planning in Maharashtra, seems to make it the only meaning – generous to builders; generous to investors; generous to industrialists – leaving urban development to take care of itself.

I am reminded of an incident I witnessed 45 years ago. A central government officer had five sons, ranging between 5 and 12 years – all boisterous and constantly at each others’ throats; quarrelling, over the meager food provided and other items; throwing things around in the tiny government flat; while the wife complained about the shortage of funds and non-availability of domestic services. Amidst all this mayhem, the man of the house calmly sat on a cane chair, nonchalantly peeling and eating peanuts. When I asked him in desperation, “How do you manage the household?”, he said quietly, “Whatever happens is management.”

One could sympathize with him because he was at least genuine in his helplessness. But is our government helpless to control anti-people urban development? If so, as planners, we could have suggested remedies. But the government and the administration are not helpless, but actively aiding and abetting chaos in the name of liberalization.

Till a few years ago, the government and administration undertook projects to benefit the people. But in the process awarded the work and contracts to favoured ones and received their gratification by

way of Diwali gifts. Soon the gifts turned into 'cuts' from contractors. Then the politicians, directly or indirectly aided by the bureaucrats and technocrats, started undertaking huge projects which did not necessarily benefit the people but brought in huge kickbacks. The construction of a large number of flyovers in Mumbai, as against the assessed requirement by MMRDA, is a glaring example.

It was then that I wrote, and many agreed with: Projects are undertaken for their propensity to generate kickbacks for the Politicians and Bureaucrats and any benefit accruing to general public is incidental and unintended. I thought we had reached the limit but I was sadly mistaken. More was to come.

The Story Behind the New Laws

When bureaucrats and technocrats found that the wishes of politicians could not be 'fitted' within the framework of the existing laws, they proposed the legislation of new laws. Thus was born the notification (in Maharashtra), on the development of townships of 100 acre or more, on any land – be it the coastal ecologically sensitive zone, forest lands, or *Adivasi*-owned. The SEZ law also came in and allowed private industrialists to buy and take over agricultural land. Bureaucrats and technocrats, in fact vied with each other in justifying such projects and jumped on the bandwagon of the lucrative assignments these projects brought in their wake.

S.S. Tinaikar, an ex-Municipal Commissioner of Mumbai, once said in a televised interview, that the breed of bureaucrat and technocrat who used to stand up to the politician and say, 'It can't be done', is now extinct! We now have a new generation of the breed who ask the politician. '*Farmayiye apki marzi kya hai mere aka* (command what is your wish my lord); and we shall fit it into the framework of laws and by-laws! How can one otherwise explain the recent audacity of the Town Planning Minister of a small state in designating the entire state as an Urban Area in the regional plan?

In this way, the new Politician-Bureaucrat-Technocrat (BPT) combine has come into being.

SEZ or Authorized Land Grabbing

A National Act was introduced in April 2000, for setting up Special Economic Zones to provide an internationally competitive and hassle-free environment for exports. Units could be set up in SEZs for the manufacture of goods and the rendering of services. The units in the zone needed to be net foreign exchange earners, but were not subjected to any minimum export performance requirements. Special Economic Zones are deemed to be foreign territory for the purposes of trade operations, duties and tariffs. As of 2007, more than 500 SEZs have been proposed, 220 of which have been created. This has raised the concern of the World Bank, which questions the sustainability of such a large number.

The Act violated the right to life and livelihood of the people who are being forcibly displaced for implementation of such projects. The principle of 'eminent domain', which is the basis of the Land Acquisition Act (1894), has been misused and given priority over the principles of the 73rd and 74th Amendments of the Constitution, that give primacy to *gram sabha*s as autonomous decision-making entities. The status of 'deemed foreign territory' having been granted to the SEZs, further undermined the sovereignty of local governance systems. Most worrisome, however, is the concentration of power in the hands of the Development Commissioners at the State level, who are bureaucrats reporting to political masters, who in turn are influenced by industrialists.

The logic for creating an SEZ is to offer infrastructure and other facilities that cannot be provided quite so easily across the country as a whole. This means assured electricity, good transportation links and flexible labour laws. The crucial element that justifies making special provisions for infrastructure and relaxing labour laws, is the 'additionality' factor. In other words, the investment that comes into a special zone has to be more than in normal areas.

The danger here is that if the primary attraction of a SEZ is its tax benefits, it can become a tax-dodging zone. India already has tax loopholes of many kinds and does not need to add another one.

The cost of providing tax exemptions (according to a statement by the country's Finance Minister), is a substantial INR158,000 crore.

The zones themselves are often small, as small as 100 hectares, except where large tracts of land close to metropolitan areas like Mumbai or Navi Mumbai, have or are being acquired, as highly lucrative real estate development propositions. For some special industries (software, bio-tech, gems and jewellery), the minimum size has been reduced to 10 hectares, which is little more than the size of an industrial plot. Providing quality infrastructure in such a small area can have no real meaning. No transport advantages would exist and the electricity generated within the SEZ would be through a medium-sized diesel-generating unit. One could as well declare every large factory in the country a special economic zone. Instead, the PBT combine gains huge kickbacks when huge tracts of land are forcibly acquired by industrialists, who then pay compensation to the small farmers who, for generations, have known no other occupation other than faming and agriculture.

The SEZ idea that worked in Communist China does not translate so well in democratic India. China first set up some SEZs in the late 1970s, in south-eastern China, with an eye to luring dollars to the motherland from their compatriots in Hong Kong, Macao and Taiwan. The SEZs were vital to the development of China's export machinery. But what has been the cost to China? Will India not bear a similar cost?

China has to feed 22% of the world's population on only 7% of global land. In July 2005, China's countryside had over 26.1 million people living in absolute poverty. It was home to 18% of the world's poor, according to Chinese Minister Li Xuju, quoted in the *People's Daily*. Every year, an additional 10 million people have to be fed. Despite this daunting target, between 1996-2005, 'development' caused diversion of more than 21% of arable land to non-agricultural use – chiefly highways, industries and SEZs. Per capita land holding now stands at a meager 0.094 hectares. In just thirteen years, between 1992 and 2005, 20 million farmers have been laid off agriculture due to land acquisition.

SEZs like Shenzen in Guangdong, showcasing the economic miracle of China, are beset with problems. After growing at a rate of around 28% for the last 25 years, Shenzen is now paying a huge price in terms of environmental destruction, soaring crime rate and exploitation of its working class, mainly migrants. In 2006, the United Nations Environment Programme designated Shenzen a 'global environmental hotspot', meaning a region that has suffered rapid environmental destruction. The Shenzen sky is thick with choking smoke, while the crime rate is almost nine-fold higher than in Shanghai.

While export-driven policy for economic growth has helped China touch record growth figures, the income gap is widening and rapidly approaching the levels of some Latin American countries. Going by a recent report by the Chinese Academy of Social Sciences, China's Gini co-efficient – a measure of income distribution where zero means perfect equality and 1 is maximum inequality – touched 0.496 in the year 2006. In comparison, income inequality figures are 0.33 in India, 0.41 in the US and 0.54 in Brazil. Further, the rural-urban income divide is staggering – the annual income of city dwellers in China is more than three times that of their rural counterparts.

There is no doubt that exports play a significant role in boosting GDP. However, in the case of India, with a sizeable domestic market, the choice lies with the producer to either export or supply to the domestic market. Household consumption in India at 68% of the GDP, is much higher than that of China at 38%, Europe at 58% and Japan at 55%. This is an important source of strength for the domestic manufacturing industry in India.

In India, with 65% of the population depending on agriculture as a means of livelihood, industry ought to be complementary to agriculture. Through SEZs, however, industry is being promoted at the cost of agriculture. Valuable resources spent to create SEZs will take away from the allocation for building better infrastructure in the rest of the country. Creating so many SEZs would seem to exacerbate the widening inequality in India, both in terms of individual income and national infrastructure.

The SEZs are being granted approvals with no mention of any studies being carried out on the social- environmental impact and damage. India is already going through a crisis in terms of water scarcity, as well as loss of forests and biodiversity. The cost in terms of lost forests and other common lands, large scale exploitation of water resources, coastal land, and environmental pollution, are not even being computed. The very legislative framework of the SEZs makes it a draconian Act that promotes large scale privatization and monopoly of resources in the hands of a few private developers, at huge costs to the state exchequer as well as the economy and environment. It has taken on the shape of authorized land grab, to benefit private developers and the PBT combine.

Farcical New Townships Notification

This notification in Maharashtra applies to projects with a minimum size of 100 acres. For projects of this size, the developer does not need to get the user status of the land changed from agricultural to non-agricultural. All that the developer has to do is approach the Urban Development department with the details of the project and get it notified as an Integrated Township Project.

This notification changes the user status of the land from agricultural to non-agricultural. All further clearances for the township are given by the concerned district collectorate or municipal corporation, based on detailed project designs.

Companies taking advantage of this policy are supposed to develop all the infrastructure within these townships; from roads, to sewage treatment plants and schools to shopping malls. To make these investments attractive, the government has also reduced stamp duty on transactions within these Integrated Townships by 50%. The policy is supposed to tie in with the government's stated aim of attracting Foreign Direct Investment into the real estate sector, the minimum project size for which is also 100 acres.

This notification by the Maharashtra Government allows developers to build townships on land of 100 acres or more and these proposals are directly sanctioned by the state government. The lands could be located within or just outside the municipal limits of existing cities; in forests or *Adivasi* areas, or in the no-development or green zone of the existing city plan – even in ecologically sensitive areas of the coastal zone. Can it be enough to merely insist that all physical infrastructure within the new township be developed by the developer, while changing the original status of these areas?

What about the source of water supply? Energy? Solid and liquid waste final disposal? Schools, colleges, hospitals, work places? Well, with the permission of the state government, all these facilities can be availed of from the infrastructure of the existing city! So it facilitates the development of colonies with wide roads and gardens, as on the periphery of New Delhi or like Amby Valley near Pune, at the expense of the taxpayer in existing cities.

The impact of this liberalization will facilitate luxurious habitats and result in the following disasters.

- Destruction of the environmental/ ecological balance.
- Paucity of land for agriculture, horticulture and vegetable farming, creating scarcity for city dwellers.
- Displacement of a large *Adivasi* population.
- Deforestation, resulting in climate change.
- Increased vehicular traffic to existing cities from these townships for work/recreation/education/medical facilities.
- Serious imbalances in the urban economy leading to crime and lawlessness.

It would be foolish to think that this impact is not comprehended by those in power. On the contrary, it enables the initiation, programming and blueprinting, of new projects like flyovers, metro rails, sea links, and multistoried housing, all of which provide endless sources of commissions.

Chapter 4

A SUSTAINABLE URBAN DEVELOPMENT MODEL

Mumbai

Mumbai (~~Bombay~~) used to be called the Manchester of India, due to its flourishing cotton textile Industry. At one time, till around 1950, there were about 85 cotton textile spinning and weaving mills employing over 100,000 workers. Over the years, ageing of the machinery of the mills and the inability of the industry to rejuvenate due to the advent of manmade fibres and a crippling strike by the workers in the '60s, compelled most of the mills to close down. These mills occupied large tracts of land owned either by the government or the Municipal Corporation, with lease terms for as long as 99 years. Most of these mills are located in the island city (south), of Mumbai and are considered a prime location. The mills occupy over 220 hectares of land currently estimated to be worth INR10,780 million (US$ 200 million).

Development of Textile Mill Lands

Under the Development Control Regulations for Mumbai, which came into force in 1991, section 58 prescribed that the total land (built and unbuilt), occupied by the mills, be divided equally among the mill owners, the Municipal Corporation and the Maharashtra Housing and Area Development Authority (MHADA). The owners were free to use their share of land for any permissible land use as prescribed in the Mumbai Development Plan; the land allocated to the Municipal Corporation would be developed by it for open recreational activities, and that allocated to MHADA, would be utilized for the construction of housing for the lowest income groups. In actual fact, most of the land now remains with the owners/lessees.

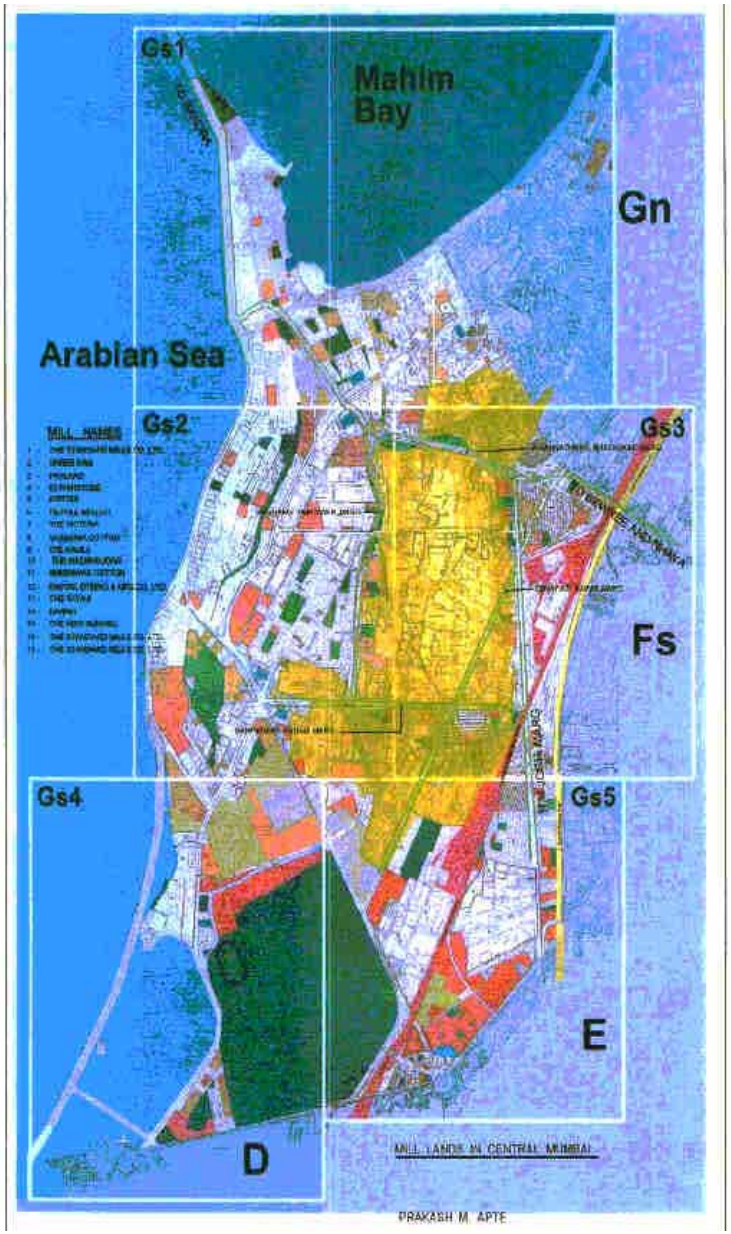
As the mill owners were not happy with this disposition of their lands, the state government appointed a committee under the eminent architect Charles Correa. The committee gave its report and more or less endorsed the provisions of section 58, of the Development Control Regulations. Under pressure from the mill owners and the political lobby, the state government tried to modify section 58 by excluding from the 'land' of the textile mills, all the area originally being used for the working of the textile mills! According to some newspaper reports, this resulted in reducing the available land area to be distributed between the Municipal Corporation and MHADA, to about 5% of the total land. Thus under section 58, the mill owners retained 95% of the total area.

Mill Lands for Whose Benefit?

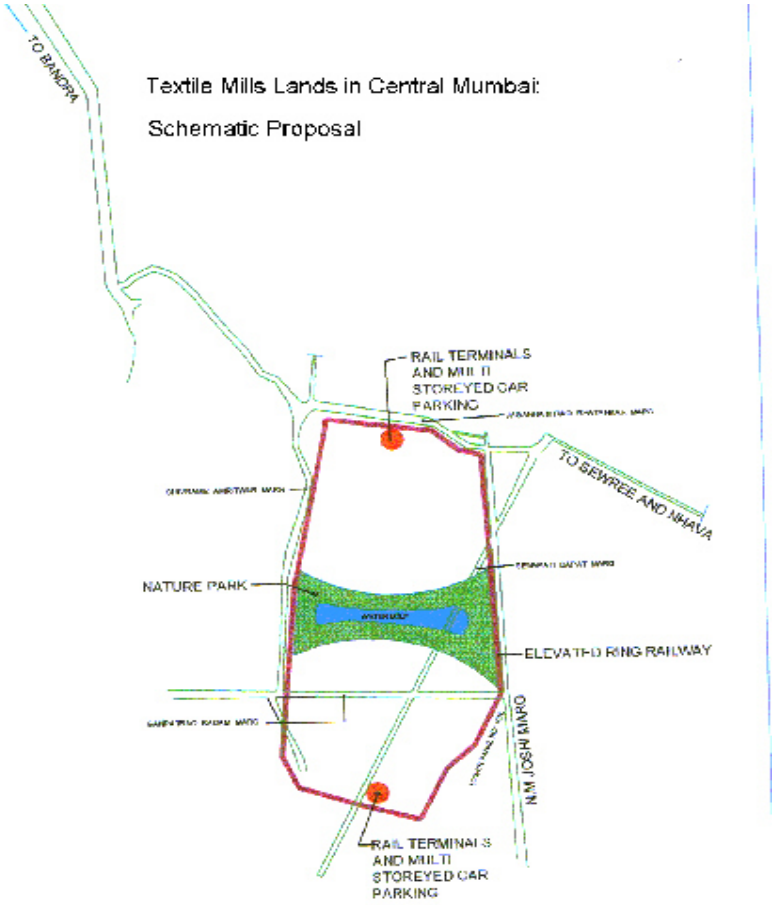
As was to be expected, there was a great outcry from the public and citizens' forums against this backdoor method of benefitting the mill owners. The state government therefore appointed another committee to redefine section 58 of the Development Control Regulations. However, such mere tinkering with the DC Regulations does not deal with the basic issue. Three crucial questions arise: first, are these lands to be used for the city or for the benefit of a few? Second, should the city not prepare a unified structure plan for it? Third, can a model of sustainable urban development be demonstrated on these lands?

Developing a Sustainable and Replicable Model

The mill lands of central Mumbai could hold the key to the future model for the city's development. A large number of mills, occupying over 150 hectares, are almost contiguously located at the nodal point of the proposed joining of the Bandra-Worli Sea Link with the proposed Shivree-Nhava Trans-Harbour Sea Link, through J. Bhatankar Marg.



The area occupied by these textile mills, mostly to the south and partly to the north of J. Bhatankar Marg, is bound by N.M. Joshi Marg to the east and S.S. Amritwar Marg to the west, extending along Mahalaxmi Racecourse in ward G South (highlighted in yellow on the map above). Thus, a north-south expressway skirts this area to turn east and proceed to the mainland through the proposed Trans-Harbour Sea Link. The map below demonstrates this vantage location.



There is a temptation for the state and local self government, to sell off these lands to private developers for high-end residential development. Apart from the inequity that will arise (over 100,000

mill workers, who were rendered jobless due to the closure of these mills, will be left high and dry), a great opportunity for the city to demonstrate a replicable model of sustainable development will be lost. The original provision in the development control regulations did try an equitable solution by apportioning the land to the owners, the workers and the city. But this provision is being diluted under the pressure of high land prices in the areas where these mills are located. Hence, all enlightened citizen should unite to convince the government to experiment with a sustainable model of development on this land that can be replicated elsewhere in the city.

Irrespective of the use or apportionment of this land among the owners and/or statutory bodies, it is imperative that all these mill lands are 'assembled' for an integrated urban development model through:

1. a Town Planning Scheme under section 59 of the Maharashtra Regional & Town Planning (MRTP) Act;

2. declaring it a special planning area under the MRTP Act and appointing MMRDA as the Special Planning Authority (SPA);

3. making it obligatory under section 58 of DC regulations to prepare an overall layout by the Municipal Corporation of Greater Mumbai.

Thereafter, a structure plan can be prepared for this area, incorporating the following basic elements relevant for most future development options, such as:

a. two mass rapid transit terminals on the northern and southern periphery with road-rail interchanges;

b. multi-storied automobile parking adjoining these terminals on the periphery of the area;

c. a Rapid Bus Transit System encircling the area ;

d. a 'nature park' with a lake (for water harvesting, pisciculture etc.) running through from east to west.

This entire area can then be made into a model of sustainable development by providing a desalination plant/rain water harvesting for its potable water requirements, and harnessing solar and sea wave energy for generation of electricity, and sewage treatment plants in each building to recycle the water for growing fruits and vegetables by hydroponics on the terraces; making the ground area automobile free for pedestrian movement (as done in Bogota, Columbia). This 150-hectare model urban development project should be made self- sustaining with least dependence on the existing infrastructure services of the city. The area can then be used beneficially for the city and its citizen for alternatives such as:

- a high density residential development with a socio/cultural center for entire Mumbai,

- a permanent exhibition/conference centre with an amusement Park like Disney World,

- a new Central Business District (CBD) for Mumbai.

Whatever be the development, being located along the two most important arteries of Mumbai, this land must be used for the city and its citizens by developing such a model. Will the state government prove its sincerity on its pronouncement to turn Mumbai into Shanghai by doing so? Or will it offer it on a platter to the mill owners?

March 2005

Despite the presentation made by the author (which was well received by many public spirited members), the Committee failed to convince the state government to assemble these lands for public purposes. Its report lies gathering dust in government files.

Chapter 5 SLUMS: REMODEL OR REDEVELOP? THE CASE OF DHARAVI

Misguided Dharavi Redevelopment

By the end of year 2012 perhaps, history's most ambitious slum-clearance project may have completely eliminated Dharavi, the beehive of human activity that houses over 1 million people. Possibly the world's most-written-about slum, which is the source of billions of dollars in economic activity, most of it involving the transformation of waste into useful new products in makeshift factories of wood, corrugated metal and plastic sheeting, will all be gone. It will be replaced with a master-planned community that gives each slum family a 225-square-foot house with running water, a toilet and electricity. These tiny homes, devised by the Slum Redevelopment Authority, will be located in multi-storied concrete buildings provided free by the developers, who in return, will get the right to build 40 million square feet of commercial developments and condominiums in exchange for re-housing the Dharavi residents in these cubbyholes.

This demolition may be a well-meaning if misguided act by a reform-minded government, to ostensibly improve the unhygienic conditions of the poor in Dharavi, but in reality, it will reap multi-million dollar profits in selling office space and top end apartments on the land to be vacated by the poor Dharavi residents.

Pseudo Urban Planners

The planners have designed a 'city in the sky,' with elevated walkways connecting high-rise apartment buildings. These developments are to be carried out by planners who have given no more than a token hearing to the well-established communities in Dharavi that will bear the brunt of the makeover.

Every family in Dharavi has paid for its housing through complex social arrangements that go back decades. They all get electricity, cable TV, and a range of other services through non-official and intricate networks. The families there have been drawn to the slum because of its wealth-making potential and have carefully built up a livelihood and an ad-hoc system of social security.

The crucial flaw in this top-down, slum-clearance plan is that it is based on the belief that people live in Dharavi because they have fallen out of mainstream society. Nobody wants to live in a neighbourhood that smells like a toilet and everyone prefers a solid roof to a sheet of plastic. People everywhere want their children to attend safe, well-run schools. And yet, despite this, urban slums like Dharavi, are still a vast improvement over rural poverty in India, particularly in Maharashtra.

Examples of Other Countries

In the past 40-odd years, more enlightened and less greedy governments in Asian and South American countries, have adopted rational and saner ways for slum rehabilitation; granting people title deeds to their tiny plots of land and providing minimal physical infrastructure like sewage, water and other utilities. 'The best plans generally let the slum dwellers themselves make the main decisions in planning their future. Government can provide clean water, toilets, electricity, garbage collection and disposal, and maybe let people build their own houses if they can, using materials that they can find or recycle,' says Aprodicio Laquian, the Filipino-Canadian planner, who practically invented the idea of slum-dweller-designed urban rehabilitation in the 1960s. These schemes, known as 'slum upgrading' or 'sites and services', have been at the heart of the most successful urban-renewal projects of the past for decades. The most impressive of these is Indonesia's Kampung Improvement Programme, which doesn't look like a project at all, but like a group of densely populated, pleasant, working-class neighbourhoods.

This is the sort of approach that India and Mumbai should be emulating. But the desire to plan from the top and bulldoze the aspirations of the people who have built their lives in the slums, continues to win the day. Dharavi still offers a better model than any Western plan to house a booming urban population in Mumbai. The soaring urban population can only be accommodated without disastrous social and environmental consequences by developing local urban design rather than a single monoculture of globalization.

Dharavi: a Sustainable Settlement

Dharavi contains the attributes for environmentally and socially sustainable settlements. Its use of local materials, walkable neighbourhoods, and mix of employment and housing, add up to 'an underlying intuitive grammar of design that is totally absent from the faceless slab blocks that are still being built around the world to 'warehouse' the poor.'

Western developers often export plans for large-scale, high-rise buildings to developing countries without realizing that slums like Dharavi are rich in the ways in which its inhabitants live and organize themselves as communities. In a few years' time, such communities will be perceived as best equipped to face the challenges that confront us because they have a built-in resilience and genuinely durable ways of living.

Mumbai has an estimated population of 12.7 million. Of this, only about 35% live in regular, permanent housing. The other 65% live in informal settlements, squatting on sidewalks and under bridges. Nearly ~~12~~ million people occupy settlements on private and public open lands, some of which are more than 50 years old. Dharavi is one of them.

Dharavi Location

Dharavi is Asia's largest and the world's second largest slum. Sandwiched between Mahim in the west and Sion in the east, it spreads over an area of 175 hectares, or 0.67 square miles. It has a population of about 1 million. Located in the heart of Mumbai, Dharavi has about 100,000 makeshift homes and one of the world's highest population densities at more than 2,700 persons per hectare

Dharavi sits just across from the Bandra-Kurla Complex, a fast developing commercial centre that has overtaken Nariman Point, the current downtown of Mumbai. Dharavi is also located close to Mumbai's present domestic and international airports. Despite its plastic and tin structures and lack of infrastructure, Dharavi is a unique, vibrant, and thriving cottage industry complex, the only one of its kind in the world. Despite its common depiction as a slum, it is actually a successful work-cum-residential settlement. It is, in fact, the kind of self-sufficient, self-sustaining village community that Mahatma Gandhi wrote about in his books on India's path to development. What it lacks is infrastructure and amenities to support the community.

Dharavi is also located between Mumbai's two main suburban railway lines, the Western and Central Railways. To its west are Mahim and Bandra, and to the north lies the Mithi River, which flows into the Arabian Sea through the Mahim Creek. To its south and east are Sion and Matunga. Both its location and poor drainage systems make Dharavi particularly vulnerable to floods during the monsoon season.

History

In the 18th century, Dharavi was an island. The area was predominantly a mangrove swamp inhabited by fishermen. The fishing industry disappeared over time when the swamps were filled and the separate islands were made into a contiguous land mass leading to the creation of the city of Bombay. In the process, the creek dried up and Dharavi's fishing town was deprived of its traditional sustenance.

The newly-filled marshes provided space for new communities to move in. Migrants from Gujarat established a potter's colony and Maharashtrian tanners belonging to the *Chambhar* (leather workers) community moved here and set up the leather tanning industry. Other artisans like the embroidery workers from Uttar Pradesh, started the readymade garments trade. Tamil migrants started coming in and many of them worked in the tanneries.

Google map showing areas of different work centres.

Economy

Dharavi pulsates with intense economic activity. Its population has achieved a unique, informal self-help urban development structure over the years without any external aid. The residents, though bereft of housing amenities, have been able to lift themselves out of poverty by establishing thousands of successful businesses. A study by Centre for Environmental Planning & Technology (CEPT), Ahmedabad, indicates that Dharavi has about 5000 industrial units, producing textile garments, pottery and leather, and performing services like recycling, printing, and steel fabrication. There is an increasingly large recycling industry, processing waste from other parts of Mumbai. Dharavi has an estimated 15,000 single-room factories. Many products are distributed in global markets. One conservative estimate places the annual value of goods produced in Dharavi at US$ 500 million. A unique characteristic of Dharavi is its productive activity which takes place in nearly every home. As a result, Dharavi's economic activity is decentralized, human in scale, home-based, ~~low-tech~~ and labour-intensive. This has created an organic and incrementally developing urban form that is community-centric and network-based, with a mixed use, high density and low-rise streetscape. Unfortunately, Dharavi is depicted as a slum, due to the lack of residential infrastructure (roads, housing with individual toilets, public amenities and conveniences). In fact, it is not a residential slum but a unique, self-contained township.

Slum or Model Village?

Prince Charles said, 'Dharavi offers a better model than does western architecture for ways to house a booming urban population in the developing world.' He warned that a soaring urban population could only be accommodated without disastrous social and environmental consequences by developing local urban design rather than 'a single monoculture of globalization.' He also said, 'Dharavi contains the attributes for environmentally and socially sustainable settlements for the world's increasingly urban population.' The Prince's comments are a criticism of Western developers who export plans for large-scale, often high-rise buildings, to developing countries. 'I strongly believe that the West has much to learn from societies and places which, while sometimes poorer in material terms, are infinitely richer in the ways in which they live and organize themselves as communities,' he told planners. 'It may be the case that in a few years' time, such communities will be perceived as best equipped to face the challenges that confront us because they have a built-in resilience and genuinely durable ways of living.'

Dharavi is not representative of other slums in India. Unlike most other slums, it is not formed by migrants to the city in search of employment. It is a pre-existing village that has densified due to the immigration of new skills as the scope for earning expanded.

Dharavi: Redevelop or Remodel?

If Dharavi is redeveloped as an *in-situ* development, its contribution to the city's economy will continue and grow. But if the residents are resettled in multistory towers with 30 sq. mt. cubbyhole apartments, in the way that an American developer has suggested and the state government has accepted, it will make it almost impossible for the erstwhile residents to carry on their work; and their contribution to the economy will substantially decrease. Many of the jobs in Dharavi include textile and leather work, which have been labeled as heavily polluting and will not be allowed in the new redevelopment plan. Except for leather, that too, only tanning, none of the other jobs are even lightly polluting.

Given the current economic situation in India where the gulf between rich and poor is widening and the middle class is almost being wiped out by the rampant and blatant financial and moral corruption of the system of governance, the only way to improve living conditions in the slums is by providing basic physical infrastructure like water supply, sewage disposal and health care.

Road to Gentrification

Are we then heading towards gentrification of Dharavi? Gentrification is defined as the process by which wealthier (mostly middle-income) people move into, renovate, and restore, housing and sometimes businesses, in inner cities or other deteriorated areas, formerly home to poorer people. The affordability gap is fundamental to explaining gentrification as an economic process. When the gap is sufficiently wide, real estate developers, aided by the government (as in Dharavi), and those with vested interests in the development of land, perceive the potential profit to be derived from re-investing in inner-city properties and redeveloping them for top end buyers of real estate. Such redevelopment effectively stops the poor from access to affordable housing, and leads to higher real estate prices affordable by the new occupants, but not by the original lower income inhabitants.

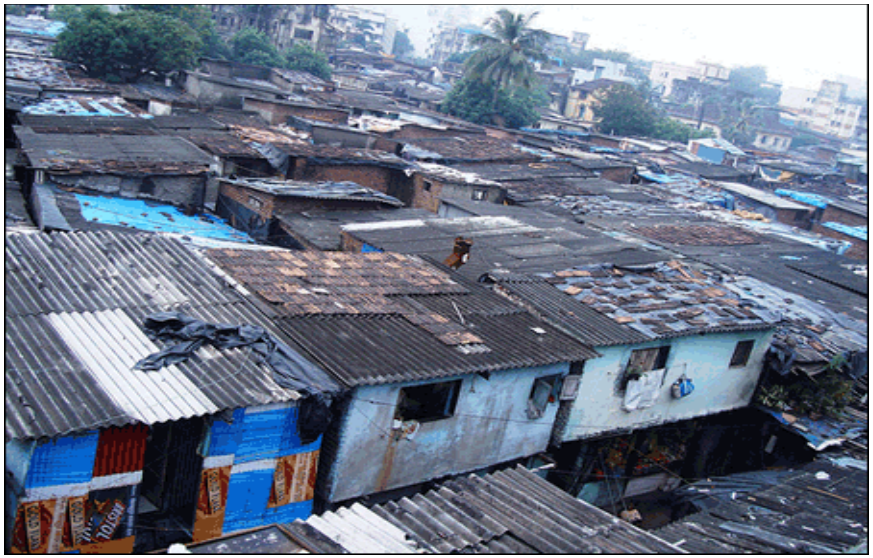
The real estate market changes when gentrification occurs. Once this happens, even the small-sized residential units built for the original residents of the area, are often converted to condominiums or luxury housing available for purchase. The developers in Mumbai have demonstrated expertise in designing 300 sq. ft. apartments meant for the original slum dwellers in a way that 2-3-4 of these on a single floor can be amalgamated conveniently to form larger apartments for the affluent! As real estate changes, land use is also altered. Prior to gentrification, these areas usually consist of low income housing and sometimes light industry. Afterwards, there is still housing, but it is usually high end, along with offices, retail, restaurants, and other forms of entertainment.

Because of these changes, gentrification significantly affects an area's culture and character. Over time, prices go up and the lower income people present there are priced out and replaced with middle and upper income people. These people then demand greater amenities and housing stock and businesses change to cater to them, again raising prices. These rising prices then force out the remaining population of lower income people and more middle and upper income people are attracted, perpetuating the cycle of gentrification.

The worst outcome of gentrification is its displacement of the redeveloped area's original inhabitants. Since gentrified areas are often in the run-down urban core (as in Dharavi), lower income residents are eventually priced out. In addition, retail chains, services, and social networks are also priced out and replaced with higher end retail and services. It is this aspect of gentrification that causes the greatest tension between residents and developers.

Replicate Dharavi

Considering its community-based successes, Dharavi needs to be replicated (albeit with adequate physical infrastructure), and not demolished. Instead, the state government wants to force the relocation of Dharavi's population into tiny cubbyhole apartments in high rise towers so that the vacated land can be commercially exploited by developers through the Dharavi Redevelopment Plan. At a conservative estimate, a development of this magnitude could fetch $460 million for a developer, giving a profit of at least 900%.



Dharavi is full of makeshift shacks like these, housing more than 100,000 families. Photo: Soumik Kar

Workers in Dharavi's thriving informal economy. Photo: Soumik Kar

Another Option: *In-situ* Development

Would it not be rational and just, to give land tenure to the existing residents of Dharavi so that they themselves can redevelop the area and upgrade its physical environment through self-help efforts by registering ownership to their piece of land and availing institutional finance?

Why is such an *in-situ* redevelopment approach of self-help (invariably suggested by experts all over the world and by financial institutions like the World Bank), not being adopted?

There are three main reasons for this.

1. Because the politicians, bureaucrats and technocrats cannot proclaim their great vision unless the solutions are grandiose and glamorous and news-worthy for the print and electronic media.

2. Because it precludes taking up huge capital investment projects that can generate equally huge kickbacks.

3. Because a scheme of acquiring over 175 hectares of land in the prime location of Mumbai in the name of slum redevelopment and converting it into a grand real estate development can generate astronomical profits.

What is 'unique' about the DRP (Dharavi Redevelopment Plan of the state government), is not its concept, as claimed by its planners, but its overt attempt to deprive over 100,000 families of their traditional livelihood and home-cum-work places so that the land can host commercial urban development that can ride piggyback on the infrastructure already created in BKC at the cost of the public exchequer and benefit the developers.

Part layout plan of buildings grouped around small community open spaces: Tamil Nadu Slum Clearance Board (TNSCB) Chennai, prepared with guidance from the Author

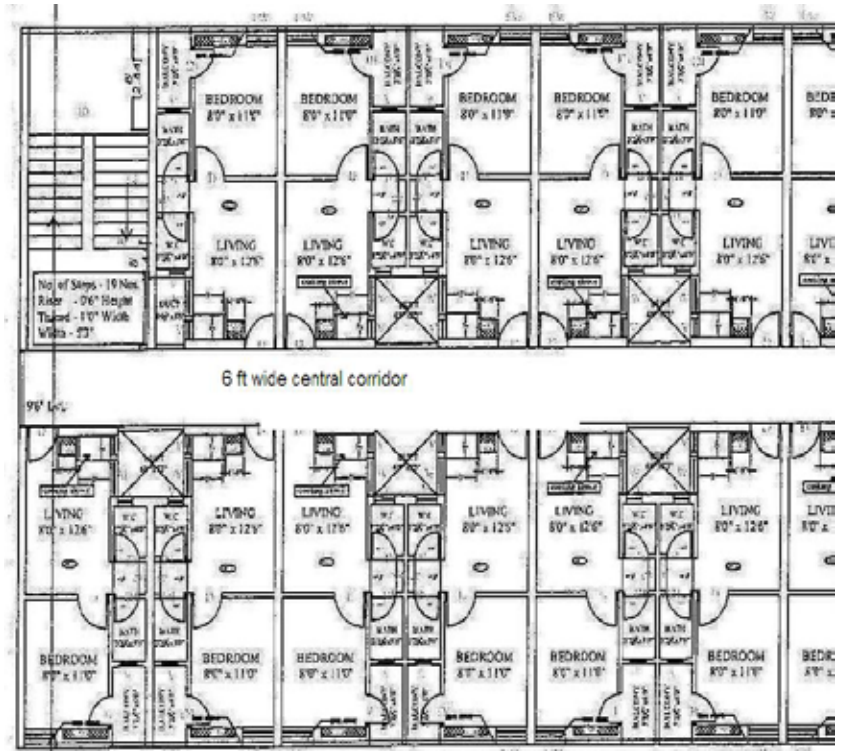
Remodeling Low-Rise Development

The least that can be done is to insist on remodeling the Dharavi project to provide for:

1. low-rise-high density development for the existing families engaged in crafts like leather tanning and making leather goods and pottery so that each house with ground + first floor has a terrace and a courtyard that will afford proper space for their work;
   or
2. provide stilt + 3 floor small apartments with the entire ground floor under the building and the terrace free for carrying on their occupation that requires large open areas.

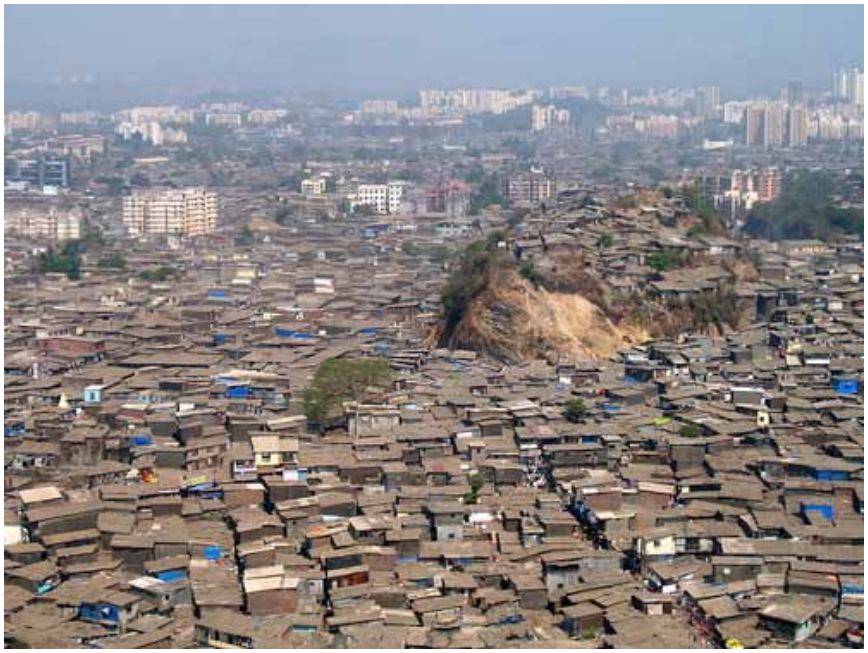
The buildings layout plan suggested here can achieve a density of 450 dwelling units per hectare in stilt + 3 floors. Either of the above options is practicable as proved on ground in a demonstration project by HUDCO at Agra, when I was its Chief, and a recent proposal under my guidance as a Consultant to the World Bank for a resettlement project by Tamil Nadu Slum Clearance Board (TNSCB) in south India. It will not require more than 140 hectares of land for housing 100,000 families including roads and all amenities.

Allocating about 14 hectares for a central recreation park will leave 20 hectares of land free for multi-storey parking structures and free sale of top end apartments.



Part Building Plan of 300 sq.ft. dwelling units in stilt+3 story construction: at Chennai by TNSCB

The part building plan illustrated above provides 300 sq. ft. individual tenements with independent toilet facilities. The tenements are grouped around a central corridor recreating the street environment conducive to social interaction and reminiscent of their erstwhile abodes in Dharavi. The plan envisages provision of all social facilities like schools, playgrounds, community and health centres, religious places, and shops exclusively for this population within their enclave; marketing facilities for their products; multistory parking facilities for visitors' cars and goods carriers; and a large recreation garden of at least 14 hectares.



Can low-rise living environments be suddenly transformed into high-rise?

The Government Plan

Under the Government Plan, the entire land of 175 hectares is to be made available free to the developers. In the suburbs of Mumbai, Floor Space Index (FSI) permissible is 1.00. This being treated as a Slum Redevelopment Scheme, the FSI permissible would be 4.5 (Development Control Regulations-DCR-for Mumbai, 1991). It means that, in this land of 175 hectares, after deducting statutory open space of 15%, total floor area that could be built will be 4.5 times the balance land (aprox.150 hectares), ie. 675 hectares. For re-housing 100,000 families in 225 sq. ft. carpet area (approx. 330 sq. ft. built up area) apartments, total floor area required would be around 300 hectares.

This would leave a balance of ~~345~~ hectares of FSI for free sale, in the form of top end apartments, offices, shopping malls by the developers. Construction of 100,000 apartments for the existing residents at a carpet area of 225 sq. ft. each will not cost more than INR 250,000 per apartment (based on cost of resettlement in the World Bank aided MUTP II project recently completed).

The total cost of re-housing would therefore be INR 2500 million or US$ 52.06 million.

The total land (inclusive of roads, open spaces and amenities), required for these 100,000 apartments in 20-storey buildings at the standards permitted by the Slum Redevelopment Authority (SRA), will be about 50 hectares, leaving the balance of over 125 hectares to be used by the developer for construction of free sale apartments and commercial space. At the current price (based on sale of land by Mumbai Metropolitan Region Development Authority-MMRDA), of around INR 28,000 per sq.m.(prices as in 2007) of FSI, the FSI available for sale on the balance land (560 hectares), would fetch approx. INR 14,448 million, or US$ 328.36 million. Deducting the cost of 100,000 flats (US$ 56.80 million), there would be a clear profit of INR 11,948 million or US$ 271.56 million – a return of 478% on investment. With current market prices, this can double to 956%!

The people must reject such a plan and insist that at least 85% of the land be used for the present occupants and only 15% (at FSI of 1.00 only), for the free sale apartments. The present proposal by SRA crams the existing occupants into 15% of the land and takes away 85% in the guise of economic feasibility.

Even by using only 15% of the land (27 hectares), at FSI 1.00, the total floor space available for free sale (after leaving 15% for open spaces), will be 2,72,000 sq. mts. Sale of this floor space at a market price of Rs. 1,00,000 per sq. m. will fetch INR 2720 million. Deducting the cost of construction of this space at INR 20,000 per sq. m., profit could peak to INR 2176 million. Taking the cost of development, facilities and housing for 100,000 families at INR10,00,000 per unit, the total cost will be INR 1000 million.

Thus, it would give a net profit of INR 1176 million(29.4 million US$). But that could still be too little for the originators of the scheme, who aim at a profit of 9 times more.

The Worst Land Grab Ever

Any plan for Dharavi should explicitly take into consideration the work-place relationship developed over the years so that it does not destroy the existing intricate urban structure that has sustained the local economy. The plan must acknowledge existing economic activities and their spatial organization, and not destroy it in the process of redevelopment. Sectoral divisions of Dharavi proposed in the Dharavi Redevelopment Plan that segregates land uses, is evidence of the insensitivity of the top-down approach to planning here. The involvement of the concerned population in the planning process is an imperative if the redevelopment is to be successful from a human and urban perspective. But for the most part, the population of Dharavi has not had much say in the creation of the plan for their community.

Ground + 5 story apartments for slum dwellers: Mumbai. Photo: Author

Case studies all over the world have documented the inappropriateness of high-rise resettlement projects in poor areas. The social and economic networks, which the poor rely on for subsistence, can hardly be sustained in high-rise structures. These high-rise projects are not appropriate for home-based economic activities which play a major role in Dharavi.

The least that can be done in this redevelopment plan is to refurbish the work places of the existing industries within the residential areas and remodel the project by providing low-rise, high-density row housing for existing families engaged in home-based occupations. This way, each house will have a ground floor and an additional story, as well as a terrace and a courtyard, which can be used for these home-based business activities.

Unfortunately, the formulation of the Dharavi Redevelopment Plan as a profit-maximizing real-estate tool, leaves little room to explore such sustainable and economically viable low-rise, high-density approaches. It exposes the DRP as a weak cover-up for a land grab of the worst kind.

Chapter 6 LOW-COST SHELTER OPTIONS

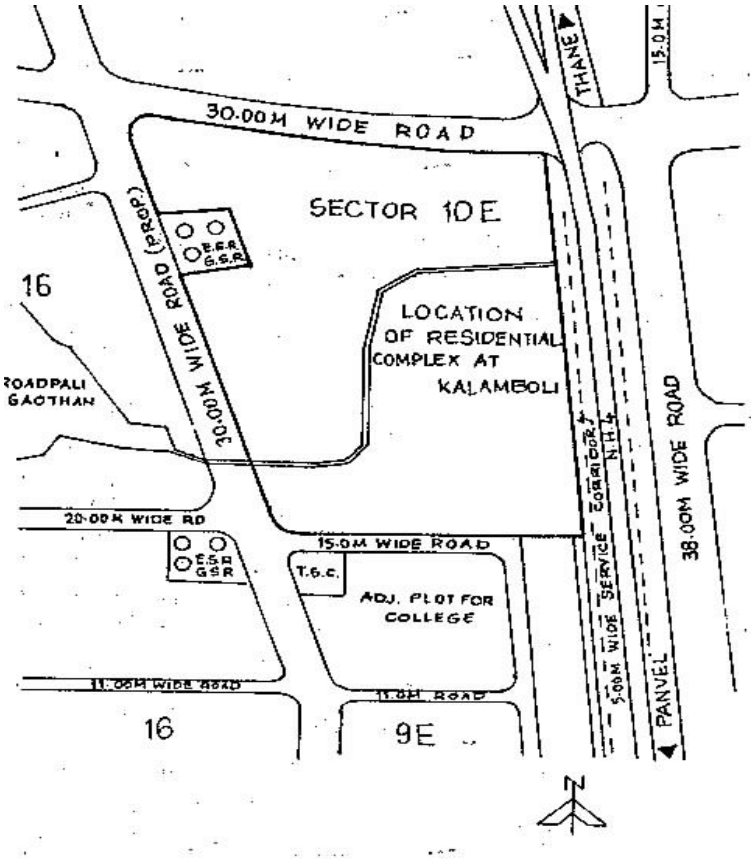
Having evolved a low-cost solution for housing the poor in Mumbai/ other cities using vernacular architecture, innovative planning concepts and estate management systems, I used this technique in a competition project floated by City & Industrial Development Corporation (CIDCO).

The Project Brief

It required the designing of seven categories of low-cost houses with plinth areas ranging from 18 sq. mts. to 100 sq. mts. at a site at Kalamboli, Navi Mumbai. The project design is described here.

Three categories of houses with a plinth area of 18 sq. m., 25 sq. m. and 34 sq. m. were so designed that the smallest house could grow to the biggest by vertical expansion for which an actual model would be available within the same group. It means that a cluster of about 75 dwelling units of these categories not only gives variety but also shows to the smallest category house owner as to how his house can be expanded. The same is the case with the three bigger categories of houses with plinth area of 50 sq. m., 75 sq. m. and 100 sq. m.

The shelter with an area of 40 sq. m. has been considered as a border line case where a much greater physical mobility has been assumed. As a result, these are the only shelters which are designed as first floor flats on top of the shops forming the market, on one side of the main access to the sector. The shops have been designed to provide a covered corridor. The entrance to the flats is totally private and does not encroach on the shops.



The site for the project at Navi Mumbai

In essence, the shelters are designed as ground or ground and first floor structures standing in their own little front and back courtyards. This not only gives the facility of the ground space to each house but also creates a sense of belonging and affinity for the house, which is expected to help in proper maintenance of these units. This design is of particular relevance for remodeling slums like Dharavi.

The design of dwelling units and the layout for the entire sector is based on nine parameters, discussed below, all of which are considered equally important.

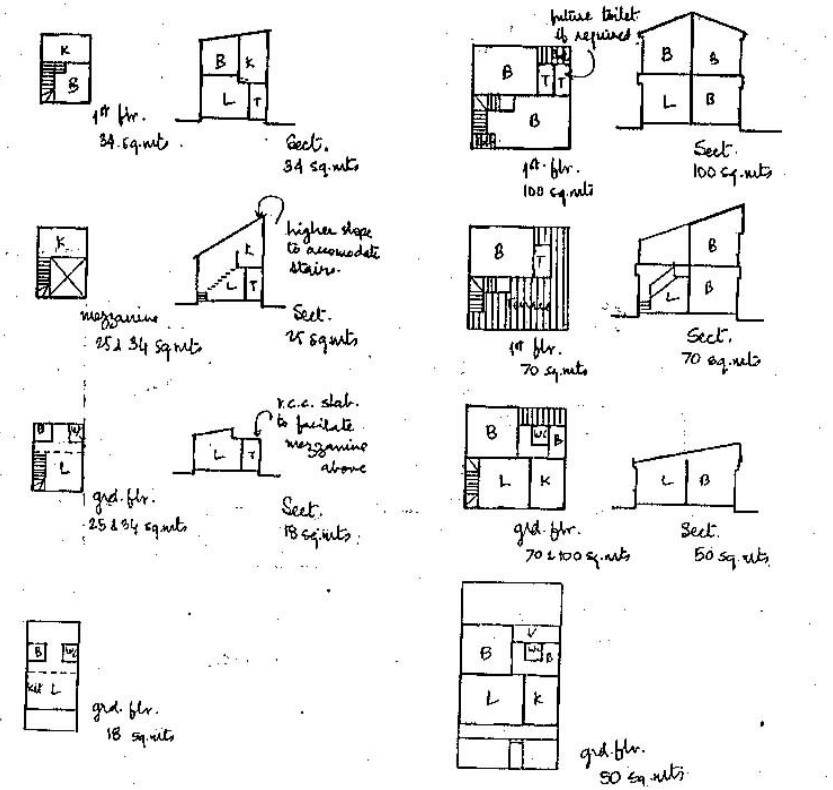
1. Cost Affordability

From the given programme, it is clear that more than 79% of the dwelling units with an area of 40 sq. m. or less are meant for economically weaker sections and lower income groups. Obviously, the over-riding consideration is the affordability of these income groups to pay for the house. The maximum construction cost prescribed is INR 1515 per sq. m. for a 34 sq. m. built-up area house. Deducting the cost of site development at about INR 12.50 per sq. ft. and accounting for 10% tender premium, 3% contingencies, 10% agency overheads, 10% escalation and 5% for interest during construction, the actual cost of building construction cannot exceed INR 918 per sq. m., i.e. about INR 85 per sq. ft. This is the guiding principle for designing of structure, specifications and materials of construction.

Basic construction cost	**1515.00**	**Per**	**Sq.mts.**
Deduct 3% for contingencies	44.12	"	"
	1470.88		
Deduct 10% Tender Premium	133.71	"	"
	1337.17	"	"
Deduct 10% Escalation	121.56	"	"
	1215.61	"	"
Deduct 10% Agency Overheads	110.51	"	"
	1105.10	"	"
Deduct Interest at 5% for one year during construction	52.62	"	"
	1052.48	"	"
Deduct land development cost at Rs.134.55 per sq.mts.	917.03	"	"
Net construction cost therefore should not exceed INR 918 per sq. mt or 85 per sq.ft.			
PLAN – DESIGN – SPECIFY within this cost.			

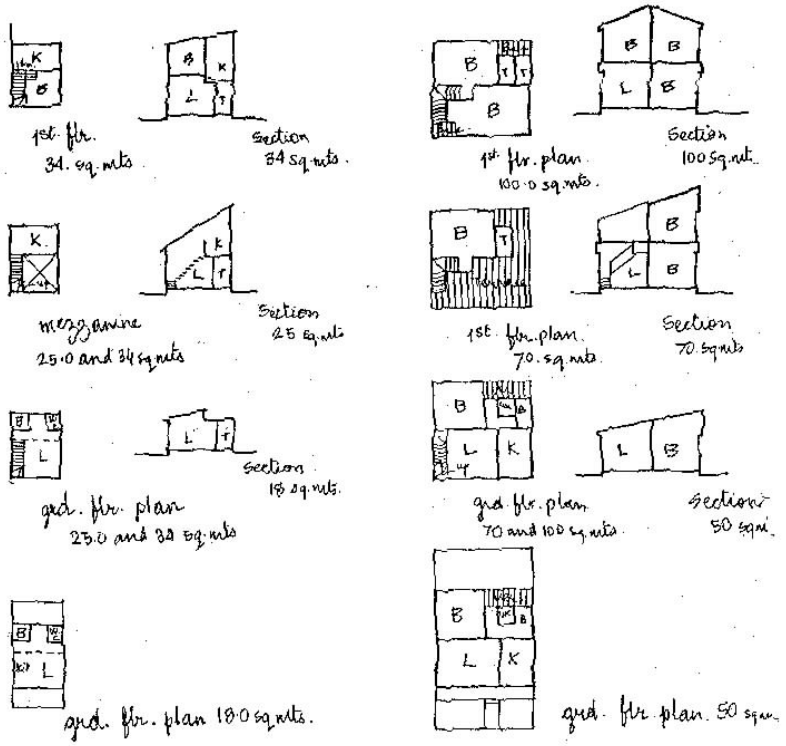
2. Flexibility

Due to economic constraints, while a family may opt for a minimum house, say of 18 sq. m., it would be unjust to condemn the family to live in that accommodation for over a generation! The house must have the flexibility to expand and accommodate the increased requirement of space. Thus, the 18 sq. m. plinth area house should be able to expand at least to the next higher category i.e. 25 sq. m., which again should have possibility of expansion to the second higher category i.e. 34 sq. m. Ideally, the smallest shelter of 18 sq. m. should have the possibility of expansion to double its size. Similarly, the 50 sq. m. house should have the possibility of expansion to 100 sq. m. with the possibility of renting out a part of the house to finance the additional construction cost. This flexibility in design and planning is an important criterion for evolving any design concept.



3. **Upgradation**

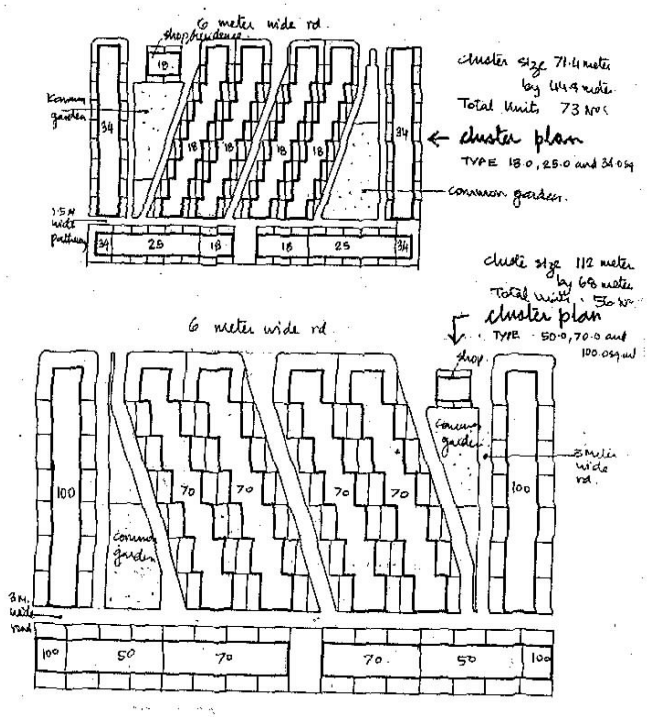
In the Indian context, because of the low affordability, it is not normal for families in the lower income groups to sell their present home and shift to a better or a bigger home. The economic classification as well as ethnic consideration is an impediment to such physical mobility. Non-availability of easy institutional finance and mortgage market also hinders mobility. Hence, families continue to stay in the shelter originally bought by them, though over a period of time their requirements may increase and income may also get augmented. Any approach to provision shelter for such families, must therefore have in-built possibilities of its up gradation in terms of space as well as specifications. This is also taken as a guiding principle of design.



4. **Harmonious Community**

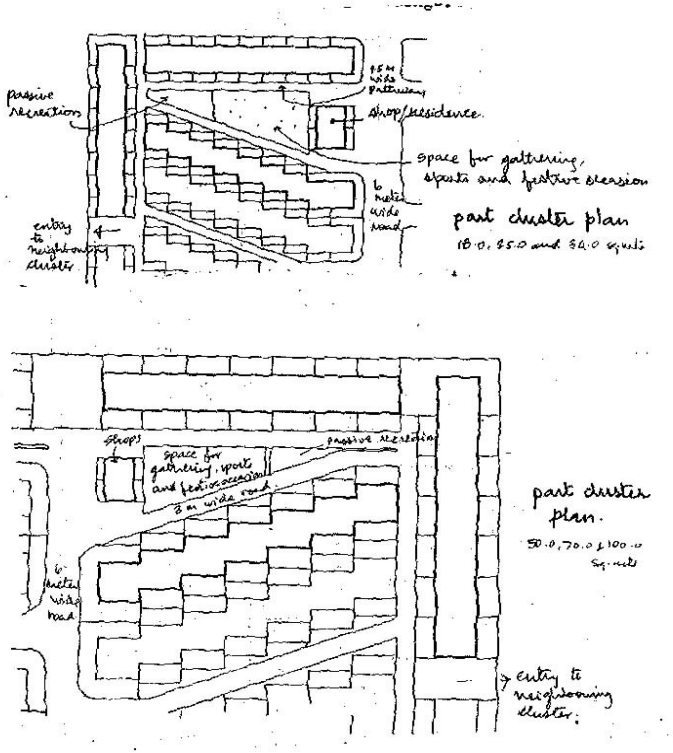
Irrespective of the socio-political objectives of our welfare state, social grouping is increasingly based on economic stratification. In the lower economic strata, social grouping is further based on ethnic considerations, while in the higher strata, caste and religion take a back seat. Two major economic stratification have therefore been assumed; one of the affordability limit up to INR 50,000 per house and the other between INR 90,000 to INR 1,90,000 per house. Within these two strata, there is assumed free inter-mixing of the sub-economic groups. It means that two basic types of housing clusters are formed; one consisting of three smaller categories of houses i.e. 18 sq. m., 25 sq.m. and 34 sq. m., while the other consisting of 50 sq. m., 75 sq. m. and 100 sq. m.

These two are considered to be basic groups, which may have minimal desire for social intercourse. Thus, it is hoped that these two basic groupings would lead to better social understanding and harmony.



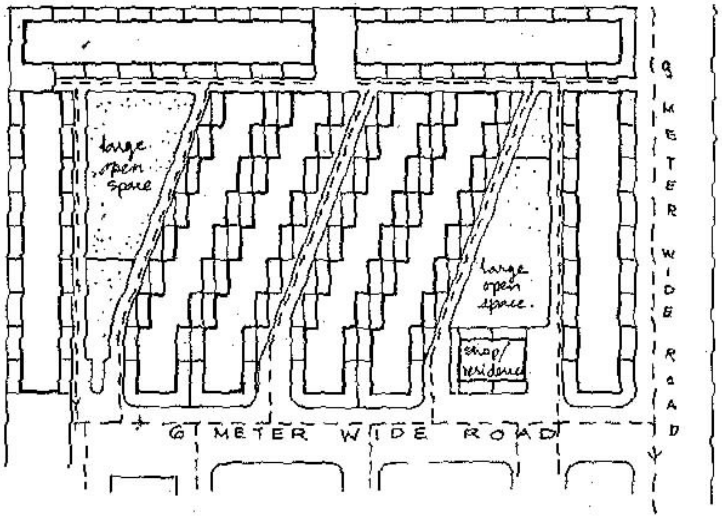
5. Physical Form of Communities

Familiarity and frequent social intercourse are the minimum requirements for the creation of a cohesive community. One physical form of grouping which leads to maximum familiarity between persons and greater social intercourse is the street pattern as against the courtyard pattern. At the same time, some amount of passive recreational open space for community gatherings is essential. Numbers also play an important role. One loses identity if there are a large number of people. In order to retain identity, the grouping needs to be small enough. An ideal grouping should consist of about 30-35 dwelling units with a population of 150 to 200 persons as the primary community in the form of cul-de-sac streets, with off-the-street open spaces for community gatherings.



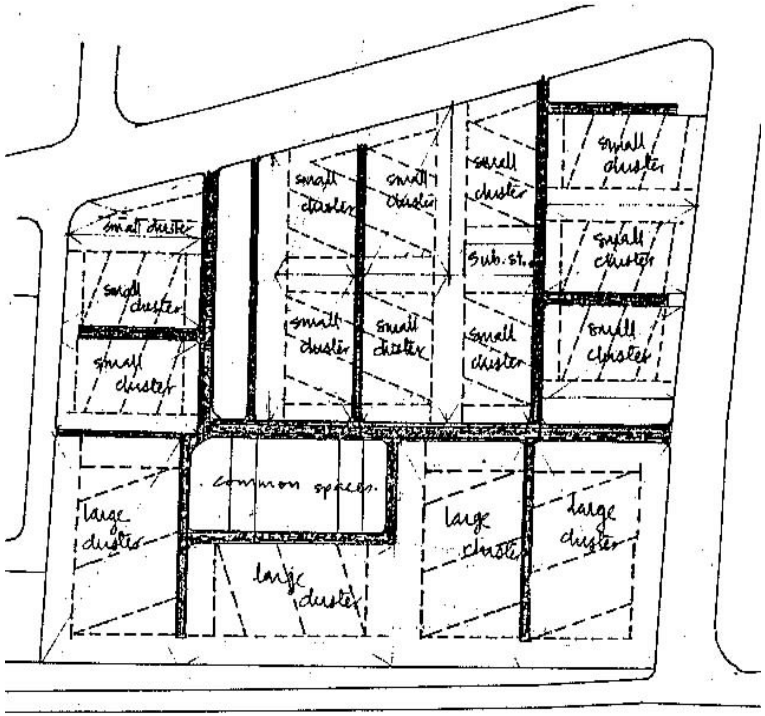
6. Estate Management

The community feeling created by the physical form of the shelters and the layout can be institutionalized and further strengthened if the community shares the burden of maintaining common facilities and services like pathways, main water-supply line, sewerage line and drainage, and open spaces. Any physical form for grouping of shelters must facilitate this institutionalization and the management aspect. It can also help in allotment of dwelling units/plots not to individuals but to co-operative societies for whom definite delineation of area and services is important. Any design approach ought to facilitate such estate management by a cohesive group. The clusters are hence evolved to facilitate the management aspect



7. **Optimizing Existing Services**

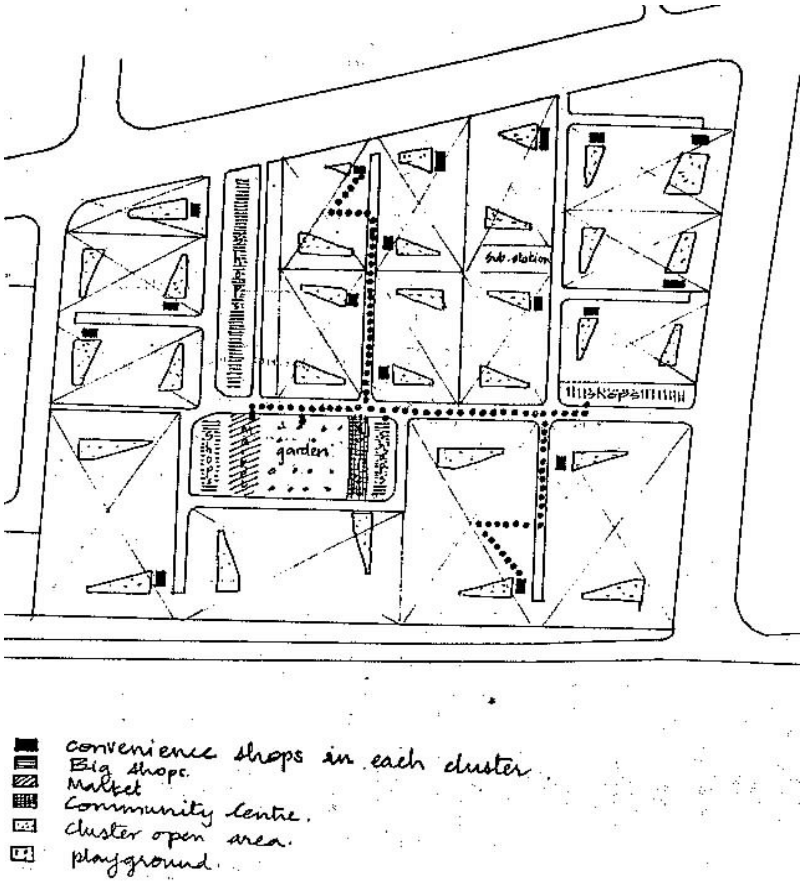
The existing peripheral roads can be utilized for giving entry to the group of shelters with larger plinth areas so that we not only achieve optimization of roads but also provide vehicular entry without disturbing the smaller category housing groups and help the bigger sized housing groups to maintain a separate identity. The housing groups accommodating the smaller categories of houses have only pathways, which give access to two-wheelers and pedestrians and yet there is adequate distance between two rows of buildings for emergency vehicles to approach.



Dotted line shows service connection from cluster to the main service on the 9 meter road.

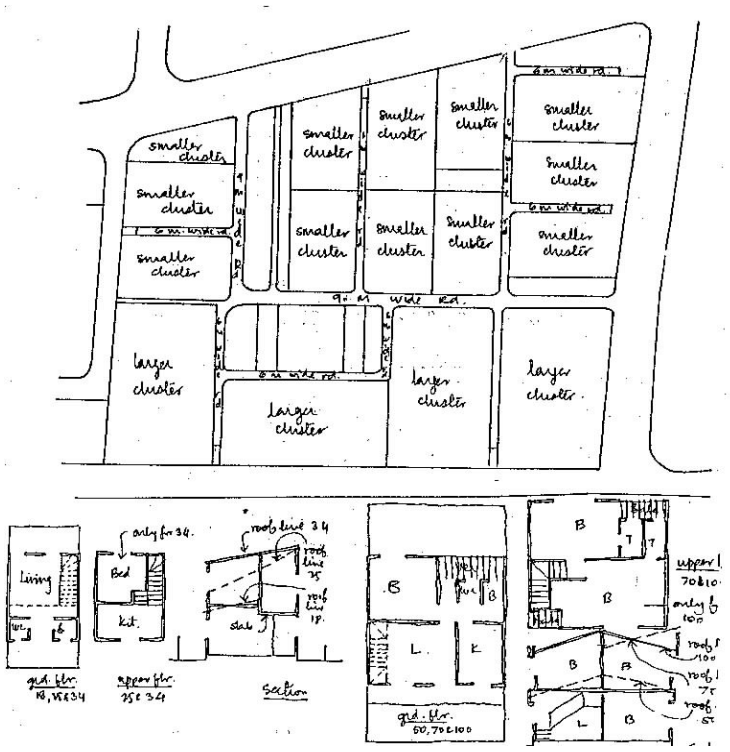
8. **Easy Access to Common Services**

The most important facility for the housing groups is the convenience shops as well as the market. The physical and social grouping of the two major categories of clusters is such that it facilitates provision of convenience shops for better communication and identity between the shop-owner and the customers. The houses along roads of 6 mtrs. width, will have the option of having a shop on the ground floor; and the major shopping area is located along the two entrances to the sector. An attempt has been made to retain the existing pattern of road, connecting the service road of the highway with the village.



9. **Modular Design**

There are only two modules – one for the smaller categories of houses i.e. 18 sq. m., 25 sq .m. and 34 sq. m.; and one for the bigger categories of houses i.e. 50 sq. m., 75 sq. m. and 100 sq. m. The provision for further expansion can either be made right in the beginning or the occupants can do it at a later stage. Structurally also, each house is expected to have its own side wall, and hence will not depend on the agreement of neighbours on either side for its further expansion. Thus, there is no common wall as each structure has its own independent wall, facilitating expansion and motivating the occupants to maintain the structure well. Even the clusters are in the form of two modules – one for the smaller and one other for the bigger category of houses. These clusters are a socio-physical unit.



Chapter 7 RESETTLEMENT OF HAWKERS

The Problem

The problem of hawkers occupying streets and footpaths is becoming more and more acute, not only in metropolitan cities but also in the mid-level, growing cities of India. So far, many attempts have been made, more in the nature of removal of hawkers by the local municipal government. But this has not solved the problem.

The hawkers mainly cater to the middle and low-income population. Because of very low overheads and the cheap quality of goods, their prices are low. As the middle and low-income families constitute almost 65% of the urban population in India, they continue to patronize hawkers. Therefore, the hawkers, in a way, are an essential part of the economy of a city and their physical dislocation only results in hardship for the population to which they cater.

On the other hand, hawkers are also a hindrance to the smooth flow of traffic as they occupy pedestrian space, forcing people to walk on the streets. This results in the slower movement of motorized traffic, greater danger of accidents and injuries, as well as a major impediment to the proper functioning of a city.

Thus, the hawkers, though an economic necessity, create problems for the city management. Their forcible removal is not a solution, only a temporary relief. Being an economic necessity, the general population sympathizes with them. It is necessary, therefore, to find a pragmatic planning solution to this problem, so that hawkers can continue to fulfill the economic needs of the middle and low-income populations. The solution cannot uproot hawkers from locations best suited for the residential population around. At the same time,

it has to be ensured that hawkers do not cause problems for traffic and transportation in particular, and city management in general. A planning solution rather than a physical solution to this problem has to be found, so that it can be replicated in similar situations and thus have wider applicability.

This is a challenging task. It was felt that a study of such a problem in an existing low-income residential sector of a metropolitan city, could possibly lead to an imaginative planning solution that could be replicated. The objectives of the study were:

1. to identify a specific neighbourhood which is dependent on a hawkers bazaar;
2. to analyze the catchment area to determine the degree of its dependency on the hawkers bazaar;
3. to analyze the hawkers bazaar in respect of location, number, type of trade/service, area occupied, type and cost of construction and residential status;
4. to assess the practicability of finding a planning solution without dislocation of hawkers;
5. to give suggestive physical planning possibilities which could be by and large replicable in similar situations.

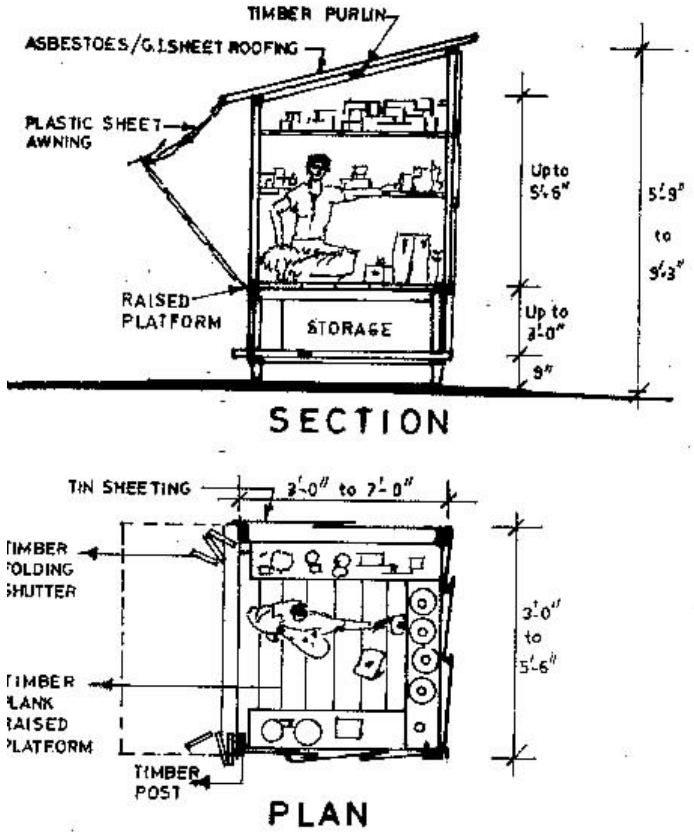
Study Area

A preliminary survey in Mumbai indicated that in most suburbs there were large concentrations of bazaars of hawkers with temporary structures, mostly along the routes from the suburban railway stations to residential areas. There were quite a few bazaars within a well-defined and developed residential neighbourhood that lent itself to analysis and solution. One such bazaar was in the erstwhile Maharashtra Housing Board's Colony at Kannamwar Nagar, Vikhroli.

Survey of Hawkers in Kannamwar Nagar

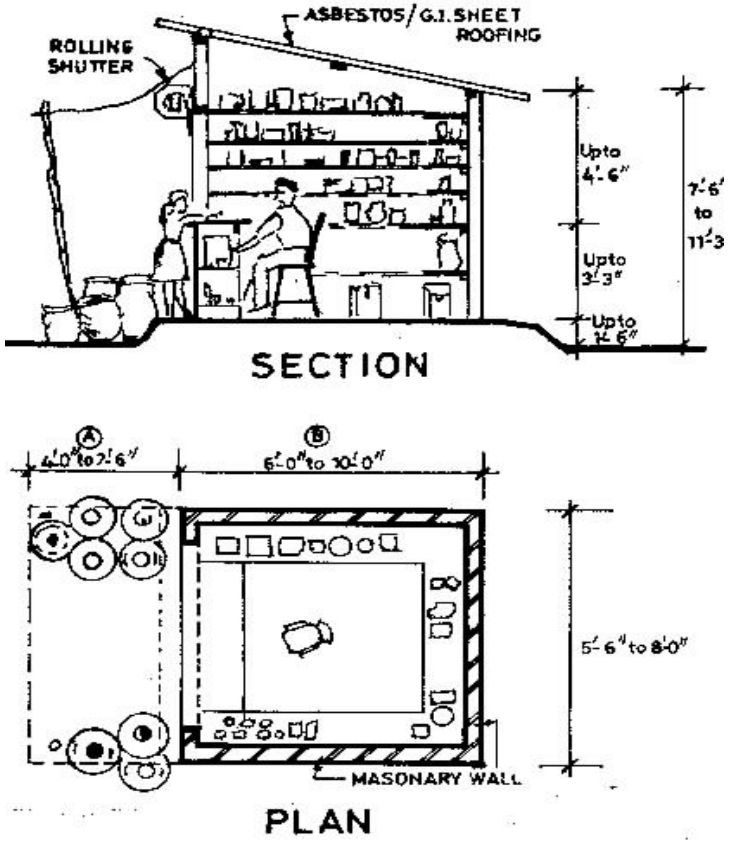
Though the original 'bazaar' started on the route from the first residential blocks to Vikhroli Station, subsequently it has now become the main shopping centre for the neighbourhood. Kannamwar Nagar I and II today accommodate about 10,756 tenements of low and middle income groups. This entire neighbourhood depends mostly on the hawkers' bazaars at different points in the colony for consumer items and services, except for consumer durable like televisions, electronic equipment, refrigerators, washing machines, fancy readymade garments and cloth.

Makeshift Shops



A typical hawker's stall

In general, families in economically weaker sections (EWS) and Low Income Group (LIG) categories, spend about 67% of their income on food, including dairy products, fuel, vegetables and grocery items, while the higher categories spend about 59% of their income on food. This hawkers' bazaar functioned as the neighbourhood shopping centre for Kannamwar Nagar and an analysis of its character could lead to evolving replicable solutions for Mumbai and other large cities.

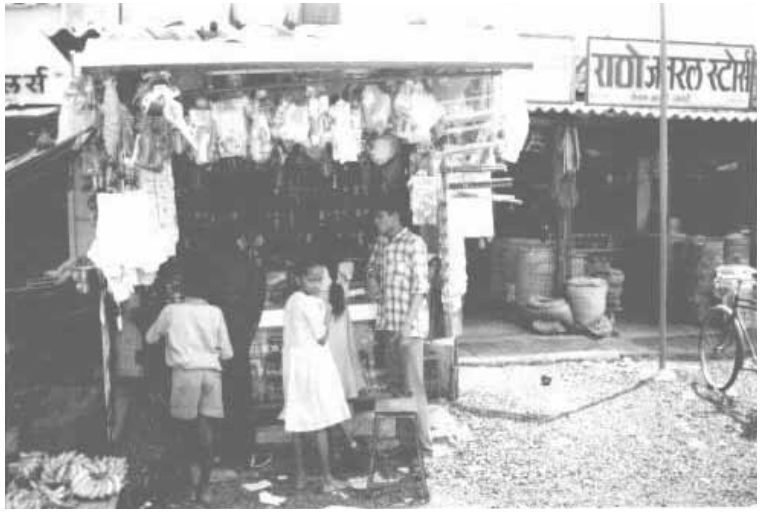


A service and grocery shop

Part of Daily Mumbai Life

Street hawkers and vendors have become an inevitable part of the daily life in Mumbai. The low income working population find it especially convenient and cheaper to buy daily necessities from these hawkers along the roadside on their way back home from work. This activity is growing rapidly and will most likely continue to grow in Mumbai where spiraling land and real estate prices naturally push up prices of goods and services of the formal sector, taking them beyond the reach of the common man, who increasingly

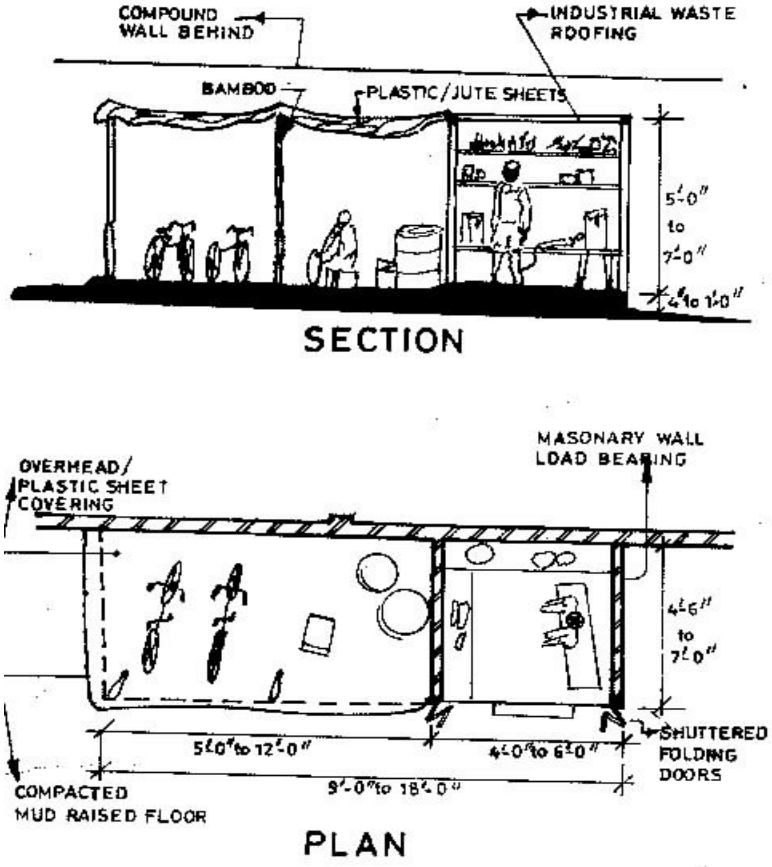
patronizes the roadside vendors for most of his necessities. Hence, despite various restrictive laws and regulations and sporadic raids by municipal authorities, this activity continues to grow. This somewhat belated realization by the municipal authorities has resulted in the declaration of some roads and areas as ‘hawker zones’ in Mumbai.



Roadside stalls of street hawkers

Socio-Economic Conditions of Hawkers

All the existing hawkers in the colony were listed along with area occupied by each and the nature of construction of the shops. There are 558 hawkers in Kannamwar Nagar. The sites, where the activity is most concentrated, are identified as ‘locations’. In Kannamwar Nagar(see map), seven such locations are identified. Out of seven locations in Kannamwar Nagar, two locations, with maximum concentration of the activity, were selected for a detailed survey.



Tea and refreshment stall

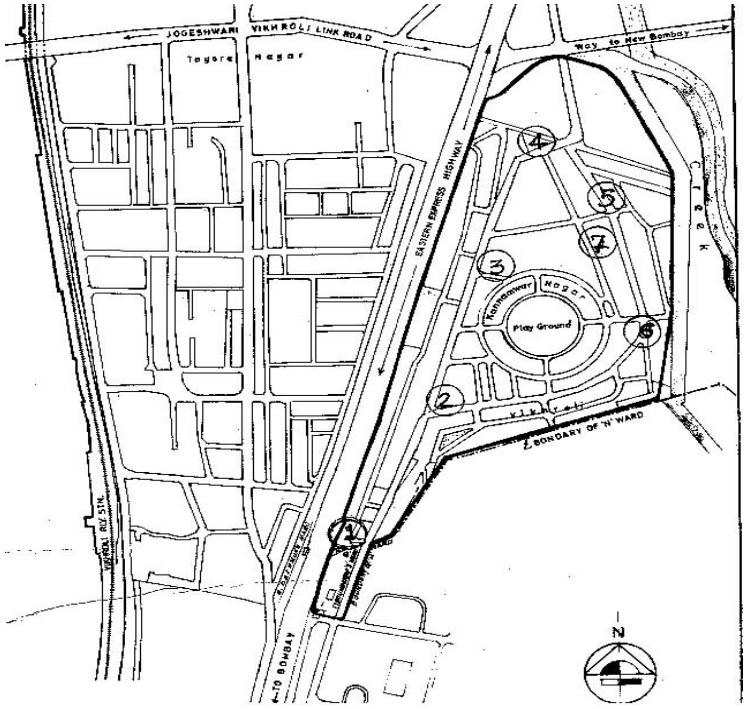
Selection of Hawkers
All hawkers involved in trading or service activity, except those employed by state undertakings like milk booths, were considered as the 'universe'. Of this universe, at least two hawkers engaged in the same trading/service activity, were surveyed in detail.

Grouping of Activities
The existing activities were grouped into 12 types, based on the criteria of the product or service: e.g. vegetable/fruit vendors were grouped together. Services were further sub-divided on the basis of the frequency of their use (frequent or infrequent). On this basis, 87 hawkers engaged in 12 types of activities from three locations in Kannamwar Nagar were surveyed in detail.

Analysis
The following aspects were studied and analyzed.

Location, number and types of trading/service activity in the colony, physical aspects like: space occupied, material used for construction of shops, physical infrastructure services available, legal status and maintenance costs, geographic location and growth pattern of hawkers, activity-wise concentration of shops at different locations.

- The highest number of shops are those that provide frequently used services (16.12%) like *atta chakki* (flour mills), barber, ironing, old newspapers buyer (*raddi*)
- General provisional stores (14.3%) selling items of daily consumption like biscuits, bread, eggs, butter, soaps etc.
- Vegetable and fruit vendors (13.4%)
- Grocers (7.5%)
- Tailors (7.5%)
- The vendors of frequently consumed items and services like bread, pan, biscuits, ironing, laundry, cobblers etc. are widely distributed.



Kannamwarnagar, Mumbai: Hawker's bazaars & their locations

Activity-Wise Growth Pattern in Relation to Population
The important parameter for a planner is to derive norms and standards for area and type of activity as a proportion to the total population in a particular location. The Table on the next page gives the total number of shops of each trade with their average area, derives the number of families required to support one such shop and thus gives a standard or norm of space for each activity. The ratio of traders to tenements may also be useful to understand the requirements of housing colonies. The table shows that the ratio of traders to tenements varies according to the use pattern of that particular commodity; e.g. the traders of perishable and daily consumable items like vegetables, general stores, pan shops are more in number as compared to the non- consumable, luxury or expensive items like jewellery and readymade garments.

INTER-RELATIONSHIP BETWEEN ACTIVITY TYPE & TOTAL FAMILIES

	Activity Type	shops	Average Area per shop sq.ft	No.of families per shop	Area in sq.ft per family
1.	General Provision Stores	80	60	133	0.45
2.	Pan & Cigarettes	50	45	225	0.20
3.	Vegetable/Fruit Vendors	75	20	142	0.14
4.	Fish vendors	14	10	1000	0.01
5.	Grocers &Oil Depot	42	50	266	0.15
6.	Tea & Refreshments	30	50	357	0.14
7.	Tailors	42	100	256	0.39
8.	Services: Frequent	90	45	122	0.37
9.	Services: Infrequent	47	48	228	0.21
10.	Cloth/Jewellery/ Cosmetics	9	35	1166	0.03
11.	Hardware/Building materials	4	50	5000	0.01
12.	Others	12	150	3750	0.04

Physical Aspects of a Hawker's Shop

Area The average area used by hawkers range between 10 sq. ft to 150 sq. ft. The area varies according to the type of activity conducted. Majority of hawkers (41.3%) have less than 25 sq. ft. area; 29.9% have an area of between 25 to 50 sq .ft. In all, 71.2% of the hawkers have an area less than 50 sq. ft.

Distribution of shops by area and activity type

Area occupied (in sq.ft)	%	Type of Shops
Upto 25	41.3	General provisions, pan, vegetable/ fruits, fish, tea and refreshments, frequent services, infrequent services.
26 - 50	29.9	General provisions, pan, tea and refreshments, frequent services, hardware, others.
51 - 75	9.2	General provisions, groceries, frequent services, cloth, building materials.
76 - 100	4.6	Groceries, tea and refreshments, frequent services, infrequent services.
101 - 200	12.6	Tea and refreshments, infrequent services like plumber, tailor etc.
Above 200	2.4	Medical stores, photography etc.
	100.00	

Physical Form

The physical occupation of space is classified into 3 categories:

- makeshift box;
- regular kiosk or booth;
- *pucca* (permanent) constructed shop.

The classification is made on the basis of type of activity, area occupied, material used, and method of construction.

Material & Construction Cost

The material used for construction varies as shown in the sketches. Wooden planks are used extensively as these are easy to dismantle. The cost of construction depends on the size of shop and material used. For e.g. a box type construction costs around INR 3,000-10,000; a kiosk around INR 5,000-15,000, while a *pucca* (permanent) construction is in the range of INR 10,000- 1,20,000 (average INR 35,000).

Maintenance Cost

The maintenance cost includes the 'rent' or the penalty charges paid by the hawkers and the electricity charges. It varies between INR 100-900. It depends on the area occupied and type of trade; e.g. vendors have to pay a daily penalty, whereas shop owners pay on a monthly basis to the municipal authorities.

Legal Status

There is a very complex system of legalizing hawker activity. The three governmental agencies involved – the Maharashtra Housing and Area Development Authority, the Municipal Corporation and the Collectorate – charge a 'penalty' and 'service charges'. Though the hawkers are charged for services like garbage disposal, no proper arrangements are in fact made. No such services exists in reality. Neither are they provided with electricity, drinking water or toilet facilities because these hawkers are not considered part of the formal market.

Grocery & Provision Stores

Solutions

Kannamwar Nagar is a settlement almost entirely comprised of housing development by the erstwhile State Housing Board. The settlement has developed over a long period of about 20 years and has now reached saturation point in terms of building activity for residential use. It is clear from the data available that the hawkers' bazaar, which has developed at various locations in the area, caters to the entire population and is an addition to the formal shopping provided. It is not that formal shopping is not patronized, but it is inadequate in terms of services and goods required for the population. The fact that a large percentage (almost 98%), of the shops in the hawkers' bazaar provide goods and services not catered to by formal shopping, indicates that the standards adopted for providing shopping per unit of population, are inadequate both in quantitative as well as qualitative aspects. Quantitatively, the area of shopping provided for formal shops is inadequate; but at the same time, the quality of building and environment provided in the formal shopping is too high for the kind of services required, to operate economically and viably, as well as for the population to afford them.

There is also a direct relationship between the total shopping area and the general level of the economy, which in a developing country like India, operates at a low subsistence level. It means that where a single well-stocked departmental store in a particular area could serve a neighbourhood in a developed country, small shops having a total area of much more than a departmental store, operate in a developing economy, because each shop-keeper operates at a low subsistence level and does not expect to get the same margin of profit as a departmental store in a developed economy.

Planning Solution

The geographic location and growth pattern of hawkers clearly indicates their preference for plying their trade on busy streets. The activity thins out as the street enters small groups of residential buildings and finally terminates in dead-end roads. Obviously, each type of shopping activity, to be viable, requires a minimum support area. This relationship suggests the area norms for various types of activities in relation to the population. It can also be observed that more than 45% of shops provide daily goods and services. Yet, these services are of a type that can operate from a very small unit area.

The inter-relationship between activity type and the population indicates the total number of shops in each category; average area of shops in sq. ft; the number of families that sustain one shop; and the area in sq. ft for each type of activity per family.

The following norms have been derived based on the survey & analysid:

The area requirement per family for different type of trades ranges between 0.10 sq. ft to 0.45 sq.ft. Significantly the minimum areas (i.e. .01, .03, .04 sq. ft per family), are for the sale of goods like clothes, jewellery, cosmetics, hardware and building materials. Significantly the highest area of 0.45 sq. ft per family, is required for goods like general provision stores and frequent/infrequent services such as plumbers, electricians.

On the basis of this analysis the requirement of shop area can be broadly categorized as follows:

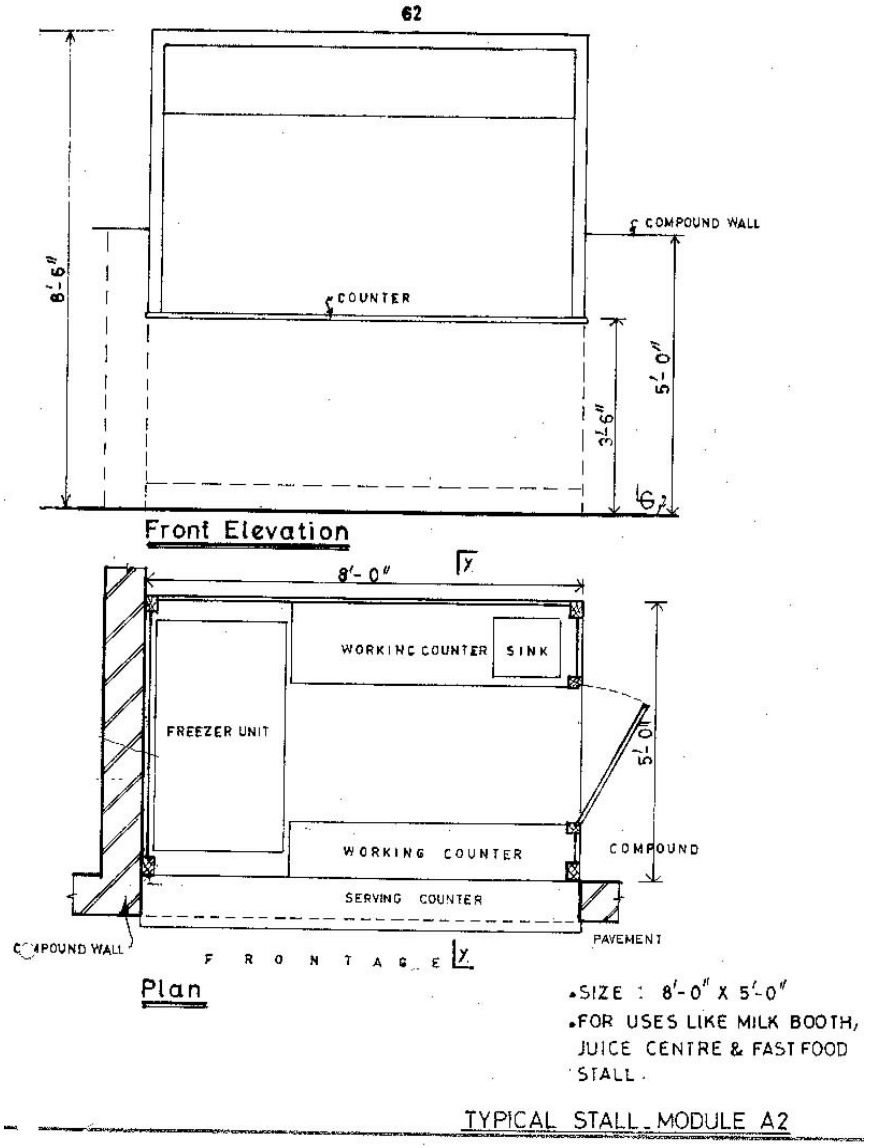
- 0.10 to 0.20 sq. ft per family
- 0.20 to 0.40 sq. ft per family
- above 0.45 sq. ft per family

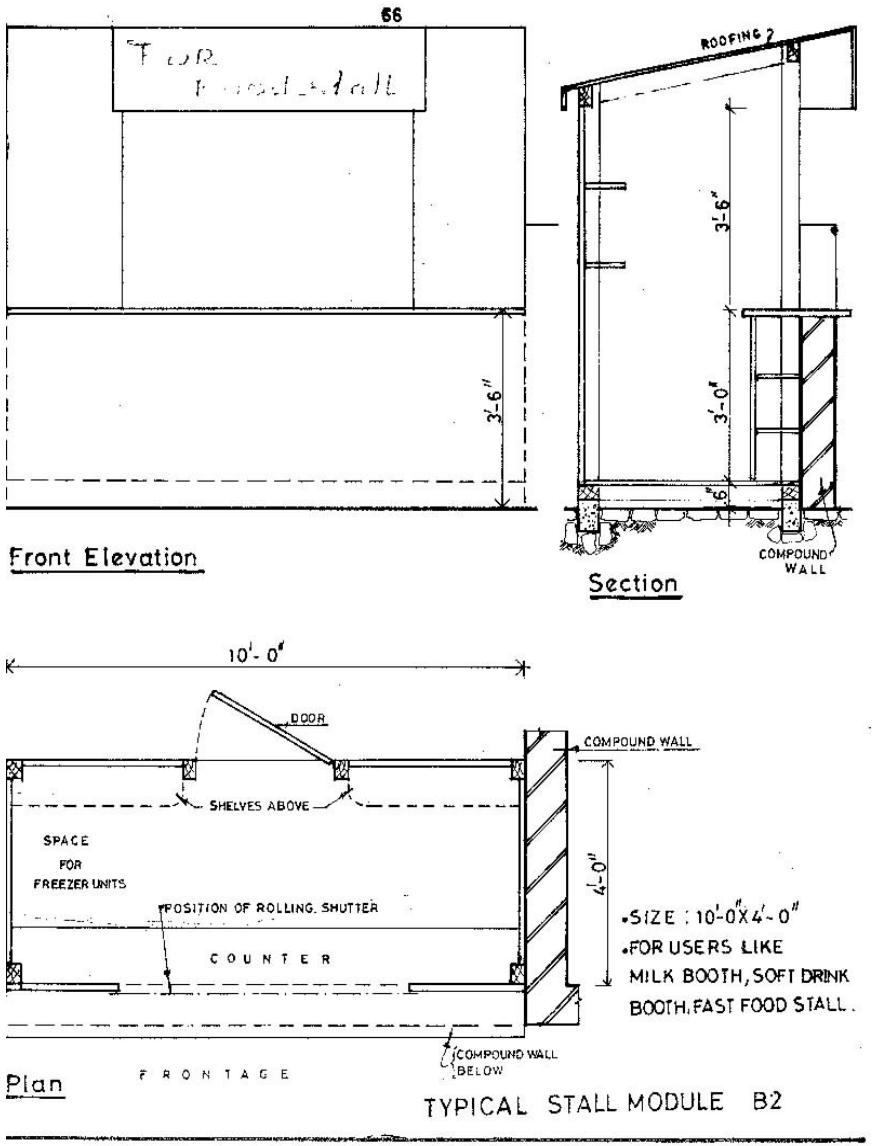
Accordingly, the average size of a shop in these three categories would range between 20-100 sq. ft. In the first category are the smallest type of shops, for goods and services such as cigarette/*pan* shops, vegetable, fruits and flowers, clothes pressing, electricians. The area of such shops ranges between 20-45 sq. ft, and hence two modules A1 and A2, of 5ft x 4ft and 5ft x 8ft, can normally take care of this category of shop. In the second category are goods and services like old newspaper buyers, tailors, plumbers, electricians, fast food joints – they require a larger space for work/storage and hence two modules, B1 and B2 of 10ft x 4ft, would generally suffice for this activity. In the third category are shops providing goods like general provisions, which require a module C1 of 8ft x 10ft.

A few of the suggested plans for kiosks and cabins that can be constructed for this activity are shown in the following illustrations.

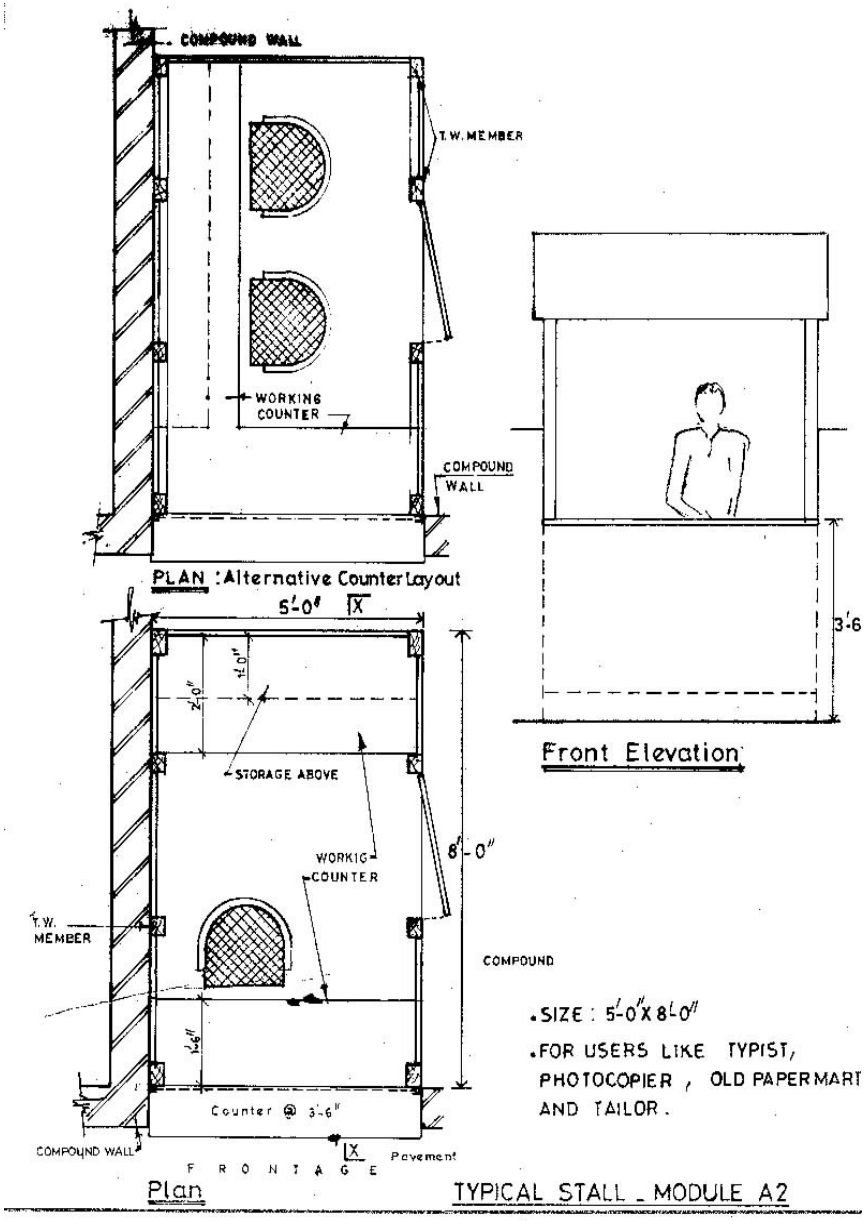
The new Development Control Regulations for Greater Bombay 1991 came into force with effect from 25th March 1991. Under these regulations, Section 52 describes ancillary uses permitted in residential zone with shop line (R2 zone). Residential zone with a shop line, in which shopping can be permissible, indicates plots in residential zone along roads on which the shop line is marked on the development plan. It also includes plots along roads with existing or prescribed width between 18.3 metres and 31 metres in the suburbs and extended suburbs.

In such a residential zone with a shop line, shops with various goods and services are permitted These shops can be allowed to be constructed within the plot of a building by permitting reduction in the front/side open spaces of the building, as these shops will not have a height greater than the ground floor of the building. The shops will thus not encroach upon the road space and will not be a hindrance to pedestrians or traffic. Suggested plans of such roadside shops/booths are given below. Construction of such shops within the plots of the buildings abutting roads will, to a great extent, reduce the problem of hawkers occupying footpaths and being a hindrance to traffic.

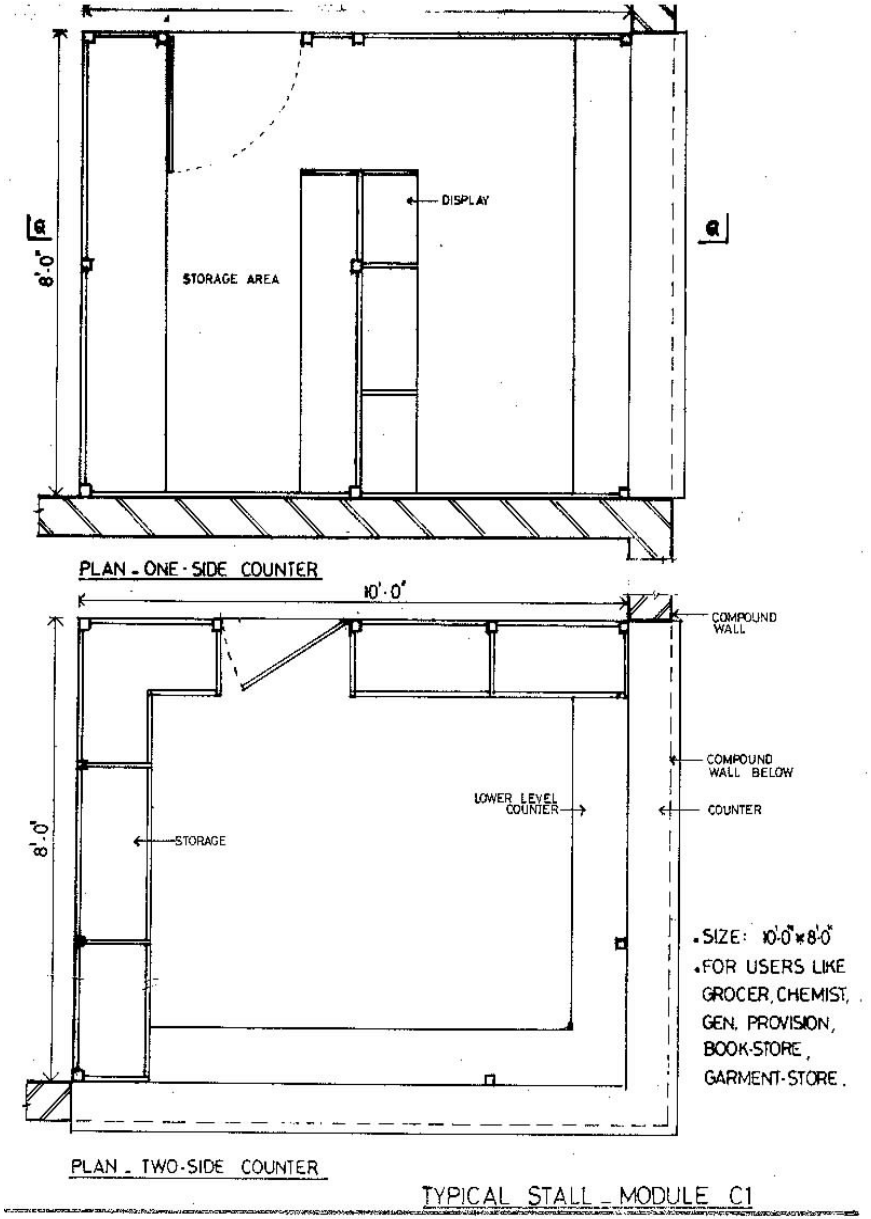




Designs for 40 sq. ft. stalls for newspaper, soft drinks etc.
(A2 & B2)



Stall for Typists, Photocopier, Tailor etc.



Design of stalls for Grocer, bookshop, chemist, general provision garments etc.

Chapter 8 RAIN WATER HARVESTING IN MUMBAI

The capital of Maharashtra state, Mumbai, had an estimated population of 12.7 million in 2012, with an area of 438 sq. km. (Municipal Corporation of Greater Mumbai). Mumbai has a coastal length 140 km. Over the last few decades, Mumbai has emerged as the financial and commercial capital of India. Urban growth has spread beyond the boundaries of the municipal corporation.

Geology & Geomorphology

The Greater Mumbai area is made up of Deccan basalt, horizontally bedded, and more or less uniform in character over wide areas. The predominant soil cover in the island city is sandy, whereas in the suburban areas, it is alluvial and loamy.

Greater Mumbai receives rains from the south-west monsoon, which usually commences in the first fortnight of June and lasts till the end of September. Pre-monsoon showers occur in May and north-east monsoon showers fall in October and November. The average annual rainfall is 2457.0 mm. The average monthly rainfall is highest in the month of July (945.4 mm), followed by August (660.4 mm). The average monthly rainfall in June is 647.5 mm and 309.2 mm in September.

The climate of Mumbai is tropical. The daily maximum temperature (mean) ranges from 33.3^{0}C. in May to 29.1^{0}C. in August. The daily minimum temperature ranges from 16.3^{0}C in January to 26.2^{0}C. in May.

Water Supply

Dahisar and Mithi are the two rivers in Greater Mumbai; the first originates at the Kanheri caves and meets the Gorai Creek; and the second originates at Vihar Lake and meets the Mahim Creek. The overflow from Vihar, Tulsi and Powai lakes goes into the Mithi River. There are three major lakes (Vihar, Tulsi and Powai), within the city that supply water to the metropolis.

Lake	Tulsi	Vihar	Powai
Location	National Park area between Mulund & Borivali.	Near NITIE Bhandup	Between Vikhroli and Bhandup Near IIT Powai
Capacity of the Lake in M C M	10.415 MCM	41.766 MCM	5.46 MCM
Catchment area in sq. km.	6.70 sq.km.	18.90 m sq.k.	6.68 sq. k.m.

Mumbai receives its water supply from these lakes and also from other lakes located in Thane district. The supply from all these sources is, however, inadequate to service the population. Against a standard laid down by the Municipal Corporation in its regulations of 135 litres of potable water per capita per day, the actual supply is less than 90 litre per capita per day (lpcd), for 35% to 40% of Mumbai's population residing in formal housing.

For 35% of the population living in informal housing and slums, the water supply is less than 60 litres per capita per day. The balance 25% of the population, sheltering itself on sidewalks, along suburban rail routes and other places, collects water from public water taps and by illegally tapping trunk water supply pipes carrying water to storage reservoirs in the city. On an average, therefore, the water supply in the city is less than 58 litres per capita per day. This amounts to a deficit of 77 l.p.c.p.d. – a shortage of 924 m. litres per day or 9.24 MCM.


Map of Mumbai
N
Dahisar
Borivali
National Park (Krishnagiri Upavan)
To Bhiwandi
Manori Beach
Kandivli
Thane
Industrial Area
Malad
Marve Beach
To New Mumbai
Mulund
Erangal Beach
Goregaon
Aarey
Vashi
Vihar Lake
Madh Beach
Bhandup
Jogeshvari
Kanjur Marg
Versova Beach
Powai Lake
Andheri
Vikhroli
To Uliva
Juhu Beach
Vile Parle
Saki Naka
Juhu
Jain Temple
ARABIAN SEA
Ghatkopar
Santa Cruz
Khar Road
Vidya Vihar
Khar
Kurla
Chembur
Bandra
Chunabhatti
Govandi
Sion
Mankhurd
Bandra Point
Mahim Bay
Matunga
Guru Teghbahadur Nagar
King's Circle
Trombay
Kolwada
Dadar
Prabhadevi
Wadala
Parel
Sewri
Lower Parel
Curry Road
Cotton Green
Haji Ali Tomb
Chinchpokli
Reay Road
Mahalakshmi
Mazagaon
Grant Road
Cumballa Hill
Dockyard Road
Sandhurst Road
Hanging Garden
Kalbadevi
Marine Lines
St.George's
Chhatrapathi Shivaji Terminus (V.T.)
Chowpatty Beach
Marine Drive
Malabar Point
Church Gate
Fort
Narriman Point
Prince of Wales Museum
Gateway of India
Elephanta Island
Butcher Island
Colaba
Colaba Point
Map not to Scale
Railway Line
Road
Beach
Tourist Place
Airport
Copyright (c) Compare Infobase Pvt. Ltd. 2001-02


Tourist Map of Mumbai
N
Dahisar
Borivali
National Park (Krishnagiri Upavan)
To Bhiwandi
Manori Beach
Kandivli
Thane
Industrial Area
Malad
Marve Beach
To New Mumbai
Mulund
Erangal Beach
Goregaon
Aarey
Vashi
Vihar Lake
Madh Beach
Bhandup
Jogeshvari
Kanjur Marg
Versova Beach
Powai Lake
Andheri
Vikhroli
To Uliva
Juhu Beach
Vile Parle
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Khar
Kurla
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Bandra
Chunabhatti
Govandi
Sion
Mankhurd
Bandra Point
Mahim Bay
Matunga
Guru Teghbahadur Nagar
King's Circle
Trombay
Kolwada
Dadar
Prabhadevi
Wadala
Parel
Sewri
Lower Parel
Curry Road
Cotton Green
Haji Ali Tomb
Chinchpokli
Reay Road
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Narriman Point
Prince of Wales Museum
Gateway of India
Elephanta Island
Butcher Island
Colaba
Colaba Point
Map not to Scale
Railway Line
Road
Beach
Tourist Place
Airport
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The water supply facilities and utilities in Greater Mumbai, if mapped by GIS application, would help planners, administrators, emergency services and utility providers.

In this chapter, I have stated a methodology that can utilize Geographic Information System (GIS) and empirical data for analyzing spatial water harvesting patterns with the objective of prioritizing the adoption of water harvesting pilot projects in Mumbai.

Urban Water Supply Strategy

The water resources in Mumbai are being stretched to their limits, resulting in available supply varying considerably during the course of a year. It is necessary, therefore, to find ways of saving, reusing and recycling water and to develop methodologies to improve water resource management to ensure a stable supply throughout the year. Water resource management strategies traditionally focus on supply policies. Instead, there needs to be a movement towards demand-control policies to meet the growing needs. Sustainable water management necessitates the development of constructive applications of new technologies like GIS to address these issues. The strategy should cover the following points.

- Demand -Control
- Optimization of existing supply
- Conservation of natural resources
- Rainwater harvesting through physical storage
- Rainwater harvesting by recharging underground aquifers
- measures to facilitate maximum percolation of rainwater in the ground
- Identification & mapping of aquifers – municipal ward-wise
- Identification and mapping of underground streams and losses through draining off to the sea
- Prioritization of municipal wards for taking up pilot rain harvesting projects

Demand-Control Policies

Demand-Control policies require that the water supply agency establish complete, accurate, and representative information about current water consumption patterns. A realistic assessment of urban water consumption is essential in understanding how the water supply department of the Mumbai Municipal Corporation can accommodate variations in time and type of use.

Optimizing Resources

Consumption patterns include a number of water use characteristics development, as well as property; representative of the individual users. These characteristics include: number of inhabitants to be supplied with water and their demographics; the consumption habits of the population; the type of size and property landscape.

Each of these parameters plays a role in determining overall demand. The Municipal Corporation of Greater Mumbai has so far relied upon analysis of large-scale consumption patterns to evaluate management options. But its municipal water managers today need to understand better the general patterns associated with water use in the city. Once identified, the MCGM can curtail demand by evaluating alternative demand-oriented management options, tailored specifically to the different municipal wards of the city to optimize and conserve existing resources.

Rain Water Harvesting: Impractical Measures

Although Mumbai is currently developing a comprehensive water supply plan for the coming decade, the city is now exploring conservation strategies for reducing the demand for municipal water supply in future. One of the strategies recently incorporated in the Development Control Regulations for the city, involves the installation of rainwater-capture-systems that harvest rainwater

from the roofs, and channel it into storage devices. In essence, the proposal consists of capturing rainwater from rooftops during the monsoon, storing it, and using it for all non-potable purposes during the high-demand summer months. While this technology is by no means new and may be practicable for new construction activity, the capital investment to install rainwater catchments in already built-up residential plots across the city, will be formidable. In plots where buildings already exist, it is almost impossible to construct underground reservoirs and it is structurally difficult and impractical to construct reservoirs on the terraces of the buildings.

New Methods

Hence, there is a need to simultaneously evolve a methodology for the conservation of rainwater through the recharging of the aquifers by facilitating greater ground water percolation, by collecting rainwater from rooftops and terraces and letting it into deep bore wells to recharge the aquifers; allowing percolation of rain water falling on the ground in the un-built portion of the plots; ensuring percolation of such water by ensuring that, to the extent possible, the ground surface is porous and if surfaced; with semi-porous materials; and also use the area of the sidewalks of all roads to act as 'catchments' by surfacing them with perforated material so that percolation of rainwater is not arrested. There is a phenomenal increase in the impervious land surfacing in the city (roads, footpaths and lands around buildings) that is progressively reducing percolation of rain water into the ground. There is an increasing tendency to pave the statutory 15% to 25% open space within residential plots to accommodate parking of the increasing car ownership. As a result, there is greater strain on the storm water drainage system leading to flooding of residential areas during heavy rain in the monsoon.

Above *New concrete roads are impervious to water percolation*

Above right *Footpaths paved with concrete tiles*

Below *Courtyards in buildings are paved for parking*

The increased rate of urbanization and industrialization has reduced the availability of open surfaces for natural recharge of aquifers by rainwater in Mumbai. Almost 85% of the city land area is built up area – divided into plots containing residential, commercial, industrial and other buildings. In a city spanning over almost 430 sq. miles, public open spaces total not more than ~~16~~ 7%. Although the built up plots are required to have an average 15% area as open space by law, these are often paved, and therefore, impervious to water percolation. As a result, during the rainy season, water is not only stopped from percolating into the ground but is also impounded by the impervious surfaces. This leads to flooding and ultimately the water flows away to the sea through natural drainage.

Artificial recharge of rainwater is the only solution for improving the groundwater potential to maintain sustainable groundwater resources. This chapter aims at identifying rainwater harvesting strategies using GIS techniques and the creation of a Rainwater Harvesting Information System. There is a need to encourage the development of a spatially explicit methodology for assessing the potential application of rainwater catchments in Mumbai. The methodology should aim at addressing the question: which municipal wards within the city have the highest overall potential for water conservation using rainwater capture systems?

The results of such a study can be used to begin a pilot rainwater capture project targeted at the highest conservation areas, and, subsequently assess the efficacy of the project. If successful, the rainwater-harvesting systems can be applied across all the municipal wards of the city.

Open spaces like the one at Oshivara, should be used to recharge ground water

Goals

The goals of the rainwater harvesting project in Mumbai should be:

- to create an understanding of geo-hydrologic systems by producing 3-dimensional maps of these systems based on geologic information, interpretation, and interpolation;
- develop methods of characterizing the 3-D geometry and properties of aquifers.

The methodology and analysis will require the creation of a water-related database, rainfall analysis of at least 30 years, analysis of monthly data for at least one rainfall station in each of the municipal wards of the city (using a vertical mapper 2.5 of the Map/Info GIS software), and groundwater level analysis of 30 years of monthly data from at least one control well in each of the municipal wards.

Methodology

Aquifer boundaries should be mapped using the presence of till, silt, sand, and gravel. Yields can be divided into categories, say: 0-100 litres per minute (lpm); 100 -500 lpm, 500-2500 lpm; and greater than 2500 lpm. Aquifer thicknesses also can be categorized into less than 8 mts, (Sheet rock is encountered in most areas in Mumbai, except in reclaimed soils at around this depth) 8 to 30 mts, and greater than 30 mts.

The methodology involves the following.

- Compilation of individual 7.5 minute quadrangle maps into a single citywide aquifer coverage.
- Mapping the estimation of rainfall, ward wise, and their ranking by intensity, quantity and periodicity of rainfall.
- Mapping average ground level of each ward with reference to each other, mean sea level and disposal through surface drainage with reference to high tide and low tide levels.

- Geological mapping of subsoil data and geomorphology, rock strata, underground water currents and porosity of rock to determine their vulnerability to salinization through percolation of sea water during high/low tides.

- Geo-hydrographic mapping of aquifers and streams in each ward, spread and capacity of aquifers and their ranking according to aquifer capacity and vulnerability to salinization and draining through live streams;

- Mapping the levels of aquifers and porosity measurements to quantify rate of percolation from sea to aquifer;

- Mapping for matching the capacity of the aquifers with percolation rates and quantity of rainfall in each ward related to the 'soft' ground area availability for water percolation;

- Ranking of wards on the basis of the matrix of all these parameters to prioritize taking up pilot projects.

In this context a recent report (June 2012), about finding of a large aquifer below the municipal KEM hospital and the GPO, is of interest and should be an eye-opener for the municipal authorities.

Ranking Method

The analysis could utilize ARC View 3.2 GIS software and could be structured around four major steps.

1. First, determine the seasonal variation in water consumption in the city where summer consumption is greater than other seasons. The MCGM could use the city land-use and seasonal water consumption data to identify wards with high consumption rates.

2. In the second step, a bi-variate categorical comparison can be made between the built area and non-built area of each ward. The built area refers to the footprint of a building in a plot, and the non-built area encompasses the remaining open space in the plot. The built area and non-built area can be broken in sequences of square foot increments based on the capacity of the non-built area to capture rain water and, thereby recharge the ground water to the extent of feeding the built area.

   An equal rainfall can be assumed across the entire ward area and complete rainfall capture on built area and non-built area. A matrix can then be developed based on the relationship between built and non-built areas, and all plots can be ranked across the ward from highest to least conservation potential.

3. In the third step, all wards with the highest percentage of comparable built versus non-built areas can be identified. Wards can then be classified based on specified built versus non-built increments to allow the water supply department to assess highest conservation potential. In other words, when selecting which ward to target within the city for installation of rainwater harvesting systems, wards with the highest number of comparable plot ratios can be chosen. The city can target these wards for the pilot project.

4. In the fourth and final step, only those wards with the highest conservation potential can be used with building area and historic rainfall data to calculate potential for water capture for priority wards. By averaging rainfall data over the last 30 years during monsoon months, the total runoff volumes from all residential buildings can be calculated in the selected priority wards. The rainwater capture from those wards with highest conservation potential will enable the MCGM to estimate the amount of water that can be removed from the storm water drainage system in Mumbai.

In determining the amount of water required for recharging of the underground aquifers in the non-built areas in each ward, the historic meteorological data can be relied upon. Given these figures, MCGM can estimate the approximate amount of non-built area required to irrigate specific areas of land within each priority ward. Those plots with the highest percentage of comparable areas will have the greatest rainwater harvesting potential, while those

with fewer comparable areas can be assigned to 'medium', and those with the least into a 'low' category. As a result, all plots within the priority wards will fall into a high, medium or low category. The indication of high, medium and low refers to both the conservation potential and a strategy to minimize the costs associated with the installation of rainwater harvesting system.

Storm water drainage is an important consideration in Mumbai. Inadequate capacity and the overflowing of these drains resulted in the disastrous floods in Mumbai on 26 August 2005. To begin addressing these issues of flooding and the resulting damage to the environment, economy and health, MCGM can estimate the amount of water to be removed (by rain harvesting), from the drainage system in the wards. This procedure can estimate total reduction of flow into the storm water drainage system by installation of rainwater harvesting systems on plots deemed with high conservation potential.

The final output map can be obtained from GIS overlay analysis, and can be used as a utility map for rainwater harvesting in Mumbai. A Rain Water Harvesting Information System (RWHIS), which can be used as a tool for identifying the specific rainwater harvesting strategies in a given locality can be developed by giving the latitude and longitude of the place. This system can be extended to provide various options for rainwater harvesting strategies towards achieving sustainable water resources in urban environments in other urban centres in the state of Maharashtra as well.

Conclusion

The advantage of using GIS for evolving such a methodology is that it may be useful in the initial identification of the plots and wards, visual cross checking with statistical data, and providing a platform for presenting the model to decision-makers for reviewing aspects such as:

Hydro-Geological Mapping

- ground water quality analysis and interpretation;
- water audit
- rainfall pattern and distribution analysis;
- strategies for rainwater harvesting including storage/ recharge optimization; and
- catchment management plan.

Water Resources

- Total surface and groundwater resources
- Extraction of hydrology (surface and groundwater) layer along with volumetric estimates
- Spatial distribution of surface water bodies and their status
- List of surface water bodies (reservoir, tanks, lakes, ponds) with surface spread and volume statistics

Sectoral utilization and potential for:

- Irrigation
- Drinking
- Industries

Estimation of demand based data – sector-wise

- Estimation of sub-resource-wise availability based on modeling tools of runoff and recharge components.

I hope this methodology will helps to establish a basis and take up pilot projects to examine the fiscal and ecological implications of water conservation strategies using GIS techniques.

Notes

1 2001 Census population 0.97m. variously estimated at 12.26 m. in 2012

2 Mumbai was originally made up of 7 islands which were later connected to the northern suburbs by a bridge across the Mahim creek. The present area of about 438 sq. km. of Greater Mumbai Municipal Corporation is divided into 27 Municipal wards of which 8 fall in the island city in the south and the rest in the suburbs north of Mahim creek.

3 BRIMSTOWAD-Brihan (Greater) Mumbai Storm Water & Drainage Report of MCGM estimated the water requirements, and capital outlay and projects required to be taken up to augment the supply and take care of the storm water and drainage.

4 Mumbai Development Plan 1991-2010 by MCGM and the report accompanying the physical plan gives detailed information on demography, socio-economic and physical facilities & utilities.

5 Development Control Regulations for Mumbai,1991, are part of the state government approved development plan in force from 1991 and prescribe open spaces to be left within a residential/commercial plot of land as a recreation space. Due to lack of strict enforcement and public awareness about environmental effects of contravening the regulations, these are observed more in default! The new rules requiring water harvesting emphasize storage of rain water in underground water tanks for non potable uses such as gardening etc. and do not specifically stress the recharging of ground water by facilitating water percolation through open wells, bore wells and unpaved areas surrounding buildings in plots of land.

6 It may also be worthwhile to map with the aid of GIS, underground water streams in the Mumbai Metropolitan region and determine their direction and depth of flow and yield characteristics if these flow through the city towards the sea in order to tap this water for urban water supply.

7 Madhav Chitale Committe's report on the flash floods in Mumbai on 26th July 2005 and possible remedial measures was made public in March 2006. Mumbai Floods, Engineering Solutions: N. V. Merani report is also of relevance.

8 Mitigating Urban Floods, Mumbai, India: Simple Solutions: Prakash M Apte. The paper submitted to the State government in the wake of the deluge on July 26, 2005 which resulted in loss of over 900 lives, emphasizes urgent need and measures to increase the percolation of water in the ground by encouraging use of perforated paving tiles, requirement of having bored/open wells within the plot of lands for residential buildings, providing seepage devices in all open storm water drains to facilitate speedy percolation of water.

Chapter 9 MITIGATING URBAN FLOODS

The unprecedented flooding in Mumbai on and after the torrential rains of 26 July 2005, was as much the result of record rainfall as the historical negligence of urban planning and management by the municipal corporation, state government, administrators and the professionals concerned with city-planning and development

As an Architect-Town Planner, I am deeply distressed by the disregard for rational planning in Mumbai displayed by politicians, administrators, builders and professionals. In a recent report in the *Times of India*, on the lack of urban planning in Mumbai, when a reporter quoted me as saying, '…this is perhaps the only city of its size in the world which does not employ a single Urban Planner in its local government…,' an ex-Municipal Commissioner and the Director of Projects angrily retorted that the Mumbai Plan was due for review in 2013, when some town planners would be consulted.

A public transport bus submerged on the road.

It is said that the catastrophe of 26 July 2005, was the result of the state and local government's failure to address the problem historically as well as on the day of the crisis. 'Failure' presupposes an 'attempt' to mitigate a calamity. In fact, there was no attempt, only inaction on the part of the state and local government; and hence the question of failure does not arise. There have been knee-jerk reactions by the government since then, such as banning of plastic bags, restrictions on not building residential units on ground floors, and so on.

Given below are the main reasons for the flood and the remedial measures that can be taken.

- First: the phenomenal increase in the impervious land surfacing in the city (roads, footpaths and lands around buildings).
- Second: the uncovering of roadside gutters in residential areas (by over-zealous malaria officers of the MCGM), leading to the dumping of solid waste therein.
- Third: choked roadside drains.
- Fourth: inadequate garbage disposal from the roads.
- Fifth: major storm water disposal water courses choked by garbage.
- Sixth: encroachments on the banks of water courses like the Mithi river.

The remedies are simple and are, in fact, inherent in the problems.


Above *New concrete roads are impervious to water percolation.*
Above *right Footpaths paved with concrete tiles.*


Above *Most building compounds are fully paved with impervious tiles.*
Above right *Courtyards in buildings are paved for parking.*


Above *A fully choked roadside gutter.*
Above right *Roadside open gutter is an inviting garbage bin!*


Above *During heavy rain this garbage first chokes the gutters and later the main storm water drains.*
Above right *Broken drains invite debris to be dumped in.*


Above *Roadside garbage ultimately finds place in storm water drains.*
Above right *Waiting to be pushed into the adjoining creek.*


Above *Collected garbage on the banks of Andheri storm water drain.*
Above right *Debris being filled into Versova Creek.*


Above *Encroachments on the bank of the Mithi river.*
Above right *The Andheri storm water drain is narrowed by the accumulation of garbage on its banks.*


Above *The narrowing flow results in flooding during a deluge.*
Above right *Nearing its confluence with the sea, the wide Andheri drain narrows down – and lacks the capacity to let the flood water flow during torrential rain.*
Below left *The result of the above is backflow of all storm water courses leading to flooding in Mumbai.*


Above right *Existing ponds like this behind Oshivara receiving station, can be deepened and converted into holding ponds.*

Rain Water Percolation
Mumbai is deficient in the provision of open spaces, which accounts for barely 10% of the total city area. Hence, almost 90% of its land area is paved with impervious materials, concrete or asphalted roads and footpaths, leaving marginal open spaces around all buildings (residential, offices, commercial etc.). As a result, there is very little scope for the percolation of rain water and it accumulates on these surfaces and in a deluge like on 26/7, rises quickly to completely inundate the area.

Roadside Storm Water Drainage
In the suburbs, this accumulated water on roads, footpaths and building compounds, has to flow primarily through the roadside gutters into the main drainage system of large drains and rivers like the Mithi and the creeks, which ultimately drain into the sea.

The roadside gutters are mostly uncovered. When attempts were made by cooperative housing societies of adjoining properties, to cover these with stone/perforated concrete slabs, the authorities brought truckloads of workers to break these up (and dump the debris into the gutters), on the grounds that covered gutters breed mosquitoes. As a result, not only the roadside garbage but also debris from the alteration/renovation work by individual occupants of buildings, gets dumped in the gutters/drains, choking them. Consequently, even in light showers, these gutters overflow and water accumulates on the streets and backs into individual building compounds, resulting in the flooding of the lower floors.

Thus, impermeability of most land surface in residential areas and the blockage of feeder gutters and drains, is the primary reason for the flooding of streets and building compounds during heavy downpours in Mumbai.

Main Storm Water Drainage
These are usually constructed drains, seasonal rivers like Mithi, and the creeks. The constructed drains, like the local drains,

being open, have become dumping areas for slum dwellers on either bank. The seasonal rivers and the creeks, being natural watercourses, are not 'trained' and have natural earthen banks that get constantly reclaimed for encroachment by the slum population. As a result, these water courses have narrowed and filled up with debris, reducing their carrying capacity. During the initial period of a deluge, local areas get filled with water due to the blockage of local gutters. But with water accumulating on the streets, the force drives debris into the main drains, rivers and creeks. The water in the local areas, therefore, ebbs a little while the carriage of the debris from the local gutters into the main water courses reduces their carrying capacity and depth, resulting in the rising of the water level and inundation of larger areas of the city.

Draining into the Sea

Most major water courses have narrowed at their mouths, where they meet the sea, due to natural and manmade reasons like reclamation for 'recreational' uses allowed to private builders, encroachments, and public works like the Bandra-Worli Sea Link.

It is interesting to study the genesis of the development of a golf course in the Aarey green area. Initially, at the intervention of the then Chief Minister of Maharashtra, about 28 acres of land was allotted to the builders for recreational purposes (a golf course), with the express understanding that there would be no building activity. This information was given on the floor of the legislative assembly. Today, this 'recreational development has a residential complex, hotels, service apartments, and a ~~Thai lake~~ village.

Recommendations of various appointed committees include building structures with gates to stop sea water entering the water courses and creating holding ponds at the mouth of these courses to hold the runoff till low tide. Suggestions such as these are gathering dust in the archives of the government. As a result, the main drainage channels are not able to drain off the water into the sea; the water backs up and floods all the areas along their banks. This is precisely what happened in July 2005.

The solutions are really quite simple and are based on common sense. But these solutions are not quick-fix, one-time-applications. There lies the rub. They require continuous effort, will and vigilance to ensure that the measures initiated are implemented all the time and not only before the monsoon. If we are to avoid a repeat of the 26/7 Mumbai floods, constant and continuous efforts are required to keep the city clean and free from debris. There have to be measures taken to ensure that storm water channels are free from obstruction and there is increased percolation and flow of rain water. This is possible at no extra cost to the taxpayer and the authorities, by simply ensuring that the manpower of the local authority actually performs its legal and mandatory duties, sincerely and diligently.

Suggestions

1. Sweep the city every day.
2. Remove garbage immediately (instead of just before the monsoon).
3. Either cover roadside drains or clean them every day.
4. Make it obligatory for all building premises to be paved only with perforated tiles to allow water percolation and harvesting.
5. Pave all footpaths with perforated tiles only.
6. Keep the mandatory Recreation Garden (RG) in every development unpaved and in one location (not in small bits and pieces), and provide an open dug well of minimum 5 mt. diameter to let rain water percolate and accumulate.
7. Allow basements only under the building footprint and not over the full plot area; and leaving the mandatory RG free as unpaved ground.
8. Remove debris and obstacles to the flow of storm water drains.
9. Widen and keep free from encroachments, the mouths of all main storm water courses joining the sea.
10. Create holding ponds near the mouths of all creeks and rivers to hold the runoff in a deluge (the kind that took place on 26/7), till low tide.
11. Train, widen, deepen and dredge regularly, all creeks and rivers and make them navigable ~~by~~ private participants.

12. Follow Coastal Regulation Zone (CRZ) restrictions rigorously.
13. No permissions for any use in Saltpan lands and CRZ areas except existing use.
14. No permissions for any use in the existing open spaces except existing use.
15. No reclamation of creeks, mangroves, wet lands, saltpans, ponds, quarries or pits.
16. Act on the recommendations of all previous committees appointed for this purpose.

If these simple solutions are put into practice, there is no need to appoint any more committees or take up grandiose projects. We don't lack talent, ideas or plans. What we lack is implementation and constant vigilance.

Chapter 10 PUBLIC TRANSPORTATION STRATEGIES

India and Mumbai

Mumbai, Capital of Maharashtra State, India

- Population 11.9 m. (2001) 12.26 million in 2011.
- Area 438 sq. km.(Municipal Corporation of Greater Mumbai limits).
- International Airport: Chatrapati Shivaji (formerly Sahar) International Airport.
- Domestic Air Terminal: Santacruz Airport in Santacruz, a suburb of Mumbai.

- Railway: Churchgate Terminus (for suburban trains) and Mumbai Central (for trunk routes) on Western Railway (WR) and Chatrapati Shivaji Terminus (CST), formerly Victoria Terminus, for suburban and long distance trains on Central Railway(CR). The suburban railway runs over 300 route km on WR and CR.
- Coastal Length 140 km. Ferry service (except in monsoon, between mid-June-mid-September), connects the mainland on the west coast, across the Thane creek.

It took over 150 years to join the original seven islands of Mumbai. The original island of Mumbai was only 24 km long and 4 km wide from Dongri to Malabar Hill (at its broadest point).

From 1870 to 1970, industrial and commercial development prospered, which increased the spate of reclamation that ended with the famous Backbay Reclamation. Backbay Reclamation yielded the land on which stand the high rise towers of Nariman Point and Cuffe Parade. East of the Naval Dockyards some land was reclaimed and work was done to the north too.

Eventually, the Supreme Court injunction protecting the shoreline and access for fishermen has slowed down the work since 1970. And the Supreme Court has added more restrictions in the 1990s with the Coastal Regulatory Zones.

Mumbai, over the last few decades, has emerged as the financial and commercial capital of India. The urban growth has spread beyond the boundaries of Municipal Corporation of Greater Mumbai to form Mumbai Metropolitan Region (MMR). MMR has an area of 4354 sq. km and a population of about 20.7 m. in 2011.

Mumbai Metropolitan Region generates about 5% of national GDP and contributes to over one third of India's tax revenues. Mumbai has a unique distinction of satisfying 88% of its peak period travel demand through public transport, mainly suburban trains and buses. Of the remaining 12% peak travel demand, 5% is met by taxis and 7% by private vehicles.

Map of Mumbai Source: mapsofindia.com

Mumbai has become synonymous with overcrowded suburban trains

Although these proportions are estimated to have remained more or less the same till 2011 (with public transport's share falling marginally from 88% to 85%), the number of public transport trips in the peak period are estimated to have risen substantially.

Transportation

Transportation in Mumbai is a major problem, especially due to the geography of the city. It is an island city. There is a large concentration of commercial and administrative functions at the southern tip of the island due to the fact that during the British rule, the Fort was located there, which has, over the years, developed into a modern Central Business District. The only highways in Mumbai are the East and West Express Highways that run north/south along the eastern and western coasts. The city's system was modeled after the London transportation system with the exception of the Underground Metro.

The largest and only public bus transport system is BEST (Brihanmumbai Electric Supply and Transport), with about 3380 buses. The road network consists of 1431 kilometers of thoroughfares, which handle an average of 4.5 million passenger trips per day. However, the most used mode of transportation is rail. The main trunk rail routes follow the same paths as the express highways and terminate at Chatrapati Shivaji Terminus on the east and Bombay Central Station on the west; the suburban route continues south to Churchgate station. In addition, there are private cars, buses, about 45,000 taxis and over 38,000 autorikshaws (three wheelers), in the suburbs, excluding the island city, where these are prohibited.

History

Not only was the Mumbai transportation system modeled after the London system, it was pretty much developed in conjunction with it. As London developed a system, Mumbai received it five years later. Tram services in Mumbai began in 1870. It remained until the 1960s, when the government felt that the trams were becoming obsolete, even though their passenger-carrying capacity was 50% greater than buses, they were more energy efficient, cleaner, and could be easily modernized.

Above *Tram in Mumbai till 1964.*
Above right *Tram in Kolkata, still in service.*

However, a government-sponsored study concluded that buses were more effective. The last tram in Mumbai ran in 1964. This was perhaps the first blow to transportation development in the city. The second came in 1974, with the abolition of the trolley bus. The trolley ran on electricity, was quiet and was able to follow routes that the large diesel buses could not run on. After the termination of these two systems, no new transportation system was introduced in Mumbai

Problems

Mumbai's transport needs are well documented. Detailed reporting on transport began in Mumbai in the early sixties. The list of significant studies and reports include, Wilbur Smith Plan (1963), Traffic System Management Plan (1980), Bombay Trans-Harbor Link (1983), Comprehensive Road Development Plan (1983), High Level Committee (1987), Comprehensive Transport Plan for Mumbai Metropolitan Region-MMR (1994), Mumbai Metro (1997) and several others till 2002.

A population of about 12.27 million (2012) in Mumbai Metropolitan Area generated total peak hour passenger trips of 21,54,860 in 1993. Of these, 88% were performed by public transport, 7% by private vehicles and 5% by taxis. In 2011, the peak hour trips are likely to be about 32,60,431. Of these 85% may be by public transport, 9% by private vehicles and 6% by taxis.

Due to its linear configuration, travelling distances are great in Mumbai. The average distance travelled per passenger of mass transportation, is 6 kms, nearly one-third the length of the island city of Mumbai. Because of the overcrowding on the mass transit system, many people are switching to personal transport such as scooters or mopeds. This further aggravates the pollution problem the city faces. Non-transportation uses of roads, such as squatting, slums and pavement hawking, have further reduced the inadequate carrying capacity of the road and rail system, compared to the demand. There is little scope to widen the right of way of rail routes (to lay additional rail tracks) or the roads, to increase their motor vehicle carrying capacity.

Any increase in the widths of roads or rail tracks will necessitate the dislocation of a large commercial and residential land use and population. Apart from the socio-economic hardships of such an action and the remote possibility of its acceptance by the politicians who are the decision-makers, it will involve large fiscal investment, the magnitude of which may be beyond the capabilities of the local government.

On the basis of the investment costs estimated for rehabilitation and resettlement of the hutments located on a small stretch of the suburban rail track on the Harbour Line, included in the Mumbai Urban Transport Project (MUTP), currently under implementation with financial assistance from the World Bank, the fiscal cost of such a project could be anything between INR 8000 million-16000 milion (US$ 160 million-320 million).

In view of these physical and fiscal constraints to the public transportation system in Mumbai, highly imaginative, economical and cost-effective options and approaches are needed that can increase the carrying capacity of the existing rail and road transport network. Instead, the authorities seem to prefer high capital cost global (glamorous?) solutions like underground rail, overhead light rail (nicknamed Sky Buses), grade separation of roads and limited entry expressways, that can help only the 7% of passenger trips undertaken by private vehicles. Imaginative approaches like double-decker rail coaches with dual loading-discharging platforms, and regulatory approaches like restriction on entry of private vehicles by area licensing, car pooling, dedicated bus lanes and re-introduction of trams or surface light rail systems have not received the attention they merit. Unfortunately, this has strengthened the people's perception that the local government is interested in high capital cost projects because of their propensity to generate large commissions and any benefit that may accrue to the common man is accidental or incidental.

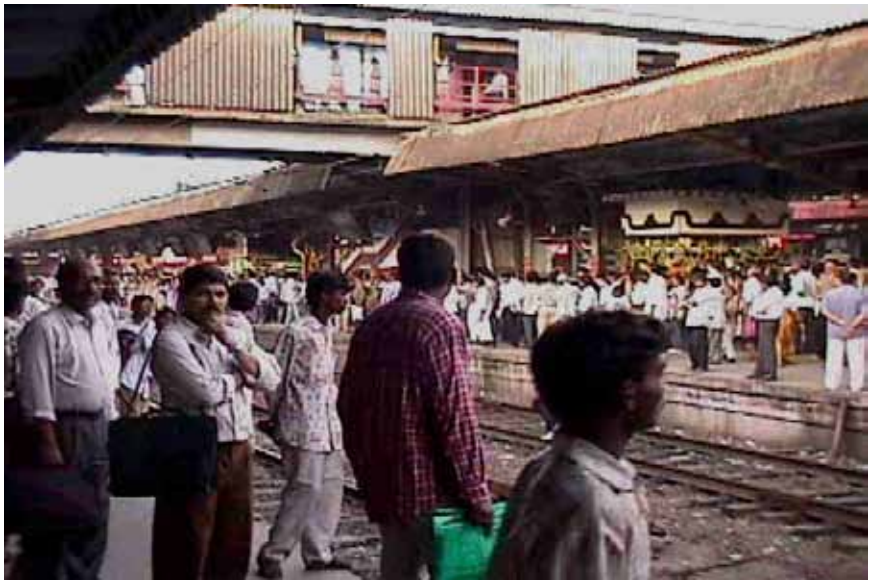
Public Transportation Today

Rail Transport

Mumbai is served by two zonal railways; the Western Railway and Central Railway. At present, the fast corridors on Central Railway as well as Western Railway are shared for long distance (mainline) and freight trains. The suburban railway services, which are in fact, metropolitan services in view of the frequency and short distances between stations, carry close to 6.1 million passengers per day.

The western corridor of the suburban system, starting at Churchgate at the southern tip of Mumbai, goes up to Virar, a distance of 60 km. The eastern corridor, starting from Chatrapati Shivaji Terminus, extends to Kasara, a distance of 67 km. A branch of this eastern corridor, popularly known as the Harbour Line crosses Thane Creek and turns south-east and extends to and terminates at Panvel (39 km), via New-Mumbai.

Proposed Mumbai Metro System



Dadar station on the Western Railway line. Note the foot overbridge which connects the WR and CR routes which converge at Dadar.

The two corridors (local and through), on the Western Railway, run northwards from Churchgate, the terminus (for local corridor) and the southernmost station of the city and from Mumbai Central for through trains. Churchgate is home to the Western Railway headquarters. The suburban rail route runs almost parallel to the west coast up to Virar (60 km). This corridor is popularly referred to as the 'Western Line'. Two corridors (one local and other through) on Central Railway run from Chatrapati Shivaji Terminus. The suburban rail route runs up to Kasara (67km.) This corridor is popularly referred to as the 'Central Line'.

The Mumbai suburban rail system has the highest passenger density in the world. More than half of the total daily passenger trips on Indian Railways are performed on the Mumbai suburban railway system. Despite the heavy demands on it, the system has provided an efficient and reliable service. However, overcrowding has grown to such an extent that up to 4,700 passengers travel by a 9-car train during peak hours, as against the rated carrying capacity of 1,700. This has resulted in a dense crush load of 14-16 passengers per square metre of floor space.

Mumbai's suburban rail system is perhaps the most complex, densely loaded and intensively utilized system in the world. Spread over 302 route km, it operates on 1500 V DC power supply from overhead catenary (now almost converted to AC supply). The suburban services are run by electric multiple units (EMUs). 184 rakes (train sets) of 9-car and 12-car composition are utilized to run 2067 train services to carry 6.1 million passengers per day.

Given the geographical spread of the population and location of business areas, the rail network will continue to be the principal mode of mass transport in Mumbai. To enable the Mumbai Suburban Railway to meet the demands of the ever-growing passenger traffic, the Ministry of Railways and the Government of Maharashtra established Mumbai Railway Vikas Corporation Ltd (MRVC Ltd), a public sector unit of the Government of India under the Ministry of Railways (MOR) and incorporated it in 2003, with equity capital shared in the ratio of 51:49 between Ministry of Railways and Government of Maharashtra to implement the Rail Component of an integrated rail-cum-road urban transport project, called Mumbai Urban Transport Project (MUTP). The cost of the rail component of the project is to be shared equally by the Ministry of Railways and the Government of Maharashtra.

Public Road Transport

Bus services in the city are provided by Brihanmumbai Electric Supply & Transport, with over 3000 buses, which cater to 4.5 million passenger trips per day, of which approximately 60% are connected with rail journeys. The road network in Mumbai predominantly radiates from the southern tip of the island and comprises three main corridors—Western Express Highway, Eastern Express Highway and the Eastern corridor to New Mumbai across the creek. Although termed 'expressways', the roads are essentially arterial roads.

BEST runs a large fleet of buses covering the entire city limits as well as linking the neighbouring district of Thane. There are two types of

buses – the single-decker and the double-decker. The entire BEST fleet of about 3380 buses, carry 4.5 million passengers on 335 routes. Buses are parked at 25 depots across the city. In addition to the buses, BEST also runs ferries across creeks in the northern reaches of the city. It is one of the few public service providers in India to ply air-conditioned buses.

Private Road Transport

The last two decades saw significant increase in private vehicle ownership. The population growth in MMR in 1981-91 was about 3% per annum, whereas the vehicular growth was 8.81%. p.a. Private vehicle registration increased by 3.45 times between 1976 and 1991 (from 1,08,146 to 6,35,172 vehicles). Private vehicles registration in MMA in 2011 is expected to be more than double the 1991 level of 13,56,498 vehicles. Number of vehicles per 1000 persons in MMA is expected to increase from 44 in 1991 to 61.1 in 2013. Private vehicles are thus expected to grow at a rate of 4.95% p.a. as against the population growth rate of 2.19% p.a.

The number of registered vehicles in MMR grew from 521,000 in 1985 to 821,000 in 1991. Private cars grew from 173,000 to 366,000 in 1991 and the number is expected to be double in 2013. Number of taxis (cabs) has grown to about 45,000 in 2004. About 300 motorized vehicles are registered every month by the Regional Transport Authority. In addition to the private cars, and taxis in the suburbs of Mumbai (excluding the island city), about 38,000 three wheeler (autorikshaws), are on the road. Each carry three passengers, excluding the driver. The entry and plying of goods/ transport vehicles is restricted to night time only in the Island city and during certain restricted hours in the suburbs. In addition, there are private buses which ply on contract basis and carry school children and a limited number of white collared workers to their work places in factories or offices.

In the distant suburbs a large number of trips are performed by motorized and non-motorized two-wheelers like mopeds, scooters and bicycles. These can be very effectively integrated in Mumbai's overall transport system and the load on public transport, particularly from residential areas to the suburban railway nodes, can be reduced substantially if adequate parking can be provided at the railway stations and bus depots. Unfortunately, this has not been adequately provided for in the station area improvement schemes (SATIS), being drawn up as part of MUTP.

MMRDA Interventions

The travelling conditions, transport infrastructure, road traffic congestion, air quality, and institutional framework, were considered as some of the major issues which required urgent attention in order to improve the transport sector management in Mumbai. Road transport is a major contributor to air pollution and noise in an urban environment. Noise levels along the roads in Mumbai have been found to be in the range of 65dB(A) decibels and 85dB(A). Both vehicular pollution and noise in Greater Mumbai have become a cause of concern. (Urban Air Quality Management Strategy in Asia, Greater Mumbai Report, World Bank Technical Paper No. 381 3.) MMRDA, therefore, prepared a *Comprehensive Transport Strategy* (CTS), in 1994, providing a strategic framework for the transport sector of MMR. Various strategic transport options identified under the CTS study included projects, such as flyovers (grade separated roads), ROBs (rail over bridges), pedestrian subways and Station Area Traffic Improvements Schemes.

Rail

The Mumbai Suburban Rail Improvement Project initiated by MMRDA included:

- buying a new type of rake, but not adding to the capacity of each train;
- provision of additional two railway lines over a length of 16 kms on the Central Railway and about 15 kms on the Western Railway, adding marginally to the capacity;
- DC to AC traction conversion involving provision of 18 DC sub-stations (5 on Western Railway and 13 on Central

Railway) in place of existing 69 DC sub-stations for better power supply and improved signaling. This will not add to the passenger carrying capacity;
- 12 coach rake operations (instead of 9), adding about 33% to the passenger carrying capacity.

In June 2004, government approval was given for a 13-station elevated light rail line between Versova on the west coast to Ghatkopar on the Central Railway line. The INR 9703 million (US 194.06 million) project envisages a 14-km long, totally elevated rail network with 13 stations, including two stations at the domestic and international airports.

Road

For improvement in road transport, the following are on the anvil.

- A road bridge (West Island Expressway), along the west coast through the open sea linking Bandra with Worli (now in operation), at a cost of INR 20,000 million (US$ 400 million).
- A 6-lane trans-harbour link bridge connecting the southern tip of the city to the mainland at a cost of INR 1,20,000 million (US$ 2400 million).
- Road widening and expansion projects include the adding of one lane to the width of two east-west link roads to a length of about 16km.
- Adding of 4 more ROBs for better road communication across the rail lines.
- An Area Traffic Control system (ACT), to improve the traffic flows for the island city, through a computer controlled traffic signal system, and central control room facility.
- A number of pedestrian grade separation measures on major corridors in the island city and suburbs.

A public bus struggles through Mumbai roads at a snail's pace of 6 to 14 km per hour, while private buses and cars speed away on the Mumbai-Pune Expressway.

Non-Technical Considerations

Maharashtra State Road Development Corporation(MSRDC) originally planned to construct about 50 flyovers in the city, of which 33 have been constructed, and the rest are in various stages of planning. The flyovers have been mainly constructed or planned on the Western Express Highway, Eastern Express Highway, and Panvel-Sion Highway – to facilitate uninterrupted traffic flow in and out of Greater Mumbai. In addition, a number of flyovers are planned or are at different stages of construction in the Island City, to relieve

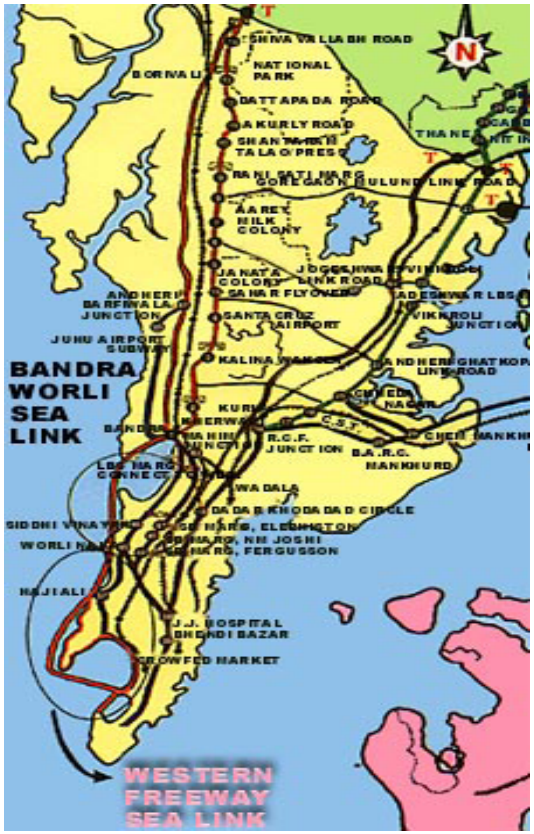
severe traffic congestion at the intersections. Except for a few, the flyovers were not part of the strategic transport options identified by the CTS study. The decision to construct these flyovers seemed to have been prompted by considerations other than technical. Even if these were to be constructed on sound technical grounds, the result would be to benefit only the private car traffic that caters to only 7% of the total passenger trips in the city.

The ten key representative projects, which are estimated to cost over INR 2,00,000 million (US$ 4000 million). include: the Mumbai Trans Harbour Link; the Mumbai Underground (Metro); the Bandra-Kurla Rail Link; the Shivaji Terminus to Churchgate Underground Rail Link; the Light Rail Transit; the Skybus; the Worli to Nariman Point Sea Link; the Western Relief Road; the Anik Panjarpole Link and the Water Passenger Terminals. The expenditure on repairs and the maintenance of city roads/bridges, and the augmentation of the bus fleet, is estimated at over INR 12,000 million (US$ 240 million) per year.

Two major road projects of over INR 140,000 million (US$ 2800 million), which may not benefit the common man are:

- a road-cum-rail bridge across the Thane Creek, linking the southern tip of the island city to the mainland south of Nhava-Sheva port, presently estimated to cost around INR 120,000 million (US $ 2400 million).
- the West Island Expressway bridge between Bandra and Worli (in operation), estimated to cost INR 20,000 million (US$ 400 milllion).

The second bridge (map below) completely closes the Mahim-Dadar Bay (see map below), and has been fiercely opposed by both environmentalists and the fishermen community. Its construction is pursued perhaps more for its Golden Gate-like (San Francisco), eye appeal than to facilitate vehicular traffic on the western corridor.



Passenger Water Transport (PWT) along the west coast of Mumbai. The project envisages construction of terminal and operation facilities at five locations, namely Borivali, Versova, Juhu, Bandra and Nariman Point, and operation of vessels (catamaran/ hovercraft) on Build, Own, Operate and Transfer basis (BOOT), for a concession period of 30 years.

Insignificant Impact

However, all these schemes are unlikely to make any significant impact on the traffic and transport situation. All the measures taken by the authorities so far in the name of improving rail and road traffic in Mumbai may result in:

- little augmentation in the carrying capacity of the rail network, which carries 88% of passenger traffic;
- no augmentation of the passenger carrying capacity of the bus transport;
- no facilities for the motorized/non-motorized two-wheeler users for east-west traffic;
- no encouragement to bicycle users or pedestrians for reducing the load on public transport;
- no reduction in the number of private cars entering the major work centres in the southern parts of the city; and
- no adequate parking provision at rail/bus nodes to encourage Park & Ride and use of public transport.

Transportation Strategy Proposals: Overview

I recommend the following proposals.

1. Double the carrying capacity of suburban trains by having double-decker coaches with the current or dual loading/ discharge platforms at all stations at marginal cost.

2. Double the carrying capacity of the bus service by creating dedicated bus lanes which will accelerate the speed of bus travel and facilitate greater frequency of services by only a marginal increase in the number of buses on roads – as the shorter journey time may facilitate higher number of trips by the same number of buses.

3. Convert the dedicated bus lanes into light rail tracks in due course to further add to the passenger carrying capacity of the roads.

4. Restrict entry of private cars in certain parts of the city by area licensing; prohibit use of cars on designated days (at least 2 per week); allow plying of cars with odd/even numbers only on alternate days to reduce the car traffic on the roads and facilitating frequent and faster bus service.

5. Provide adequate parking area at the suburban rail stations and the bus depots to encourage use of public transport and motorized and non-motorized two wheelers for the east-west transport and from the residential areas to the suburban rail stations, considerably reducing load on the bus service and reducing congestion.

6. Construct elevated pedestrian walkways as extensions of the foot over bridges at the suburban rail stations to reduce the load on the east-west bus service between residential areas and the suburban rail stations.

7. Provide a satellite air terminal in south Mumbai with helicopter service to Mumbai International Airport, Sahar, to eliminate car traffic to/from the airport to south Mumbai.

8. Reconsider construction of the Trans-Harbour link bridge project. It will only aggravate the traffic congestion in the southern tip of the city by pouring in more traffic from the mainland. Instead, the projected cost of this venture estimated at Rs.12,000 million (US $ 2400 million) can be used to create employment opportunities on the mainland in the Navi Mumbai (New Bombay) area and provide subsidy to high traffic generating land uses in Mumbai city to shift to the mainland.

9. Create a ‘calm sea channel’ along the coast from Bandra to Worli for use by traditional ferries all the year round, by constructing a submersible wall along the coast at 30% of the cost of the proposed West Island Expressway between Bandra and Worli. over a bridge through the sea along the coast.

Transportation Strategy Proposals: Detailed Analysis

- ✓ *Double the carrying capacity of suburban trains by having double-decker coaches with the current or dual loading/ discharge platforms at all stations at marginal cost.*

Presently both the Western and Central Railways operate on a network route of 302 kilometers. The rakes designed for a load of 1700 passengers carry over 4700 commuters in dense crush load conditions. The Central Railway and Western Railway runs about 1100 and 1000 trains, respectively, with each train carrying about 4700 passengers during the rush hour. To optimize existing resources, the least cost alternative that achieves desired objective has to be chosen. Can the passenger carrying capacity be doubled employing double-decker coaches for the trains at less cost than adding one more rail track and running the necessary number of trains? The economics is in favour of double-decker trains.

According to estimates prepared by the MRVC, the cost of laying a new single track suburban rail line would be around INR101.53 million (US$ 2.02 million) per km; exclusive of rolling stock and operation and management cost which is estimated at Rs. 4.0 million (US$ 0.8 million) per year.

The cost of a new rake (9 coaches) with improved design would be INR 182.72 million (US$ 3.65 million). A double-decker coach rake may cost around 30% more (wheel base and catenary remaining the same), that is about INR 237.53 million (US$ 4.75 million)/rake. The Western Railway's suburban route from Churchgate to Virar is 60 km long. For dual loading and discharge (if required), a platform will have to be created at the upper level. The level of this platform will be almost at the roof of the presently existing platforms along the tracks within the railway station precincts. Hence what would be required is to replace the existing roofs over the platforms with a concrete slab for the boarding and alighting of passengers at the upper level and raise the existing roof over that.

The double-decker coaches currently used on trunk routes by Indian Railways

This can be done by encasing the present steel columns supporting the present platform roof by cement concrete and laying a concrete slab for the upper level platform floor. This will entail least disturbance to the operation of the trains. The steel columns designed in the 1940s normally had a factor of safety of 4 and will be able to support the upper level platform slab. However, for costing purposes, even if it is assumed that a concrete slab about 180 mts. long and 7.5 mts. wide for each of the two platforms on either side of the rail track were to be constructed now with RCC columns, the cost would be about INR 5.8 million (US$ 0.01 million) per platform. For the 28 stations on this route, the total cost of platform construction may be INR 162.4 million (US$ 3.24 million).

Between Churchgate and Virar, which is a distance of 60 km, running of 1000 trains requires about 100 rakes (900 coaches @ 9 coaches per rake/train). At INR182.72 million/rake, the cost would be INR 18,272 million (US$ 365.44 million). Thus the total cost of running 100 rakes/day by laying a new track for 60 km would be

INR 24,363.80 million (US$ 487.27 million). As against this, the cost of new platforms and 50 rakes (equivalent to normal 100 rakes) of double-decker trains would be INR 12,038.90 million (US$ 240.77 million), which is a little over 50% of the cost of laying new tracks, not counting additional operating costs for the new track.

Thus, double-decker trains, even with dual loading/discharge platforms constructed at upper level, can be run at half the cost of laying a new rail track and will double the carrying capacity of a train or reduce the current level of congestion by 100%. Of the 9 coaches at the lower level, 3 can be reserved for women, 2 for First Class passengers, 1 for the famous *dabbawala*s (lunch box carriers) of Mumbai, 1 for the school students and physically disadvantaged and 2 for the non-pass holders. All the coaches at the upper level (80% standee only), can be totally reserved for pass holders, who travel regularly at specific times and are generally bound for the final destination of the train.

- ✓ *Restrict entry of private cars in certain parts of the city by area licensing; prohibit use of cars on designated days (at least 2 per week); allow plying of cars with odd/even numbers only on alternate days to reduce the car traffic on the roads in the city, facilitating frequent and faster bus service.*

The creation of dedicated bus lanes on the north south trunk routes will mean reduced road width for plying private vehicles like cars and taxicabs. This can be overcome by reducing the use of private cars by allowing plying of cars with odd and even numbers on alternate days; prohibiting use of cars in the island city area two days in a week; permitting use of cars only if there are more than 3 passengers per car; area licensing for entry into specific areas of the city.

These measures will release road space for creation of dedicated bus lanes. A dedicated bus lane can almost double the speed of travel of buses, (presently the average speed of buses on the north-south arteries is 14-16 km/hour and as low as 6 km/hour in congested residential areas on the east-west bus routes), thus shortening the journey time by at least 40% (since stoppage time will be constant). This will mean a greater turnover time for a bus, increasing its total passenger carrying capacity by at least 40% in a day and increasing the revenue, which can be used to ply additional buses on the same route. The frequency of buses will be greatly increased, congestion reduced, working as an incentive to the car owners to travel by public bus transport. Introduction of air conditioned buses on these routes will further attract the car owners. In due course of time, these dedicated bus lanes can be converted for light rail tracks as is prevalent in many cities of the world. The restrictions on the use of cars should not be considered Utopian as has been demonstrated by such measures already implemented in Bogota, Columbia by its famed Mayor, Enrique Penelosa.

- ✓ *Provide adequate parking area at the suburban rail stations and the bus depots to encourage use of public transport and motorized and non-motorized two wheelers for the east-west transport and from the residential areas to the suburban rail stations, considerably reducing load on the bus service and reducing congestion.*

- ✓ *Construct elevated pedestrian walkways as extensions of the foot over bridges at the suburban rail stations to reduce the load on the east-west bus service between residential areas and the suburban rail stations.*

The linear configuration of Mumbai is often cited as the reason for the long journeys to work, especially as work centres are mostly concentrated in the south. On the contrary, if right measures and decisions are taken, this linear development of residential areas on either side of the two north-south rail-road spinal routes can be a great boon to fast and comfortable journey to work by adopting the concept of Park & Ride.

Most residential development in the city is within a 1 km distance from the two rail transport spines. If the carrying capacity of the rail-road spines is doubled by measures discussed earlier, facilitating the east-west journeys to the railway stations from the residential areas will further help solve the transport problems in the city.

To facilitate smooth and fast travel from the residential areas to the suburban rail station, the east-west roads leading to the rail stations need to be improved by restrictions on hawkers on these streets during morning and evening peak hours; restrictions on vehicular parking on these streets during peak hour traffic; creating dedicated bicycle and motorized two wheeler vehicular lanes on these streets; providing two wheeler parking at ground level along the rail tracks within the right of way of railway land as this land may not be required for laying of additional rail tracks (the need being fulfilled by deploying double-decker coach trains); providing multistoried car parks over the railway stations and bus depots in the city extension; and widening of the foot bridges over the rail lines (as depicted in the picture below), at all suburban stations to bridge over the north-south road arteries (parallel to the rail lines), and give a grade separated access to the pedestrians directly from the suburban rail station to the residential area.

A covered ramp giving access to a footbridge over the suburban rail line in Mumbai.

These measures will encourage the daily commuters to either walk or use personalized vehicles for their journey to rail stations and make optimal use of the public transport. Such a proposal to 'pedestrianize' the suburban railway precinct area and the streets leading from residential areas to the rail stations, is by no means utopian or impractical.

- ✓ Provide a satellite air terminal in south Mumbai with helicopter service to Mumbai International Airport at Sahar to eliminate car traffic to and from the airport to south of Mumbai.

A major contributor to the traffic on the north-south road arteries in Mumbai is the car and taxi traffic from the Mumbai International airport. A proposal to start an air taxi service has been debated for long. Rather than an air taxi it would be far more convenient and acceptable to the traveler, if the 'check in' for the international flight could be arranged at a 'satellite terminal' in the south of Mumbai. Air travelers could check in at this satellite port and be directly ferried to the departure lounge of the international airport.

The present international airport at Sahar has already reached its maximum handling capacity and the MMRDA has proposed a new international airport at Mandwa across the Thane creek on the mainland directly opposite to and east of the southern tip of Mumbai. Landing at this proposed airport will involve a circuitous road journey of at least 5 hours to reach south of Mumbai (via New Bombay, Thane). Hence, a proposal to link the southern tip of Mumbai to the mainland by a road bridge at a currently estimated cost of Rs. 1,20,000 million (US $ 2400 million) has been mooted and is being enthusiastically pursued! Due to the quantum of investment required it may take a long time to have the proposal implemented.

In the meantime, though the present airport at Sahar has already reached its optimal capacity and its augmentation is not feasible without shifting its location, its accessibility with the city needs to be improved. Hence, a new proposal of an overhead light rail (estimated to cost Rs. 9703 million, i.e. US $ 194 million) between Versova on the west coast to Ghatkopar station to the east touching

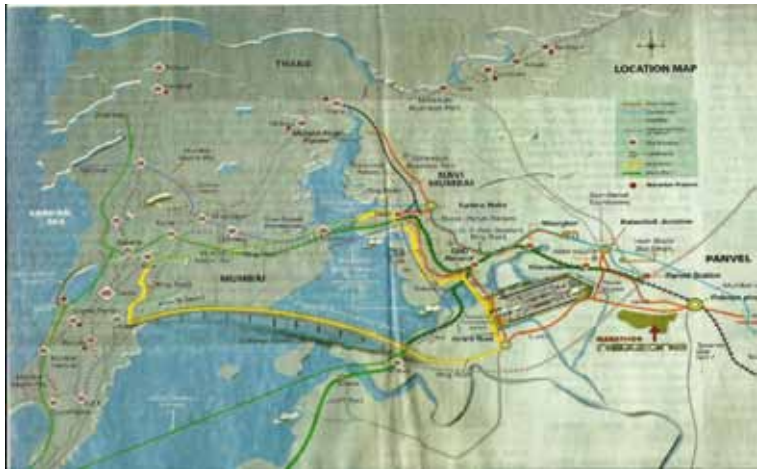
Sahar with a new rail station on the Central suburban rail line is mooted and global tenders have been invited! The fact that Sahar airport would not be serviceable in another year is lost sight of in the enthusiasm to undertake new and costly projects and turn Mumbai into Shanghai!

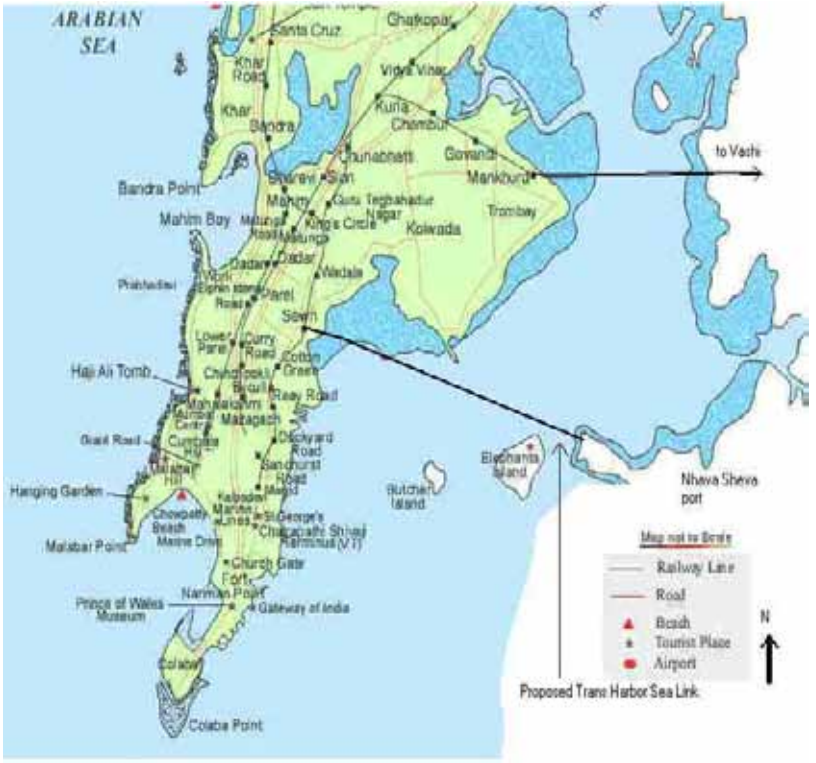
What is required is to relocate the international airport in such a way that it is linked to the entire city by existing suburban rail routes and the hinterland by existing trunk routes. The best location for the airport is the triangular area formed by the suburban rail station Thane at its apex to the north, the present road-rail bridge connecting Mankhurd with Vashi in New Mumbai at its base in the south and bounded by Eastern Express highway to the west and Thane-Belapur road to the east (see Mumbai map). This location will give access to south of Mumbai by rail and road, to the north and east by expressways and will have scope for expansion for the next 50 years. The runways can span the creek by bridges, so as to cause least disturbance to the ecology of the area. The Air Terminal buildings can be located either on the mainland at Vashi in New Mumbai or at Deonar.

✓ *Reconsider construction of the Trans-Harbour Link bridge.*

The project will only aggravate the traffic congestion in the southern tip of the city by pouring in more traffic from the mainland. Instead, the projected cost of this venture estimated at INR 1, 20,000 million (US $ 2400 million) can be used to create employment opportunities on the mainland in the Navi Mumbai area and provide subsidy to high traffic generating land uses in Mumbai city to shift to the mainland.

It has been discussed earlier that the Trans-Harbour Link was originally proposed to provide a direct access from the proposed new international airport at Mandva, on the mainland south of Nhava Sheva port (see map ~~above~~). As the location of the new airport at Mandva is now fiercely opposed by the local population, the Trans-Harbour Link has lost its basic purpose. However, the proposal for the link is now being justified on the grounds that it will help development of that area on the mainland.





What it will actually do is to create a satellite residential community for the ultra rich who will find a serene seaside location for their palatial residences and commute to their business empire in south Mumbai just across the bridge. Once the link is created, migrants from the poorer Konkan area, will pour into Mumbai in search of livelihood.

The international consultants, McKinsey, in their recent report noted that, '…the slowdown in economic growth is responsible for deterioration of Mumbai. To achieve 8% to 10% growth, 0.5 m. additional jobs need to be created. This can be done in the high and low end service sector by converting the hinterland of Mumbai into a manufacturing logistics hub'.

The estimated cost of INR 1,20,000 million for the Trans-Harbour link can be used to create jobs in the mainland area by providing physical infrastructure services for establishment of agro- based, fishing, food canning and similar industries. Subsidy can be given to existing traffic intensive land uses in Mumbai (wholesale vegetable, cotton, cloth steel, scrap markets), to shift to the New Mumbai area. Such a measure will achieve the dual purpose of development on the mainland and reduce traffic in Mumbai.

The Trans-Harbour Link should be viewed in the broader perspective of its effect on migration to Mumbai from the under developed hinterland.

- ✓ *Create a 'calm sea channel' along the cost from Bandra to Worli, for use by traditional ferries all the year round by constructing a submersible wall in the sea along the coast at 30% of the cost of the proposed West Island Expressway between Bandra and Worli, over a bridge through the sea along the coast.*

The proposed West Island Expressway linking Bandra with Worli by a bridge through the sea along the west coast is expected to cost around INR 20,000 million (US$ 400 million). It will only carry cars and taxicabs or air-conditioned long haul buses. This high speed traffic over the bridge will ultimately have to merge into the existing arterial road from Worli to south of Mumbai, and will, in fact, add to the density of car traffic on that stretch of the road.

Existing traditional Ferry service from Apollo Bunder to the mainland.

A cheaper alternative that will help the common man travelling by public transport would be a ferry service from Versova to Nariman Point with jetties at Juhu, Bandra, Mahim, Dadar, Hajiali, and Chowpatty.

In the past, many attempts were made to run such ferry services with high-tech vehicles like catamaran and hovercraft. These failed as the service could not be run during the monsoon (between mid-June to mid-September), due to choppy seas. For a mass transport to be successful, the first requisite is its availability all the year round.

To facilitate such a service, at least in the stretch between Bandra and Worli (the two points proposed to be connected by the West Island Expressway by a bridge at a cost of INR 20,000 million), it can be explored if a deep but calm channel along the coast can be created by constructing a submersible wall in almost the same

alignment as the bridge (with outlets for small fishing crafts) between these two points to substantially reduce the effect of the tide and choppy sea in the monsoon and facilitate plying of the traditional ferries. It is a feasible proposition almost like the walls protecting the ships in a harbour. The cost of such a submersible wall may be a quarter that of the West Island Expressway bridge.

MAKING WAVES ON THE WESTERN FRONT

The project will connect Borivli to Nariman Point. Passenger terminals will be at areas like Nariman Point, Bandra, Juhu (Near Holiday Inn), Versova, Marve, Borivli (Charkop)

HOW WILL YOU COMMUTE? On hovercraft and catamarans

WHEN WILL IT BE READY? After it gets clearance from the state government and the tender is finalised, work is expected to be complete in two years. Passengers could be riding on the ferry by January 2015.

HOW MANY WILL IT SERVE? MSRDC hopes to deploy 39 catamarans and hovercrafts, which could allow nearly 80,000 people to travel in comfort every day.

FREQUENCY? A vessel every 15 minutes at peak hours and every 30 minutes during non-peak hours.

TICKET PRICES? An unsubsidised ticket could be anywhere between ₹200 and ₹250. However decision on ticketing will be taken after consultations with the winning bidder.

MSRDC'S PLANS: Build infrastructure on its own: After facing flak for the project not taking off, the MSRDC has decided to build the physical infrastructure on its own through a cash contract of ₹753.44 crore.

The MSRDC has now decided to ask the private player to buy the vessels. The operator can recover cost by running the service for a mutually agreed time.

MUMBAI'S LONG WAIT FOR WATERWAYS

1993: An expert group recommends a water transport system to the state government

1994: Navi Mumbai development authority launches hovercraft services from Vashi, Navi Mumbai to the Gateway of India. Hovercraft operators suspended services in December 1998 citing lack of jetties, other infrastructure and support from the government

2003: Offers received from five bidders, including a consortium under Satyagiri Shipping Company, to operate the service from Borivli to Nariman Point on a build-operate-transfer basis

2009: Letter of Award is handed over to Satyagiri Shipping. The consortium faces internal problems and partners walk out

2008: A high-powered committee, under chief secretary Johny Joseph, calls for cancellation of the tender as the party was violating tender rules

Feb: MSRDC cancels tender

June: Govt calls for tenders, but none of the 10 prospective bidders submit their bids

August 2010: Pratibha Industries is the single bidder to run the Borivli to Nariman Point water transport project

April 2011: The state empowered committee asks MSRDC to scrap the bid and undertake the project on its own.

Borivli (Charkop) National Park
Marve
MUMBAI
Versova
Juhu (Near Holiday Inn)
Bandra
Nariman Point

Conclusion

Transportation strategies for urban areas cannot be evolved in isolation. They have to be an integral part of the overall urban ~~development~~ strategy for a city. The economic as well as social costs and benefits of any approach to evolving a transportation strategy have to be carefully balanced. Such a task is not easy as the social costs or benefits of a strategy are rarely 'quantifiable'. An urban growth strategy for Mumbai and approaches to its transportation problems can be evolved only in its socio-economic context and constraints. The context is that 54% of its population lives in slums (occupying only 16% of its land), 15% live on sidewalks, 82% of the population has an annual income of less than INR 30,000 (US$ 600), and all its public institutions like the rail, bus and municipal services as also the state government are either running at a loss or deeply in debt.

The MUTP estimates that the minimum package of measures to marginally improve the situation will cost INR 200,000 million (US$ 4000 million). All these projects will need to be financed mainly from the surplus revenues of either the state or local municipal government. As against this requirement, the total yearly (2004-2005) budget (deficit) of the state of Maharashtra, is INR 1,99,833 million (US$ 3966.6). Its current debt is INR 8,70,000 million (US$ 17,400 million). The servicing of this debt even at a low interest rate of 6.5% will require an amount of INR 56,550 million (US$ 1131 million). It is therefore almost impossible for the state to finance such a large investment.

The Mumbai municipal corporation has a yearly budget of INR 33,000 million (US$ 660 million). A staggering 82% of this amount is spent on establishment (administrative expenses and salaries). It is therefore left with hardly INR 5,940 million (US$ 118 million) for development works. It can hardly be expected to finance a project cost of US $ 4000 million.

The strategy should be to build on the current strengths of the existing transportation network, optimize its utilization, convert the threats into opportunities and shun the temptation to make Mumbai look like Shanghai or Singapore by taking up grandiose projects like trans-harbour sea links, elevated light rail or sky bus projects. In fiscally constrained times the only prudent alternative is to optimize available infrastructure.

Why Unified Transport Body for Mumbai ?

A proposal is being floated to have a unified transport authority for Mumbai. After 60 years of legislating and creating new authorities, why do we still believe in them as the panacea for all ills? When will it occur to us that the fault lies with the tardy or non- implementation of plans, policies and programs and not with the structure of authorities?

Why a unified Authority for Transport only? Why not for Housing (SRA, MHADA, Shivashahi Punarvasan, Police Housing Corporation); for Energy (REL. Tata, BEST); for water resources and waste management (MCGM, MMRDA, Mithi river Authority)? If such single function super authorities are to be created why have MMRDA?

The BMRDA Act 1974 states: *Object of the Authority shall be to secure the development of the Bombay Metropolitan Region according to the Regional Plan…*

Having prepared the regional plan, of which traffic and transportation forms a very important and integral part, and got it sanctioned by the state government, why cannot MMRDA ensure that all transportation authorities work towards it? Why get bogged down in the implementation of petty projects like skywalks and flyovers?

The answer is simple. Planning and coordination does not bring glory or money. A new authority means a Chairman, Managing Director, office-building, cars and one more organization at the command of the administrators and politicians, large investments, appointment of transport consultants and commissions.

Mumbai Trans-Harbour Sea Link

The proposal for this link has been under the consideration of the state government for a number of years. Global bids were also called for the project. It was then reported that the proposal was not found to be feasible due to the objections by the Ministry of Defence, Government of India. It was reported that the proposed bridge was considered highly prejudicial to the security of the country. It was feared that if such a link-bridge were to be built, in case of a war with another country, the destruction of the bridge would block the water channel to the open sea, creating an impediment to the free movement of war ships and submarines. A sudden air strike on the bridge would block the channel and the warships and submarines in the port would be sitting ducks for an air strike by an enemy creating a repeat of Pearl Harbour. Hence, the Defense Ministry did not approve of the construction of the bridge. Thereafter proposals were mooted to build a rail-cum-road tunnel under the sea to overcome the Defense Ministry's objections and some feasibility studies were done.

Boost for water transport project

EASING TRAFFIC WOES CM gives MSRDC two months to complete spadework

HT Correspondent

MUMBAI: The proposed water transport project on the western and eastern coasts of Mumbai, which has been languishing for 12 years, may well be back on track.

On Monday, Chief Minister Prithviraj Chavan directed Maharashtra State Road Development Corporation (MSRDC), the state's nodal agency for carrying out infrastructure projects, to undertake detailed studies within two months for both routes.

The studies will cover estimation of traffic, cost of building port infrastructure, estimated tariff and agreement clauses with private operators. Chavan also asked the agency to work out expression of interest documents for interested parties during this period.

TENDERS COULD BE ISSUED IN TWO MONTHS

WESTERN WATERWAYS

- MSRDC to present project report on establishing six jetties proposed along the route
- This includes jetties and passenger terminals at Nariman Point, Bandra, Juhu, Versova, Marve and Borivli
- The cost of building the port infrastructure is around ₹750 crore

EASTERN WATERWAYS

- MSRDC likely to consider building jetties at Ferry Wharf or Gateway of India, Nerul, Rewas, Mandwa and Alibag
- The project cost for eastern waterways is estimated at ₹250 crore

While the western route aims to connect Borivli with Nariman Point, the eastern route aims to connect Nerul with Gateway of India.

Chavan's review of the water transport project comes following criticism from various quarters over the state's inability since 1999 to exploit the city's coastline, which will take the pressure off the roads.

"In the past, we had tried to get this project off the ground on a Build-Operate-Transfer (B-O-T) basis but did not succeed because the project was not viable," said Chief Secretary Ratnakar Gaikwad.

Now, the government is looking at creating the port infrastructure and then asking private operators to run the catamaran or roll-on and roll-off services using their own vessels.

"The project is viable through government funding of port infrastructure and I think it can take off," said Gaikwad.

If the studies by MSRDC show that the routes are viable in terms of sufficient traffic volume, the government plans to issue tenders for developing port infrastructure.

Chavan has asked MSRDC to look at building six jetties along the western route at Nariman Point, Bandra, Juhu, Versova, Marve and Borivli, and five jetties on the eastern route at either Gateway of India or Ferry Wharf, Nerul, Rewas, Mandwa and Alibaug.

The state government wakes up to the option of providing water transport
~ Hindustan Times 22.11.11

Does the revival of the proposal for the sea-link by a bridge mean that the Defense Ministry no longer considers it a threat to the security of the country and all the arguments earlier put forward against it are withdrawn invalid?

Update on the Bandra-Worli Sea Link

MMRDA's consultants, who recommended the construction of the link, projected a daily traffic of over 1,20,000 passenger units. In fact, the volume was only 20,000 passenger units in January 2009. The cost escalated by almost 550% from INR 300 crore to INR 1684 crore.

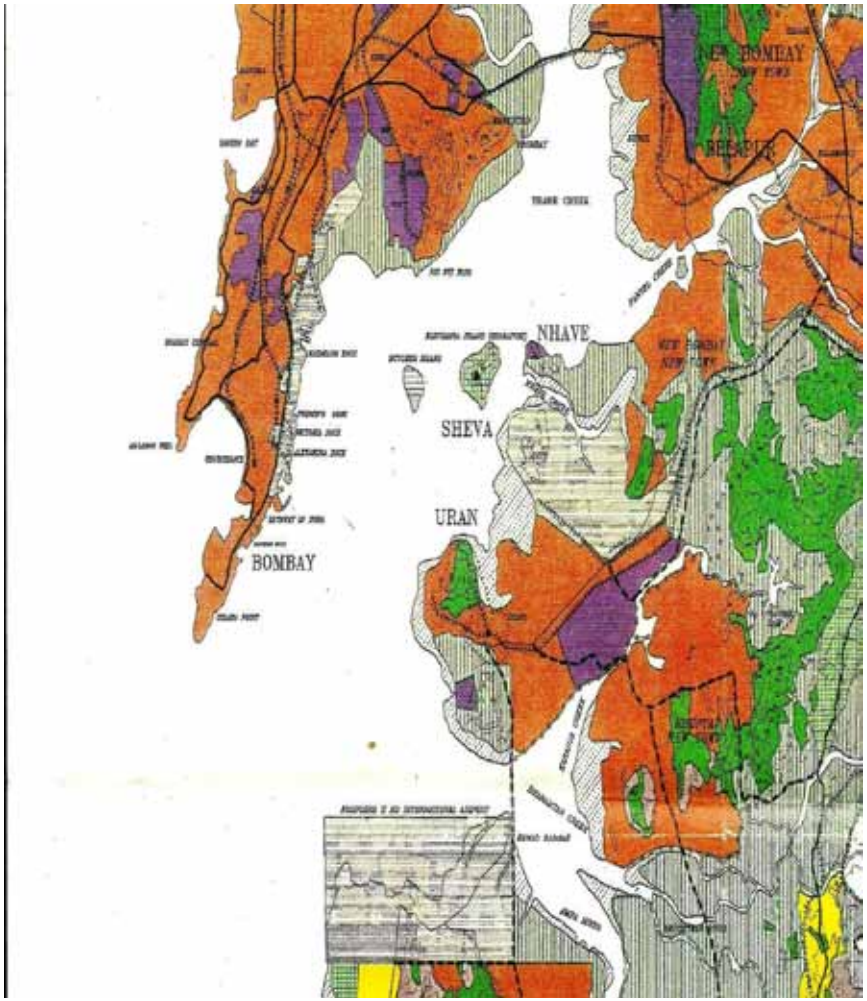
Chapter 11 NEW INTERNATIONAL AIRPORT

It is estimated that by 2020, the total traffic at Mumbai (Sahar) international airport, may be about 20 million passengers per year. Against this, the handling capacity is about 7.5 million passengers per year. The proposal for a new airport at Navi Mumbai is being propagated on the grounds that there is no possibility of physical expansion of Sahar International Airport. In fact, if the slums around the airport were to be resettled elsewhere, the airport's hardware could be expanded to handle double the present capacity (ie.15 million passengers). Moreover, as suggested by the consultants appointed by the Airports Authority of India (in their interim report recently), if certain software improvements suggested are put into practice, the present airport can handle 20 million passengers. It means there is no need for a new airport.

But these options are ignored. Why? Because they are low-cost, in fact no-cost.

The Mumbai Regional Plan of 1973, as well as the current plan, advocates a decentralized pattern of growth by promoting new growth centres such as Navi Mumbai and by restricting growth of employment and offices in south Mumbai. An important aspect of the office location policy advocated in the new Regional Plan is to encourage the location of office and business activity as well as work centres in the north, particularly in the designated District Centres at Bandra-Kurla, Kanjurmarg and Oshiwara.

Significantly, and perhaps, in support of such a strategy, the plan is logically silent about a transport link with the mainland between Colaba and Uran. Any such link, either in the form of a bridge or a tunnel, is bound to defeat the very purpose and objective of the



New International Airport location Suggested at Mandva in the regional plan by MMRDA

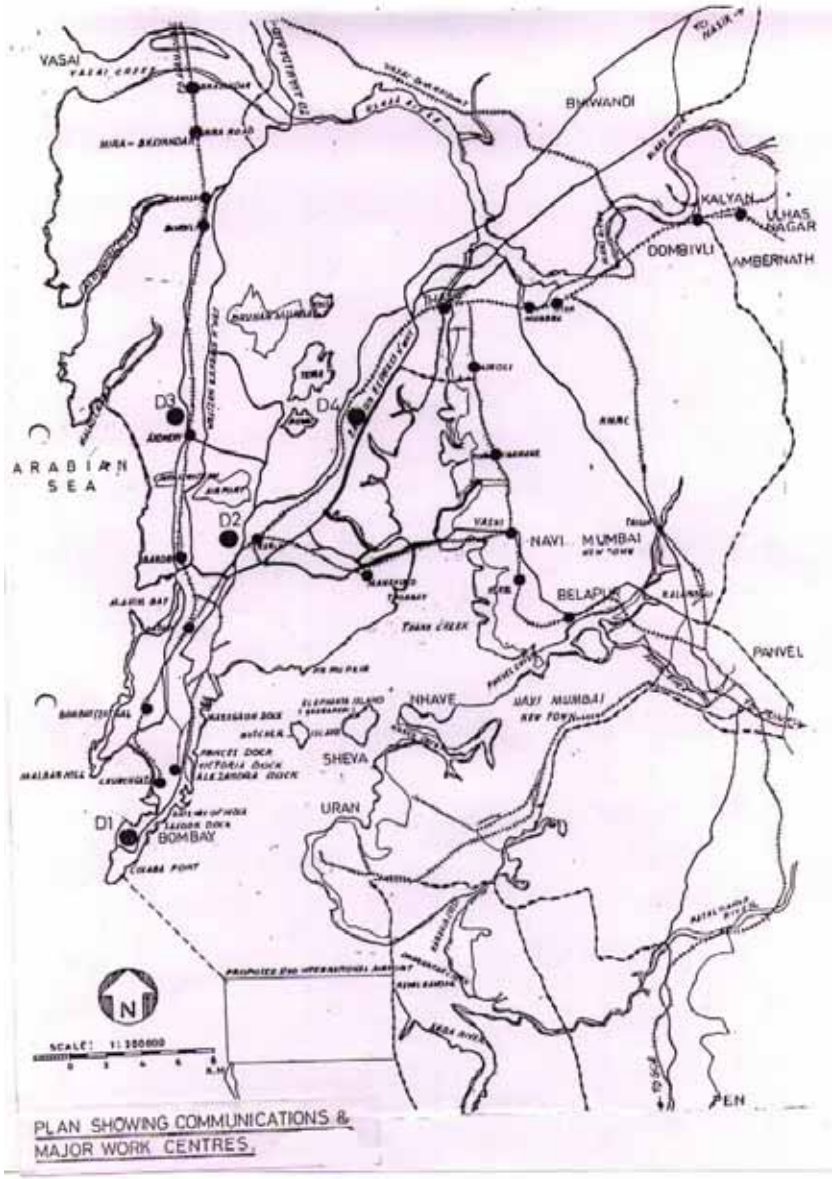
Regional Plan as it will further promote residential development at Uran, on the mainland, making the then easily accessible Colaba area, the most desirable location for office and business expansion, further aggravating the already chaotic traffic conditions, parking problems and commuting delays. The proposed location of the second International Airport at Mandva is highly unsuitable from this point of view.

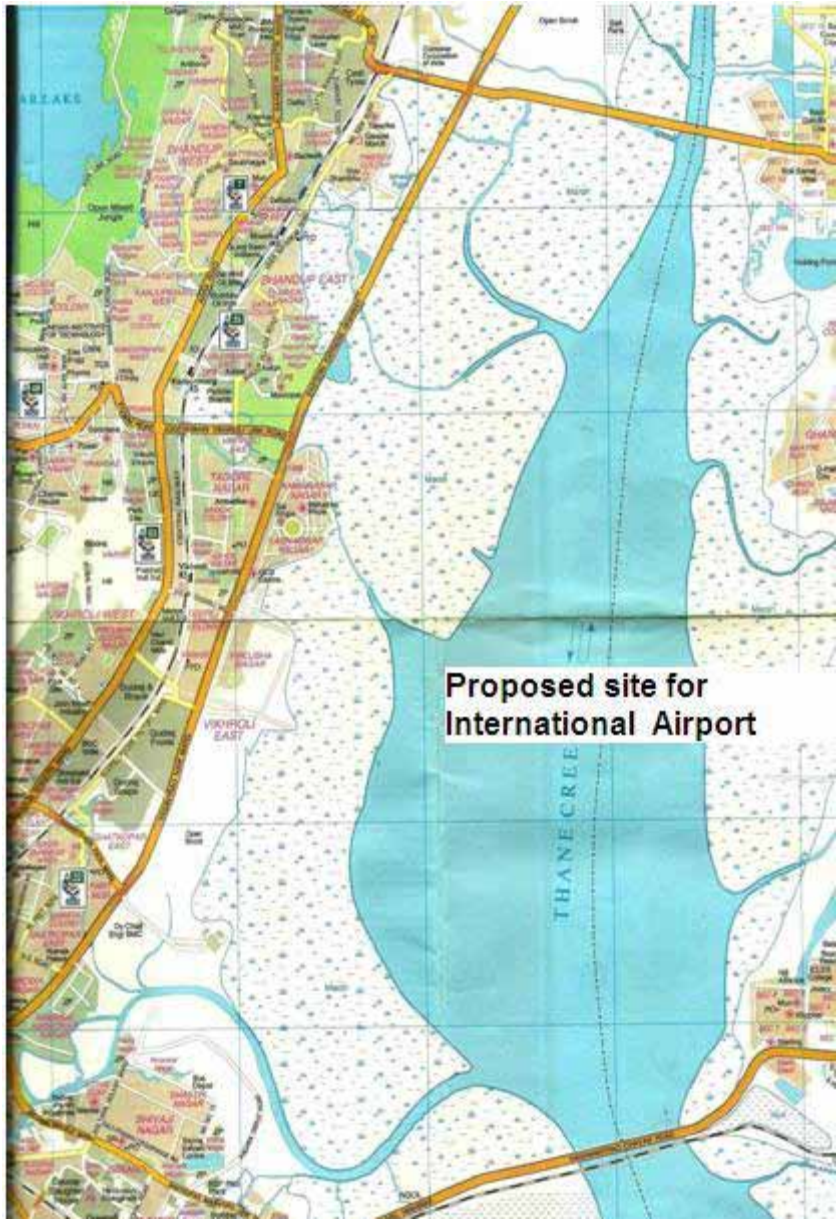
On the other hand, without a direct link to Colaba, use of this airport will entail a road transport time of at least 4 hours from South Bombay via Thane and Panvel. As such, if the airport is located there, the concerned lobbies are bound to create pressures for a direct link across the harbour from Colaba to the mainland and defeat the basic objectives of the Regional Plan of shifting the employment centres to the north in Mumbai city and negate the purposes of MMRDA's office location policy.

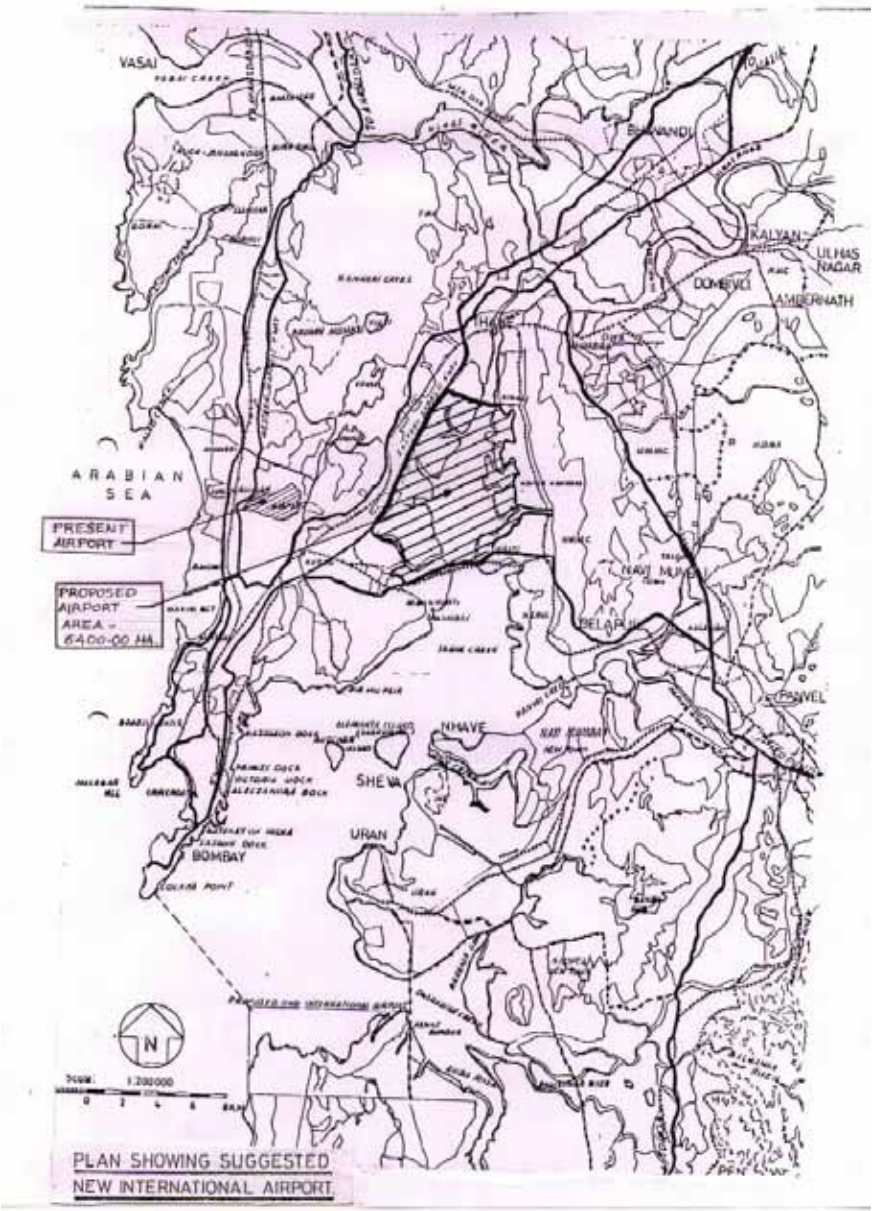
It is, therefore, necessary that the location of the second International Airport is such that it will strengthen and promote the objectives of the Regional Plan, while facilitating use of the airport from the existing and proposed work centres in Mumbai and Navi Mumbai. The location also must afford quick and easy access to rail transport for travel to different parts of the state and country, as also to the suburbs of Mumbai.

Such an ideal location is available in the form of a vast undeveloped tract of land north of the new Thane Creek bridge. The area, bound to the south by the rail and road link from Kurla to Vashi, to the west by saltpans, to the east by coastal wet lands and stretching up to the proposed road link from Airoli in Navi Mumbai to the Eastern Express Highway to the north, is about 6,400 ha. It includes the existing Thane creek which carries part of the runoff of Ulhas river. The area is ideally situated as it gives linkages to the entire state by road and rail from Thane and a suburban rail ring is available and already in operation.The ministry of Railways has recently proposed developing Thane as a terminus for long distance trains

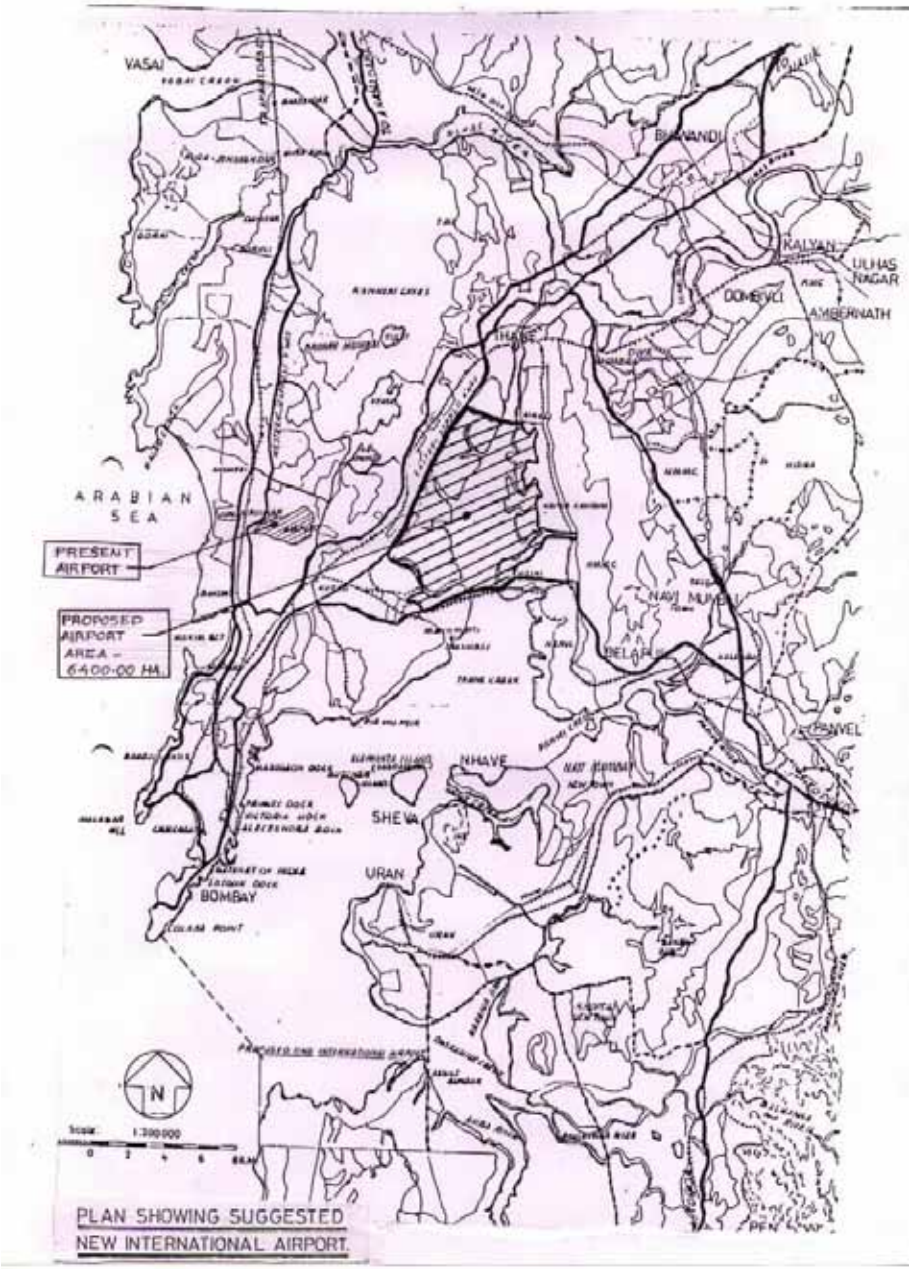
The proposed new location (suggested by the author), for the airport also shows the possible direction and lengths of runways and the aircraft approach funnel area at this location. It appears from the study that, prima-facie, the location is suitable for the International Airport and the creek may be bridged only to the extent of the requirement of the runways ~~(see photo of runway over an expressway)~~. If the airport is not located here, this area is highly vulnerable to the pressures of future development and is bound to get urbanized, endangering the coastal wet land's flora and fauna as well as the entire drainage system for Mumbai. The location of the airport with green vegetation all round will help and preserve the character of this area and also help to contain noise pollution.







Proposed location for the Airport on the Thane Creek as suggested by the Author.



Constructing an airport runway over a water body is neither impractical nor a novel idea. In fact a precedent is available in India itself. Chennai Airport has two runways – the 3,658-m-long primary runway No. 07/25 (east-northeast–west-southwest orientation) and the 2,925-m-long secondary runway No. 12/30 has been constructed across the Adyar river to extend it by 1,400 m. When the Airports Authority of India (AAI) recommissions the secondary runway, Chennai airport will join the league of airports with a functional runway across a river.

Proposals for development of the Thane creek area are already being floated by the builder's lobby supported by the politicians. It strengthns the suspicion that the location of the new airport at Navi Mumbai is part of the grand plan not only to get the trans harbor bridge constructed but also to usurp the Thane creek land for development at a later date!

Transport and communication is one sector where new development and advances have overtaken man's imagination. It would therefore not be Utopian to envisage the possibility of vertical takeoff passenger aircrafts within the next 10-15 years, a period which in any case would lapse before the airport of this magnitude gets completed at such a location.

It is, therefore, necessary that the MMRDA declares this area for the proposed location of the International Airport as a green zone reserved for an International Airport in the Regional Development Plan and include the proposal in the coastal management plan for Maharashtra.

This proposal was submitted by the Author in 1999 to the Planning Committee appointed by the State Government to review the Regional Plan of Mumbai Metropolitan Region.

Chapter 12 METRO & SKYWALKS

Many newspapers articles about the metro rail and skywalks have highlighted the inconvenience caused to the people because of ongoing construction and the scant concern shown by MMRDA. Seeing the traffic snarls and chaos around, the municipal corporation and the traffic police questioned the wisdom of these projects. Doubts have been raised by experts about the timely/ targeted completion of these projects and even the need for them. The metro links referred to in this chapter are east-west.

The skywalks are everywhere. The basic questions are:

1. Has the need for such east west links been established by any 'origin-destination' surveys to determine the daily volume of projected traffic?
2. If yes, does the volume and the carrying capacity of the Metro justify its construction at a cost of about Rs. 120 crore per km.
3. Are so many skywalks required, usable and necessary?
4. Have any other options both for the Metro and the Skywalks been examined and evaluated?
5. Was any need/pedestrian traffic volume and 'desire lines' study conducted before embarking on the construction of the Skywalks?

Judging by the scant use of the constructed skywalks and the fierce opposition by residents, it would appear that most of these were or are being constructed not because they are required or necessary but perhaps to make the city look modern and in the process benefit the builders-officials-politicians

A long skywalk with hardly any pedestrians using it. Hence a proposal has now been made by the MMRDA to allow hawkers there.

The Metro elevated train rake is expected to carry 72 passengers which is equivalent to a single-decker bus load. A modern low carriage bus would cost less than INR 1 crore. This means that for the same passenger carrying capacity, the Metro is 120 times costlier. The question arises whether there is sufficient road space available to accommodate plying of additional buses.

This is indeed possible by earmarking special bus lanes or BRT (Bus Rapid Transit system). The expenditure, apart from the bus, will be just for 'marking' the special transit lane. Alternatively more double-decker buses can also be plied on the East-West routes.

Even at this late stage when construction is in full swing, has the option of converting these elevated rail tracks into elevated roads been considered? The width is adequate to carry minibuses and will save on the special rolling stock of the Metro rakes that needs to be imported and constitute about 50% of the cost or about INR 60 crore per km.

Apart from BRT, the carrying capacity of the existing roads can be increased by disallowing roadside parking during daytime, restoring the sidewalks to the pedestrians (who presently walk on the roads) by removing the encroachments, hawkers and illegal structures and restricting the registration of new motor vehicles to available parking spaces in residential/commercial buildings only.

It seems unlikely that the administrative and technical talent in the government and MMRDA/MCGM, have not thought of cost effective options like BRT, which any city planner would first examine before embarking on the astronomical expenditure of the Metro for the East-West corridors or the skywalks. Why has credit not been sought from the World Bank? The World Bank would certainly have asked for a thorough study of the issues, which would have required the authorities to establish conclusively that there was no other option other than the Metro or the Skywalks.

If a low-cost solution to the problems of traffic and transportation in Mumbai is possible (if there is political will and administrative capability), then why is this huge expenditure being incurred and the citizens being inconvenienced? It is unfortunate that the experts in Mumbai have chosen to overlook the fact that the city is linear and needs fast rail traffic more than a Metro, more suitable for cities like Delhi, Kolkata or Bangalore.

The double-decker train.

My suggestion to run double-decker coaches on the existing suburban rail routes, would not only obviate the need for additional rail lines but also the Metro rail proposal. A further refinement that can be done in double-decker trains is to restrict entry to the train compartments at the ground level and exit at the upper level. This will not only completely relieve the jostle of people trying to get into the train and obstructing alighting passengers, but will also facilitate the upper level links from the platform to cross the streets. Many innovations are possible once the principle to use double-decker trains is accepted.

These projects (about 60 km of Metro and the Skywalks together), will cost about INR 8,700 crore. Will the people of Mumbai really benefit from these projects or will they only help the builders to secure large contracts and earn huge profits?

Chapter 13 ELEVATED MONORAIL

Imagine a service station that supplies fuel to the surrounding community and specializes in automobile repair. Its good service attracts good business. The business is entirely dependent on customers who enter via a right turn from a link road.

One fateful day, the municipal corporation decides that the street serving as access to this station is to have a concrete median. This leaves no convenient access to the petrol pump except taking a long detour and a U turn; no right turn for the customers at the petrol pump. Perhaps it was not intentional, but an engineering consultant who saw the pump from a map decided that this concrete barrier was needed for some reason. In what seemed like a blink of an eye, the business of the petrol pump was badly affected

This example in Andheri west, Lokhandwala area is a representation. The overhead Monorail on J.P. road is currently lined with hundreds of small businesses. How will the Monorail in the street center affect these businesses?

Will the building of the Monorail make people walk instead of driving their cars? In theory, people may use this new rail, and will surely choose walking over driving. But theory often conflicts with common sense. This ‘walkable’ theory might work well where every day is fair weather. But in Mumbai, there could be three to four months when 40-45 degrees C. is the normal high temperature. There’s another three months of torrential rains! Will anyone walk in that weather?

Building a barrier down the center of a street cannot be good for business. When driving, the only way to access the vast majority of the businesses on the opposite side of the street is to drive a distance to the next major intersection, then make a (probably illegal) U-turn and drive all the way back. Given this choice, most

potential customers will bypass the business while some may stop at the competition on the convenient side of the street.

Solution

Eliminate the elevated Monorail and replace it with a BRTS. This would not require the current vehicular system to change much; it could be built with almost no interruption to businesses, and at 1/100th of the cost of an elevated Monorail system.

Was the driving force behind the elevated design for the light-rail intended to provide mass transport system or create a show piece to the world in the attempt to turn Mumbai into Shanghai? It would appear that our traffic planners are not dedicated to cheaper options for mass transit, since their bureaucratic and political masters prefer undertaking capital intensive investments. The elevated Monorail proposed and under construction is viewed by the citizen as a political project as it is not economically viable, technically extravagant and socially a disaster.

Elevated rail under construction

The cost of such a project is about INR 275 crore per km. A 15-km stretch of such a line (for example Versova-Andheri) will cost around INR 4,500 crore. It will take away a minimum width of 6 mt. from the centre of the road over which it is constructed. This space below the rail, because of the widely spaced heavy pillars and for technical reasons cannot be used for road traffic. It will probably become a slum or hawkers' paradise.

The space which is made unusable by the overhead Monorail can serve as a 'dedicated' road lane. If the rail track is not constructed the entire cost of the overhead structure can be avoided. This dedicated ~~two~~ lane road can be used for Rapid Bus Transit and like the present local trains, buses can run on it every three to five minutes. Its carrying capacity in terms of passengers per day will be double that of the Monorail and yet the only additional expense will be for the buses. It is estimated that for an equal carrying capacity per day the rapid bus transit system will cost only INR 2.75 crore (1/100 of the cost of the light rail system). Total cost of the project for a 15-km stretch may thus be only INR 41.25 crore as against INR 4500 crore for the Monorail system.

Why are the authorities so enthusiastically rushing ahead with the light rail system? The unprecedented alacrity shown by all concerned officials is quite understandable. The cost of such an elevated Churchgate-Virar corridor (excluding the rolling stock), may be in excess of INR 6500 crore. The Ministry of Railways proposes to appoint consultants to prepare a feasibility report for the elevated rail corridor. Is it possible to include in the consultant's scope of work, suggested options to the elevated corridor?

HINDUSTAN TIMES, MUMBAI
TUESDAY, SEPTEMBER 20, 2011

Agency to review monorail viability

COLD FEET Government, MMRDA fear duplication of networks

Zeeshan Shaikh
zeeshan.shaikh@hindustantimes.com

MUMBAI: Four years since it was mooted and after pumping in Rs 5 crore on drawing up a master plan, the much-touted monorail network seems to have lost favour with the administrators, who now find it a waste of state resources.

Planned as a supplementary transport system, the state government had earmarked over Rs 20,000 crore for an eight-line Monorail network in the city. However, the administration has developed cold feet with chief secretary Ratnakar Gaikwad asking the Mumbai Metropolitan Region Development Authority (MMRDA) to reconsider the viability of the venture. "There seems to be a lot of duplication between the new transport systems. I have asked MMRDA to review the entire master plan," Gaikwad said. The review appears to be the first step towards cancelling many of the proposed eight monorail lines.

In 2008, Mumbai become the first Indian city to start building a monorail, despite developed countries eschewing it due to its limited carrying capacity. A monorail has a load capacity of only 500 passengers, against the Metro's 1,500.

It is interesting to note that it was Gaikwad, who as the then MMRDA commissioner, had decided to go ahead with setting up of a monorail network to act as a feeder service to other transport systems. What may have forced the rethink now is that these lines have to be built solely with MMRDA funds, and also due to doubts on whether it will get the projected response from commuters.

The master plan was made by consultants Lea Associates at the cost of Rs 5 crore, but the authority has yet to start construction on any of the lines save the first one. In fact, in 2008, MMRDA had got a monorail line from Bandra to Bandra Kurla Complex sanctioned by the chief minister but later decided to scrap the project.

Metropolitan commissioner Rahul Asthana confirmed that MMRDA will review the Monorail master plan on state's recommendation. "However, I would like to clarify that there are no plans of dropping the monorail project," Asthana said.

MONORAIL PLAN FOR MUMBAI

CHEMBUR-WADALA-JACOB CIRCLE
The 19.54-km line (see map) is being built at a cost of Rs2,450 crore. It was due to be operational by mid-2011, but frequent delays have set back the completion date to December 2012

PROPOSED LINES

MULUND-GOREGAON-BORIVLI ₹4,170 cr	THANE/NAUPADA-MIRA BHAYANDAR-DAHISAR ₹3,370.80 cr
VIRAR RAILWAY STN-CHIKHALDONGRI ₹6,39.90 cr	KALYAN-ULHASNAGAR-DOMBIVLI ₹3,669.60 cr
LOKHANDWALA-SEEPZ -KANJURMARG ₹1,826.50 cr	CHEMBUR-GHATKOPAR -KOPARKHAIRANE ₹3,686.30 cr
MAHAPE-SHIL PHATA-KALYAN ₹2,932.90 cr	
Total ₹20,296 cr	

WHY IS MMRDA BACKTRACKING?
Officials feel many Monorail routes duplicate other networks like the Railways and Metro

The cost-benefit analysis for Monorail shows it does not fare better than Metro. The capacity of Monorail is nearly one-third of a Metro line

Monorail networks are being built by MMRDA on contract basis as there are no takers for public-private partnerships. It now believes the funds will be better spent on creating a Metro-system

For example, as I have been advocating for the last 20 years, it is possible to run double-decker trains on the existing tracks by constructing just an elevated platform over the existing ones to facilitate passengers to board and detrain at the upper level. This will save the major cost of civil work for the elevated track and laying of another set of tracks and may mean a reduction in the cost of the project by at least 75% - from around INR 6500 crore to only INR 1625 crore. But the less the value of the project, the less the kickbacks and commissions to be accrued.

The existing road and rail infrastructure of Mumbai, with a very low cost up gradation, can serve the city for at least next 20 years.

Chapter 14

LIGHT RAIL CONNECTION CST-CHURCHGATE

Mumbai Suburban Rail Network

Mumbai is served by two north-south suburban rail transit routes originating from the CBD of Mumbai at Churchgate and CST and reaching the northern limits of the metropolis.

The two suburban rail lines known as Western Railway and Central Railway, have their originating points at Churchgate and the CST respectively, in the CBD of Mumbai. There is also a large commercial area south of these stations, not served by any rail routes. This results in a great exodus of commuters from and to these two rail heads, travelling to and from the southern tip of the city, mostly by road transport buses and taxis. The location of the main State Government offices, the World Trade Centre and other private corporate offices at the southern tip of the city generates heavy commuter traffic.

LRT Proposal

A proposal was mooted in 2001, to join the rail heads of Churchgate and CST by means of an underground rail and extend it at grade, up to the World Trade Centre. This proposed Light Rail Transit (LRT) line from CST-Churchgate to World Trade Centre, was investigated in a report and was found to be potentially bankable and financially feasible. This project, called SMART (Selection of a Mass Rapid Transit System for Mumbai), was a technical co-operation project between the Republic of India and the Federal Republic of Germany.

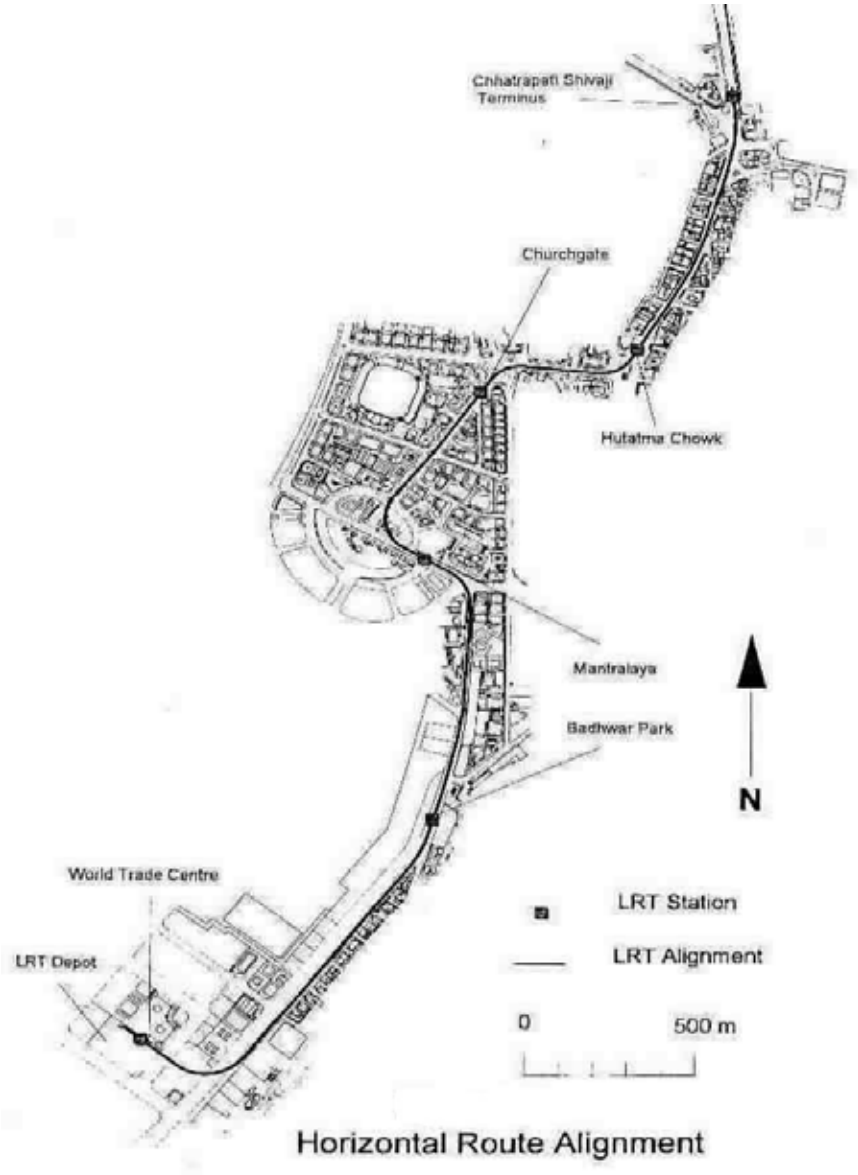
Financial Feasibility

The following is the financial feasibility assessment of the rail-based mass rapid transit (MRT) alignment in Mumbai CBD, (defined as the area south of CST and Churchgate railway stations) up to the World Trade Centre (WTC). With stations at CST, Hutatma Chowk, Churchgate, Mantralaya, Badhwar Park and the WTC, it would connect the most important destinations in Mumbai's central business district with the city's two main railway stations. As a modern and efficient transport system, it would enhance Mumbai's image and strengthen its role as the nation's commercial capital.

An at-grade alignment was ruled out in the CBD because of conflicts with road traffic, particularly at junctions. The decision on, which sections of the line should be elevated and which should be in tunnel, was governed by considerations of economy in the cost of project implementation, as well as the visual impact and aesthetics. Minimizing capital costs and aiming for ease of construction favoured maximizing the proportion of elevated structures on the alignment, since the capital costs of tunneled structures are two to three times those of elevated structures. Minimizing adverse environmental effects, particularly visual impacts, and land requirements favoured a part of the alignment to be underground particularly in the existing densely built-up commercial areas in the CBD.

The line is thus aligned underground from CST to south of Churchgate, to ensure that there is no adverse environmental impacts in the Fort Heritage precinct, and elevated from there to the World Trade Centre, thereby achieving economy in cost of construction.

Since financial feasibility is very important, as much of the alignment as possible should be elevated for financial reasons. However, it is proposed to tunnel part of the alignment, because of potential visual impacts. An elevated structure on D.N. Road and past the Martyrs' Monument at Hutatma Chowk was unacceptable for aesthetic reasons. But an elevated alignment was acceptable south of Churchgate.



Horizontal Route Alignment

~~Coastal Regulation Zone~~

The southern part of the proposed line passes through the Coastal Regulation Zone. The station development at Badhwar Park will require exemption from the Ministry of Environment and Forests. Neither the shoreline nor any other ecologically sensitive areas will be affected by the project.

Resettlement
The depot area at Cuffe Parade may involve resettlement of up to 4,500 persons for whom alternative housing will have to be provided.

Tree Plantation
A large number of trees may have to be removed along the alignment, particularly on J. Tata Road. This impact is proposed to be mitigated by extensive replanting and development of a public park, north of the World Trade Centre

Financing

Potential for Real Estate Development
Potential for real estate development has been identified at three locations.

1. Commercial office development above the proposed LRT depot adjacent to the World Trade Centre.
2. Residential development over the proposed LRT station at Badhwar Park.
3. Commercial development including entertainment, recreational and retail facilities as part of the proposed underground station at Hutatma Chowk.

The following pages describe the potential for real estate development on the CST-World Trade Centre LRT route. It also provides first estimates of costs and potential returns from realestate development.

Factors Affecting Development Potential

- Location and compatibility with surrounding land use
- Land availability
- Accessibility by other modes of transport
- Ease of construction
- Environmental impact

Location and Compatibility with Surrounding Land Use
For all of the intermediate stations on the proposed CST-World Trade Centre LRT line, the potential and type of development is affected by the location. By and large, most station locations along the alignment of LRT have good development potential, since they are in the CBD of Mumbai. However, some have better potential for residential use, others for shopping and office/commercial use. The location at Hutatma Chowk has a high potential for shopping and retail trade. At Badhwar Park, residential use has good potential. At the depot in Cuffe Parade, commercial (offices) use has good marketability.

Land Availability
Availability of land, its quantum and its cost, are important factors, particularly where the LRT passes overhead. In the alignment between Mantralaya and Cuffe Parade, land for real estate development on the west of Prakash Pethe Marg, may be difficult to acquire in view of the existing fishermen's colony and the Coastal Regulation Zone restrictions. The plot at Cuffe Parade, on which it is proposed to locate the depot with a commercial development above, is designated for a club and gymnasium in the development plan prepared by MMRDA. This will have to be re-designated for a depot and commercial use.

Other Transport Modes
At each of these station locations, accessibility by other modes of transport, as well as adequate parking facilities, need to be

considered. Existence of bus stops or taxi stands enhance the desirability and marketability of such locations. The Hutatma Chowk area is ideal for a recreation/entertainment centre, which will be mostly used in the evening and can therefore make use of the ground-level parking available after office hours. At Cuffe Parade, some relocation of the existing slum population is required to provide an 80-foot wide road for the plot on its southern side.

Ease of Construction

Any constraints on construction are also an important factor, whether done above or below the ground. In the case of the underground development at Hutatma Chowk, the complexity of construction is accentuated by the requirement to shift or reroute underground utilities and services. Even in the case of overground construction, there are constraints of existing buildings, and noise pollution as in Badhwar Park, where some relocation of the boat parking of the fishermen's colony may be necessary. Since the plot at Cuffe Parade is very close to the sea, it may present some difficulties in the underground construction of parking areas.

Environmental Impact

The environmental impact of the developments at stations and the depot need to be studied. The additional traffic generated, noise level, aesthetics of the new development, blending of the new buildings with the environment and structures are environmental issues to be addressed. This will help to ensure public acceptability of the proposals. Construction on the seashore at Badhwar Park will require clearance from the Union Ministry of Environment and Forests.

Geographical Jurisdiction

Most of the area of alignment of the proposed LRT line falls under the jurisdiction of the Mumbai Municipal Corporation. Some of the portions at Nariman Point and Cuffe Parade, are under the jurisdiction of MMRDA and the Architect to the State Government. The regulations for development vary with the authorities and the development proposals have to be designed accordingly. The plots at Cuffe Parade and Badhwar Park are owned by the State Government, while the land at Hutatma Chowk is under the jurisdiction of the Municipal Corporation.

Development Regulations

The Development Control and Land Use Regulations vary with the jurisdictional authority and the best possible development option has to be worked out keeping this constraint in view. For example, as of today, no new office/commercial development is allowed in the island city of Mumbai according to an MMRDA notification that regulates the office location policy. Special permission is required for commercial (offices) development on the plot at Cuffe Parade.

Floor Space Index

The Floor Space Index prescribed is 1.33, for the entire CBD area. However, the method of FSI calculation may vary for different land uses and will affect the requirement of land and the economics of the development. For example, in case of residential or commercial development, 15% of the physical area of a plot is required to be deducted from the plot area for factoring FSI calculations.

Whether such a requirement will be insisted upon in the case of the plot for the LRT depot at Cuffe Parade, needs to be ascertained. Depending on the area of the plot, 20% recreational open space at Badhwar Park and 25% recreational open space (of the total plot area) at Cuffe Parade, needs to be provided. It is hoped that it will be possible to obtain clearance to provide such open space at an elevated level, i.e. at +16m. level, instead of at ground level. For the underground development at Hutatma Chowk, it is necessary to request the authorities to waive the requirement of providing recreational open space.

CRZ Regulations

Since the proposed LRT alignment, particularly in the Cuffe Parade area, is towards the sea coast, CRZ regulations apply. It may be possible to obtain permission for the Cuffe Parade plot if the road is constructed on its southern boundary. Since the site at Badhwar Park is on the seashore, special permission needs to be obtained.

Marketability

Prevailing Prices & Past Trends

A general review of the prevailing market prices for different types of development and uses, with specific reference to locations near the stations and car shed (depot) area, indicates that the current (2001) prices of commercial property are around INR 18,000 (US$ 400) to INR 26,000 (US$ 577), as against around INR 12,000 (US$ 266) per square foot of built area for residential property. Any development proposal here is, therefore, commercially viable because the construction cost for a good-specification RCC structure is expected to be around INR 2,500 (US$ 55) to INR 4,500 (US$ 100) per square foot including elevators and air-conditioning. The cost of underground structures will be substantially higher, but still a considerable margin exists between the current costs and prices. However, the cost of funds and the time of construction and idle investment will have to be considered on an actual basis.

Estimates of Saleable Quantum

The saleability of any type of development has to be studied in terms of size and phasing over a time period. This is particularly important in view of the changing trends in commercial office development in Mumbai and its shift towards the north, particularly to the Bandra-Kurla Complex. The general feeling that commercial/office/shopping space in Mumbai CBD can sell quickly, may not be true, unless the development is tailored to actual needs. Since the cost of development of underground locations is very high, and in view of the potential hazards in case of a disaster and the security requirements; specific low-volume, high-turnover and high-margin trades and uses only can sustain such costs. For example, an entertainment centre with restaurants and clubs at Hutatma Chowk, could perhaps be a more profitable use than mere shopping, which will have to compete with the existing shopping area.

Development Specifications

The quality of development is of great importance. Most of the area in the alignment of the LRT is in prime location, calling for a high order of quality and development specifications. Well laid out garden and lawns enhance the surroundings of buildings. The works and facilities to be provided include: an air-conditioned entrance foyer with granite/marble floor and wall cladding, curtain walling/permanent finishes for the exteriors, closed circuit TV security system, central air-conditioning and automatic sprinklers for fire fighting, smoke and heat detectors, continuous water supply and stand-by electric generators. The higher cost is necessary in view of the prime location.

Retail or Bulk Sale

A decision, in principle, has to be taken about retail or bulk sale of the property. Both have advantages and disadvantages. In retail sale, as the number of buyers is large organizing them into associations and co-operatives for maintenance of services is a long drawn-out procedure, during which period the responsibility may remain with the LRT project organization. In case of bulk sale, the advantages are obvious but the price could be comparatively low.

Captive Development

The possibilities of captive development can be explored for specific trades/organizations/corporate bodies, so that even the designs and specifications could be decided by the prospective buyers. Large corporate bodies may stand to gain by shifting their back-of-the-office operations to the station locations, releasing their own prime location office buildings for more prestigious use.

Financial Viability

Development Cost Estimates

The development cost estimates should take into consideration the special nature of work (over ground or underground). Necessary escalation in cost during the period of construction and costs of appointing project management consultants need to be included. Cost of funds during the period of construction and cost of idle investment until the built spaces are sold can be a major cost, which can be reduced substantially by speeding up construction and presale of spaces even at lower prices.

Cost of Funds

Depending on whether the project is funded from internal resources or through borrowings from national/international financial institutions, a certain minimum return on capital invested needs to be taken into consideration. It is absolutely necessary to work out cash flows for the period of construction and till the entire space is sold and the borrowed funds are repaid.

Time Phasing

If the entire construction work is undertaken simultaneously at all locations, multiple agencies need to be found to undertake such work. In view of the limited options in finding such capable organizations, phasing of construction work is prudent, keeping in mind availability of funds and the capability of construction agencies. The phasing of real estate development needs to be interfaced with the construction phases of the LRT project, particularly where the real estate development is underground. Similarly, in case of overground development, the movement of heavy machinery and equipment will decide the phasing of station area development at the ground level.

Pricing & Rate of Returns

The pricing of the real estate created depends on the location and the use. A general indication of current prices of real estate (residential and commercial) has already been given. However, financial institutions insist on a minimum rate of return on the funds which they lend. The payback period is adjusted according to the quantum of borrowing. It is possible to make advance sale of the real estate to be developed and collect a 'booking' amount before the project commences.

Implementation

There are two basic options for real estate development. One, only the land required for the station areas and depot area can be developed. This option leaves the construction of shopping/ residential/commercial component to individual/private real estate builders. This will imply development of land and its infrastructure including utilities and services and charging a certain price to the private builder. Since the major component of profit is the opportunity cost of land, this will maximize the profit, while minimizing the effort and capital investment.

The other option would be to develop the land and also build the commercial/residential space. In case of only land development, the profit margin may be reduced by about 15% of the total profit.

Joint Venture

The real estate development at each point can also be taken up as a joint venture with private developers. An agreement can be made to define the responsibilities as well as share in the cost and the profit at each location.

Contracting Construction Work

The most commonly adopted methods are the item rate contract, labour contract, lump sum contract or turnkey contract. The last two require least staffing for ensuring quality control and hence are most cost effective. It is possible to enter into turnkey contracts with reputed construction companies on the basis of pre-determined plans and designs. It can be considered whether the real estate development should be made a part and parcel of the LRT

construction project, so that international construction companies can be entrusted with the work and political pressures avoided in the award of such contracts.

Time Period

The concept of incentives and bonuses is rarely incorporated in the contracting system in India, but can be considered to ensure timely completion of projects so that the inflow of funds is ensured. Though it is customary to write in every contract the phrase “Time is the essence of the contract,” this principle is observed more in the breach. Only construction companies with proven track records, and which are highly mechanized in their operations, should be considered through global competitive bids.

Captive Development

In order to avoid having a number of buyers at various sites of real estate development, each buying a small area, it may be possible to develop one particular location for a single buyer, who will then have flexibility in designing and using the real estate development at that particular location to suit his needs.

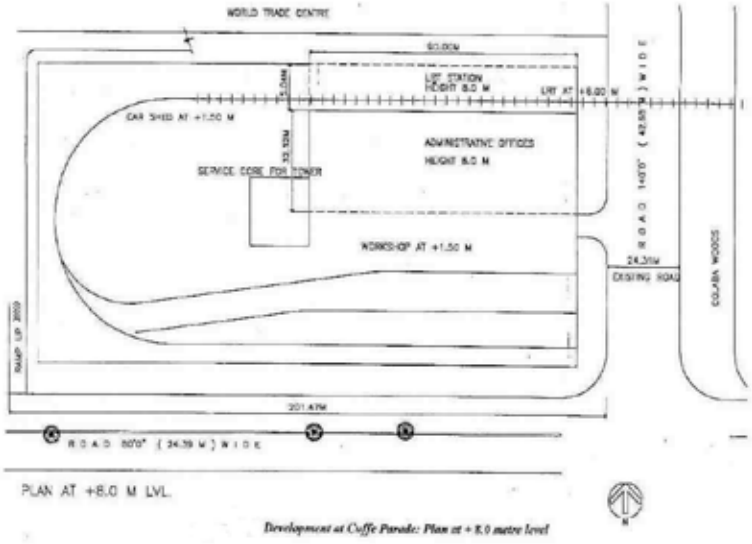
Site Franchise

There is another option as in the case of allotment of plots by the State Government in the reclaimed lands at Nariman Point/Cuffe Parade. Sites at the various locations can be allotted to corporate bodies for a premium and a ground rent on a long lease. This can be the most cost-effective method as it can ensure a continuous flow of funds, without subsequent problems of building construction and sale. This will also substantially reduce the total project cost, reducing the requirement of funds and interest costs.

The Economics

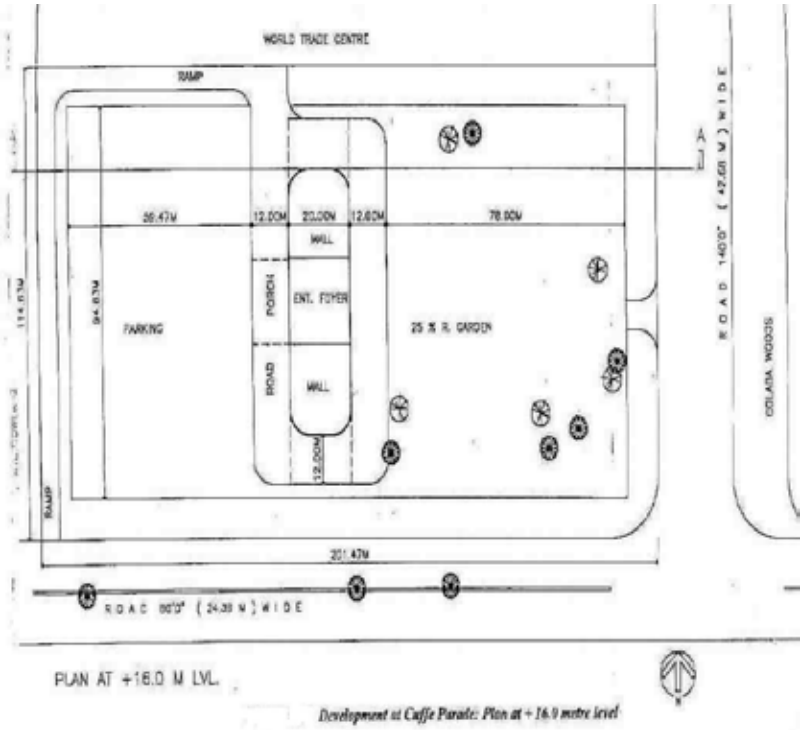
Cuffe Parade Development

In the plot proposed for the car shed (depot) area – excluding the built-up area required for the depot, the workshop, the station and the administrative office for the LRT project – about 30,000 square meters (or 300,000 sq feet), of space can be built for commercial use in the tower building above the podium level of 16 m height.



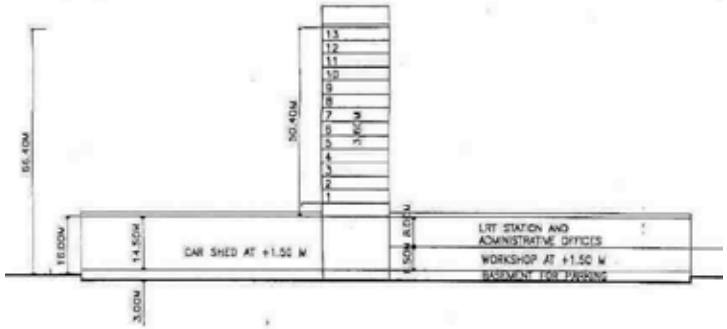
Development at Cuffe Parade: Plan at +8.0 metre level

In addition, an area of about 17,000 square meters (or 180,000 sq feet) can be constructed for car parking at the basement level, about two-thirds of which can be used as ‘pay and park’ to generate revenue. The cost of construction of all the components of the LRT project can be included in the LRT project cost. Hence, the cost of the depot, workshop, offices, and station area need not be loaded on to the commercial project. The cost of relocation of slums (excluding the land cost) and for getting an access road to the plot is estimated at around INR 100 million.



Development at Cuffe Parade: Plan at + 16.0 metre level

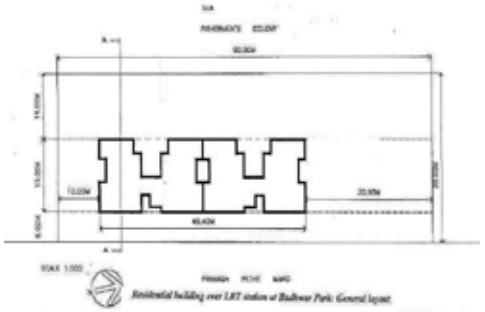
The cost of construction of the tower building for commercial use will be around INR 1,920 million at INR 4,000 per sq foot + INR 100 million for slum re-housing. At a sale price of around INR 17,000 per sq foot, total revenue will be INR 5,100 million and net surplus around INR 3,080 million.



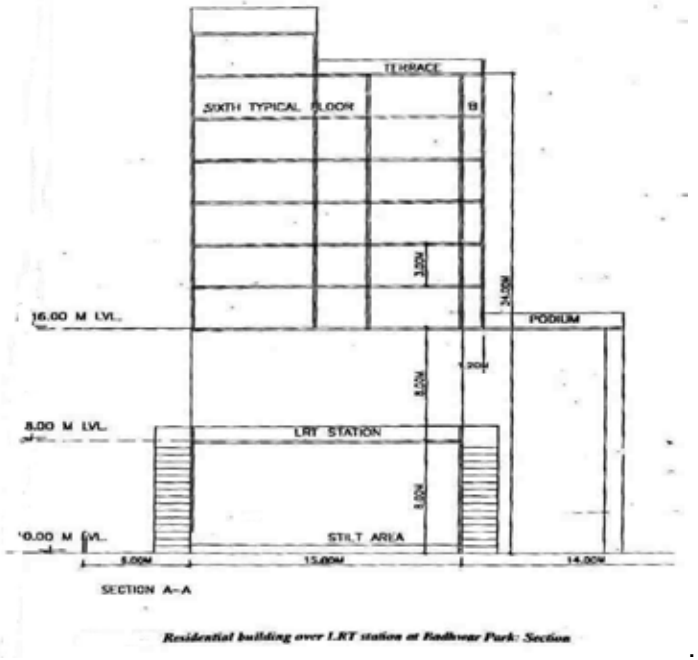
Development at Cuffe Parade: Section

Badhwar Park Development

In the notional plot of about 35 meters by 100 meters that could be earmarked for the station at Badhwar Park, a residential tower can be built with the total saleable area of about 30,000 sq feet. Considering the cost at about INR 2,000 per sq foot, total expenditure may be INR 60 million. With a probable price of INR 12,000 per sq foot, total revenue may be INR 360 million. The resource generation can therefore be around INR 300 million.



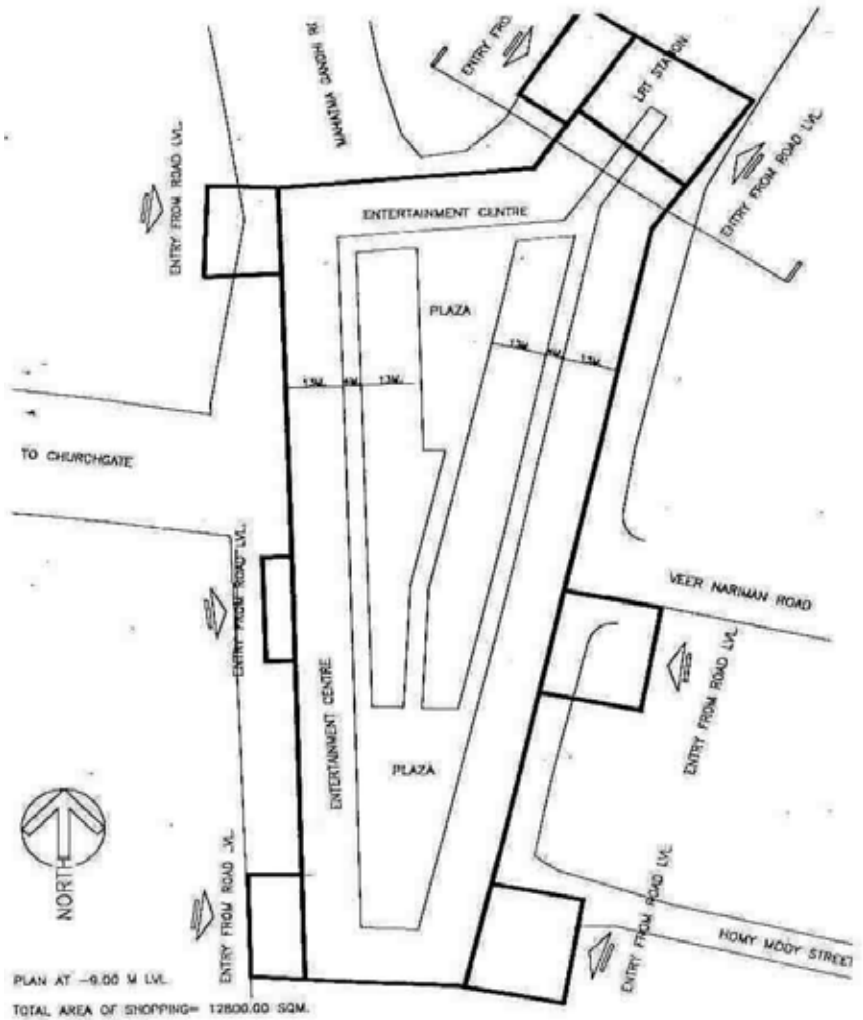
Residential building over LRT station at Badhwar Park: General layout



Residential building over LRT station at Badhwar Park: Section

Hutatma Chowk Development

The development of an entertainment centre at Hutatma Chowk will be perhaps the best possible use for optimal resource generation. The area available underground, connecting the station at the concourse level is around 12,800 sq meters or 138,000 sq feet.



Development at Hutatma Chowk: Plan at –9.00 metre level

This area can be developed as a recreational centre with restaurants, amusement arcades, bowling alleys, health and fitness clubs, bars and pubs and some retail outlets with pedestrian plazas. The cost of construction in this area will be very high, as it is totally underground and will require artificial ventilation, air-conditioning, security and disaster prevention arrangements, among other things.

The cost may be around INR 9,000 per sq foot. Thus, the total cost of construction of this area may be about INR 1,240 million. The sale price in this area can be expected to be around INR 23,000 per sq foot. This will result in a total revenue of INR 3,174 million.

Total Resource Generation

Estimated Costs, Sale Prices and Net Resource Generation of Real Estate Development for LRT

Location	Total Cost (Rs. mn.)	Total Sale (Rs. mn.)	Net resource generation (Rs. mn.) (US $ mn.)
Cuffe Parade	2,020	5,100	3,080 (US $ 6.84)
Badhwar Park	60	360	300 (US $ 0.66)
Hutatma Chowk	1,240	3,174	1,934 (US $ 4.29)
Total	3,320	8,634	5,314 (US $ 11.79)

At current prices and costs, the net revenue generation can be about INR 3,080 million for the depot plot at Cuffe Parade; INR 300 million for the station plot at Badhwar Park; and INR 1,934 million for the underground development at Hutatma Chowk. The total net resource generation through real estate development at the three locations can, therefore, be about INR 5,314 million (US$ 118 million).This will meet almost 100% of the cost of the total LRT project as estimated in 2001.

The above is based on the Author's work as a member of the SMART team which comprised experts from the Federal Republic of Germany and Tata Consultancy Services.

Chapter 15 MAKING A CITY LIVABLE

Early Efforts

In late 1970s, city-planners and some prominent personalities, analyzed the growing deterioration in the quality of life in Mumbai and attributed it to the increasing population that led to congestion and the proliferation of slums. Shifting the State Government functions and the related housing, to the mainland across the Thane Creek, would decongest the city and help in working out a solution, the planners believed. Thus was born the idea of Navi Mumbai. The State Government, though not favourably inclined to the idea, probably thought it could be a popular measure and worth supporting. It would, in any case, help in buying time through the motions of building a new city.

When, in 1970, the Government of Maharashtra-CIDCO (City & Industrial Development Corporation) brochure declared shifting of offices from the Island city to Navi Mumbai as one of the key objectives aimed at decongesting Mumbai, it was perhaps more to humour the bureaucrat-technocrat combine that had mooted the idea; it wasn't really a statement of serious political will or intent.

While the onus was on the politicians to shift offices to Navi Mumbai as the solution for decongesting Mumbai, the planners did support the politicians by arguing that the purpose could be served by developing Bandra-Kurla-Complex-like centres, multistory car parking in the island city, cluster-model redevelopment (*a la* Dharavi), flyovers, an overhead Metro, a Bandra-Worli Sea Link and a trans-harbour rail/road bridge to the mainland. All this was ostensibly aimed at making the city livable.

But, we need to first understand what is meant by 'livability'. What makes cities livable? What are the most important indices of livability?

What is Livability?

The Economist does a yearly survey of the most livable cities in the world. They take into account low crime, little threat from instability or terrorism, and a highly developed transport and communications infrastructure, as key criteria.

Merce's quality of living study considers political, social, economic and environmental factors, as well as personal safety and health, education, transportation and public services. Its quality of living survey is based on 39 criteria. Some of the important criteria include safety, education, hygiene, recreation, political and economic stability and public transportation.

Each year, the Sustainable Transport Award is given by the Institute for Transportation and Development Policy (ITDP), New York, to a city that enhances the sustainability and livability of its community or region through innovative transportation strategies that increase mobility for all, while reducing transportation, greenhouse and air pollution emissions, and improving safety and access for bicyclists and pedestrians.

The Award recognizes the city or major jurisdiction that has made most significant progress during the year in the following areas.

- Improving public transportation.
- Improving non-motorized travel and public space.
- Implementing traffic demand management programmed to reduce private car use.
- Reducing urban sprawl by linking transportation to development.
- Reducing transport related air pollution.

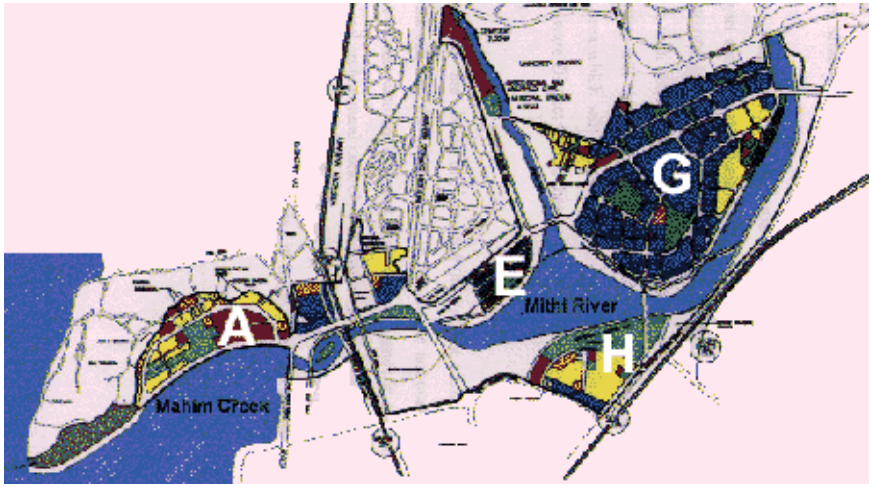
To summarize, the state and the city government in Mumbai can consider following criteria and take appropriate actions that will contribute to making Mumbai a livable city.

1. Hygiene*: in-situ* redevelopment of dilapidated housing and slums *without adding to built up area or increasing FSI*, effective solid waste management, public sanitary facilities, cleaning the beaches.
2. Improving public transportation: Rapid Bus Transit, no more flyovers; double-decker coaches for suburban trains; improving ferry service to the mainland at 1/15 th of the cost of the proposed Trans-Harbour bridge.
3. Implementing traffic demand management programs to reduce private car use: no multistory or underground car parks; no harbour bridge (Shivari-Nhava Sheva) to the mainland; restriction on VIP traffic movement in the city, processions on streets.
4. Improving non-motorized travel and public spaces: relocation of hawkers to facilitate pedestrian and rapid bus traffic.
5. Safety: reduction of noise and smoke pollution.
6. Recreation: cleaning the beaches and making them available to the general public; no conversion of any land allocated for parks, gardens, green zone; no development zone, playgrounds or their allotment to private institutions; no development of saltpan lands, which will add to congestion and restrict the runoff during monsoon flooding in the city.

Destroying Mumbai's Livability

The BMRDA, in its incarnation as MMRDA, is responsible for embracing the ideas that suited the intentions of the politicians of not shifting their offices to Navi Mumbai and selling off land to developers by dislocating the slum population and arbitrarily increasing FSI. It has worked zealously to promote the Bandra-Kurla Complex and Oshivara district centres; built multistory car parking in the island city; encouraged the redevelopment of Dharavi (proposing in the process to congest Mumbai further); built flyovers; started building the overhead Metro links; completed the Bandra-Worli Sea Link and started on the trans-harbour bridge.

BKC (below), originally planned for shifting 1,20,000 jobs from Nariman Point will now provide over 2,40,00 new jobs. Each one of these projects will congest Mumbai more than ever before. The last straw on the camel's back will be the increase in FSI (already done covertly for Slum Redevelopment Authority-SRA schemes), from the current levels to more than 4 in the near future.



Plan of Bandra-Kurla Complex

Having thus congested Mumbai with active help from the 'planners', the specious argument now is that the shifting of offices to Navi Mumbai can be of only marginal help in decongesting Mumbai. So it is desirable to redevelop the entire Mantralaya area (a recent devastating fire in the Mantralaya in June 2012, will help the state government in this direction), including the various state and central government offices. It is apparent that the measures listed and being so vigorously executed by the State Government, will in no way reduce either the congestion or enhance the quality of life in Mumbai.

The capital intensive investments will make Mumbai more attractive for immigration from the state and elsewhere and speed up its growth, further degrading the quality of life.

It is my contention that the only remedy to Mumbai's woes is for the government to stop forthwith all investment in the so-called

development works. Let us examine critically whether these measures of so-called 'development' have resulted in achieving the declared objectives and in making Mumbai a livable city.

Bandra Kurla Complex Photo: Realestatemumbai.com

The Bandra-Kurla Complex and other district centres, were envisaged to shift jobs from the southern tip of Mumbai to the suburbs to achieve a more even geographical distribution of employment and reduce the one way traffic load from north to south in the morning and a reverse flow in the evening. But as the government and private sector failed to shift jobs from the south to these centres, the MMRDA sold land to whoever could buy it, in order to recover its large fiscal investment in the infrastructure. Thus it ended up creating new jobs. As against the proclaimed objective of shifting 1,27,000 jobs from Nariman Point to BKC, it has ended up creating over 2,00,000 new jobs and will add an equal number now by enhancing the FSI of BKC from 2 to 4.

The government should immediately ensure that the land/built-up area in the district centres is used by buyers only to shift offices/ jobs from within Mumbai and new jobs are not created there. The FSI of 2 should be retained as originally planned.

Venal Car Parks

Availability of car parks within the island city and the city in general encourages people to acquire private vehicles and use those instead of public transport. This, in turn, adds to the traffic congestion and acts as an incentive to the commercial establishments to expand/ intensify their operations in the south of the city leading to further congestion.

A multistory car park at Nariman Point provides a multiplex cinema, restaurants, food courts and other facilities, further attracting traffic and almost nullifying the propose of the car park.

Redevelopment Dharavi Style

Redevelopment of old and dilapidated structures or slums (in terms of physical condition of buildings and lack of adequate physical infrastructure), to re-house the existing dwellers without destroying their social linkages and structure is certainly a desirable objective. However, 'Dharavi style' redevelopment, which destroys the existing workplace relationships and social linkages to convert land for commercial use, must be stopped as it also adds to congestion and forces and pushes out the poor to accommodate the rich.

Dharavi is a living community with strong social linkages which can be retained only by an in-situ *redevelopment without any extra FSI.*

Unfortunately this style of development has been eagerly embraced by our politicians and bureaucrats with active participation of the planners to make money by enhancing the FSI purportedly to finance the re-housing of the existing dwellers. The law – a section in the MRTP Act – expressly requires that such redevelopment be done by the cooperative efforts of the existing tenants of the slum/ dilapidated buildings. The clause has been very adroitly violated by a maze of notifications and amendments which give the land sharks a free run of the 'cluster redevelopment idea'. This has resulted in the ouster or cramming of the existing dwellers in tiny multistory apartments, totally unsuited to their lifestyles and occupations – and gifting the land to the rich for their spacious abodes.

In-situ redevelopment of slums or their improvement by providing common public toilet facilities, is the most viable alternative. Instead of giving extra FSI to developers in the name of financing the redevelopment, the money saved by abandoning unnecessary projects like the flyovers, overhead Metro railway and Trans-Harbour bridge can be used for this purpose.

This so-called 'cluster development' should be stopped, additional FSI not granted and the existing tenants of the buildings/slums be allowed to reconstruct the dwellings for their own use, adding only such infrastructural facilities as they may desire to have without increasing the density or population.

The basic purpose of a flyover is to increase the speed of traffic by avoiding the road junctions. It therefore essentially helps peak time through traffic of private vehicles/hired vehicles like taxis and contract buses, which constitute hardly 7% of Mumbai's vehicular traffic. One may wonder whether it is rational or prudent to spend astronomical sums to aid private vehicles to move faster? Apart from benefitting a microcosm, it further encourages private vehicle ownership, adding to congestion and pollution on the roads.

It is learnt that after undertaking a cost-benefit analysis, the MMRDA had originally identified only 19 road junctions where flyovers were desirable. Yet the State Government decided to build 44 of them and keeps on building more. The reasons are obvious to the people. Moreover, the flyovers do not help public transport-buses that constitute over 27% of vehicular traffic in Mumbai, as the buses need to stop frequently, which cannot be provided for on the flyovers. *Instead, this investment can be used to provide a rapid bus transit system.*

Flyovers used minimally and only by cars and hired vehicles not used by public transport.

Mass Public Transportation

Measures to improve traffic and transportation in Mumbai should have a three-pronged approach.

1. Discourage private transport and make it prohibitive.
2. Improve bus transport and usability of roads.
3. Increase the capacity of the existing rail transport network.

Measures like non-registration of new vehicles unless proof of their parking facilities is provided has been discussed earlier. Assuring rapid transit bus lanes is a solution which requires improving usability of roads. Currently the roads, by and large are used only to 50% capacity. This is because of permanent roadside parking of all types of vehicles and usurping of road space by pedestrians as all the sidewalks are mostly encroached upon by hawkers.

Kerbside parking & encroached sidewalks reduce road usability by 50%.

As discussed earlier, roadside parking (from 6am to 10pm), can be banned. Hawkers can be reassigned spaces within the compounds of properties abutting the roads by allowing such property owners to build booths within their compounds and charge rent from the hawkers accommodated there and also provide electricity and water to them, so that the sidewalks are made available for the pedestrians, thus freeing the space on the roads. It is estimated that by these two measures of removing parking and encroachments by hawkers, the road capacity can be increased by at least 33%, so that not only rapid bus lanes can be created but the investment on road widening can be postponed for another 20 to 25 years.

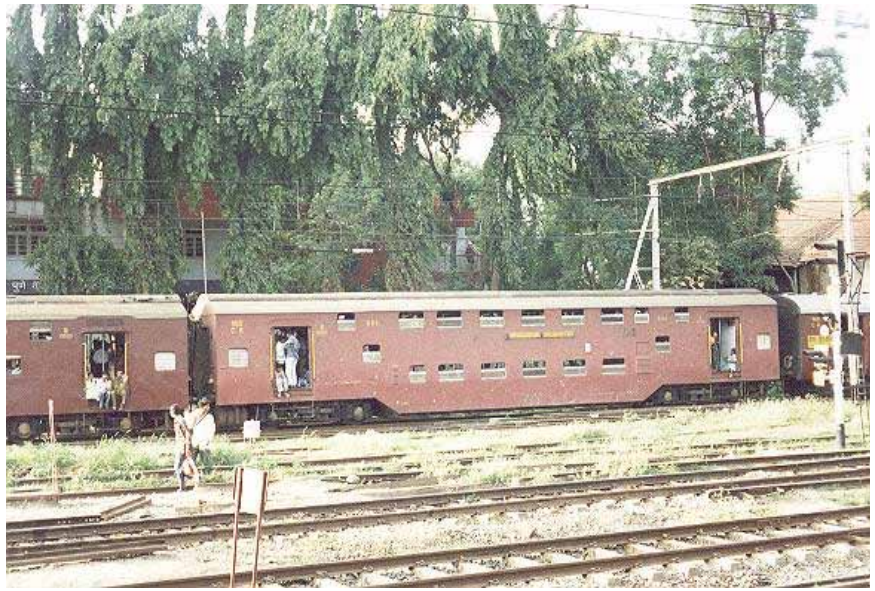
Usability of roads truncated by encroachments & strians.

Hawkers and pedestrians occupy over 50% of the road area making it look narrow. The real width (which is adequate to carry the current load of vehicular traffic) can be seen at *Ganesh Visarjan*, when these are cleared of hawkers and pedestrians

As far as the rapid rail transit system is concerned the proposals and investments already undertaken to provide underground and overhead rail systems is absolutely unnecessary and seem to have been undertaken only for kickbacks for politicians from the astronomical investments proposed.

The objective of increasing the capacity of the existing rail system can be achieved by providing double-decker suburban rail coaches that will increase the capacity by over 66%, taking care of the future traffic increase up to the year 2020.

If all these measures are undertaken there is likely to be a saving of over INR. 2,200 crore.



Double-decker coaches can be used for suburban train services.

Bridge Bluff & Buster

It has been claimed that the trans-harbor bridge will open up the under-developed areas of Raigadh and the mainland, by providing easy access to Mumbai. In reality, it will help a gigantic migration wave to Mumbai from the mainland that will create new slums all over the city, helping politicians to build vote banks and support their argument of not shifting government offices to Navi Mumbai.

The real purpose that this link may serve is to give quick access for the select elite of Mumbai to commute to their work places in the Nariman Point area, making it convenient for them to build mansions on the mainland that will cover about 12000 hectares (land being acquired ostensibly for SEZ, at about 100 hectares per mansion that may accommodate a private swimming pool, golf course, and heliport).

The purpose of a link between the mainland and Mumbai is at present being served by the existing ferry service. But it is necessary to increase its frequency, modernize the equipment and ensure its service throughout the year, especially during the monsoon season.

Modernising, increasing capacity and frequency and working round the year will make such ferries an adequate option to the proposed Trans-Harbour bridge at no cost.

The cost of the Trans-Harbour bridge is estimated at INR 4000 crore (source: MSRDC). The cost of a 250-passenger capacity catamaran is about US$ 17,50,000 or INR 8.75 crore. Even if a 3-minute frequency service is to be operated, it will require 20 catamarans, costing about INR 175 core. As most of the infrastructure, such as jetties, already exist, it requires only an upgradation cost of about INR 100 crore. Thus, at a total cost of INR 275 crore, 1/15th of the cost of constructing the bridge, a viable option of transportation to the mainland can thus be made available. But the planning community supports the bridge proposal. In fact, this proposal may finally doom Mumbai to extinction by making it the world's most congested, urban megalopolis with the lowest quality of life.

If, instead of the bridge, a frequent and fast modern ferry service is introduced, it will save, at current prices, INR 3,750 crore.

Abandon Pipe Dream Projects

It is an open secret that in India and particularly in Mumbai, projects are undertaken for their propensity to generate commissions, any benefit accruing to the general public is incidental and unintended. The major development projects being promoted are thus pipe dreams that will make no real difference to making Mumbai livable.

In fact, if all such costly projects were shelved, it would result in a minimum saving of INR 6700 crore immediately. This investment could be fruitfully employed to improve the livability of Mumbai.

In addition to these major improvements, certain administrative measures can help improve livability in Mumbai and they are outlined here.

1. Hygiene: Solid Waste Management

One has only to visit some of the beaches in Mumbai, particularly the one at Versova, to find that they are nothing but large open air latrines littered with human excreta.

All that is required is the provision of an adequate number of public toilets and a strict control on the staff in charge of refuse collection. J.B. D'Suoza, who was a Municipal Commissioner of the city, mentioned that as chief executive, he concentrated on certain critical issues, one of which was garbage removal. Mumbai was never so clean as during his tenure as Commissioner.

In recent times, Surat, which has historically been the dirtiest city not only in Gujarat, but in India, was cleaned up and well maintained during the tenure of S.R Rao, as the Municipal Commissioner. Both these examples illustrate the importance of drive and dedication rather than financial investments.

Mumbai: a massive garbage dump.

2. Traffic &Transportation Management: the removal of roadside parking, imposition of traffic discipline, & the pedestrianization of streets

Restriction on registration of vehicles, unless proof of their off-street parking facility is provided, will restrict the number of private vehicles. A ban on street parking between 6am -10pm, will make the available road width wider by one lane. Within all premises, commercial and residential, tiered parking can be allowed. There are simple devices that allow parking of one car over another, and these are already in use.

3. Relocation of Hawkers

Relocation of hawkers within the compounds of properties adjoining the roads on which they conduct their business presently will make the sidewalks available for pedestrians and make one more lane of the existing roads available for providing Rapid Bus lanes. The hawkers will have a secure place and will get electricity and water by legal connections, increasing the revenue of the local authority, as at present they mostly steal these two services. The property owners along the roads will get revenue by charging rent to the hawkers.

4. Noise pollution: loudspeakers, festivals, crackers, procession on streets, home improvements/repairs

Most festivals and functions in the city are restricted to buildings wherein there is no necessity for loudspeakers. It is a hangover from our rural culture when houses were well spaced and in absence of public media like radio, TV or press, the only way to advertise an event was to make a lot of noise. The tradition of a bridal procession on the streets also has its origin in rural society, where it was necessary to advertise and create witnesses to the occasion. These customs need to be ~~looked at~~ in modern terms. Such processions as well as the bursting of crackers and loudspeakers should be ~~eliminated~~.

With increasing urban incomes, there is a tendency among buyers of apartments, to renovate them by *in-situ* work in marble and tile cutting and the fixing and making of furniture. Due to the paucity of artisans, such skilled labour often do this work after their regular jobs hours, resulting in tremendous noise pollution in the evenings and late into the night. All such on site work needs to be disallowed in the common interest. It will encourage and help the building industry to provide off-the-shelf products that will involve minimal on site work and thus contain noise pollution.

5. Vigilance Force: Cooperative Society

All members of the executive committees of cooperative housing societies of residential/commercial buildings, should be enlisted by the local body to work as vigilance wardens with special powers to book offenders who create noise pollution or throw garbage on roads and public places, including gardens. Their evidence in a court of law should be considered as conclusive and final. The offenders must be fined heavily to create a separate fund for the development of the locality.

6. VIP Movement

The worst nightmare for the common commuter is VIP movement. It results in the stoppage of traffic and subsequent snarling back-up of vehicles, at least an hour before and after the so-called VIP's cavalcade of 10 to 20 vehicles has passed the road. It is for the State and the Central Government, to consider if such VIP movement should take place by helicopters only, so that in cities like Mumbai with its linear geography, the people whom these VIPs purport to represent, are not subjected to misery.

7. Public Address & Information System

It is a pity that the most powerful and popular media like radio and TV, is used only for entertainment. During the flooding of Mumbai, people had to depend on the private TV channels to get information on the situation and the whereabouts of their relatives. Similarly, for traffic bottlenecks, one has to depend on private FM radio channels to get information on traffic jams.

The State Government which is spending crores of rupees on so-called disaster management programmers, could certainly evolve a good and reliable information system round the year and not only during disasters.

8. Restoring Mumbai Streets to Pedestrians

Why are the streets in the crowded mega city of Mumbai running out of space for pedestrians? Most street footpaths are taken over by vendors and squatters. Hence, the root cause of the problem of non-availability of the sidewalks, is their takeover by hawkers and squatters, as well as their encroachment by the shops lining the streets. Evidently, it is because of the unwillingness of the local government to remove them that the problem persists. For some, this threat to traffic has become an opportunity.

Mumbai is building more than 50 elevated walkways. There is no cost-benefit analysis made for any of them. There is scant traffic on the skywalks. Why? Apart from the no cost-benefit analysis, no feasibility report or need-analysis was done. The widening of certain roads with IBRD credit under MUTP (Mumbai Urban Transport Project), involved the removal and resettlement of hundreds of slum dwellers/hutments, involving a resettlement programme (part of which I oversaw as a World Bank Consultant). It was undertaken after thorough studies that established the need for widening, on the basis of traffic surveys.

But for the skywalks, no such due diligence was required or done. As Ashok Ravat, Head of the Mahim Skywalk Protest Committee, said: 'Whether you have skywalks or not, the problems will remain the same.'

Why is it that the obvious solution of widening the sidewalks is not taken up as an option? It is eminently possible if the street vendors occupying the space are allowed to be resettled within the boundaries of adjoining properties. (*A study prepared by the Author, six years ago, on how it can be done, lies gathering dust somewhere in the archives of the local authority*.)

The vehicles parked along the streets can be packed off in vertical parking lots and all illegal encroachments by the roadside removed. The projected bill for the 50-plus skywalks is around $300 million. The city just cannot expect to recover most of that cost by selling advertising space on them. It will ultimately resort to auctioning vendor stalls on these skywalks and thus create multilevel hawker plazas.

Engineering difficulties and neighborhood opposition have blocked many planned skywalks and could stop more. But the city planners will continue building them because the return from undertaking costly capital works is too lucrative to abandon.

All that remains is to repeat my own statement that has now become an axiom: Projects in Mumbai are undertaken for their propensity to generate kickbacks for politicians, bureaucrats and technocrats…and any benefit accruing to the populace is incidental and unintended.

Conclusion

It is still possible to make Mumbai a livable city. The State and the city governments must make determined efforts to shun mega-projects, and instead take on practical, simple and low-cost measures, by building upon the existing infrastructure and better management of existing facilities.

EPILOGUE SOME QUESTIONS

- Why do governments take projects that are not the best option?
- Why are governments averse to exploring simpler and cheaper alternatives?
- Why lay additional suburban rail lines to run additional trains at huge cost? Why not explore the optimization of the existing infrastructure by running double-decker trains?
- Why construct a trans-harbour bridge at astronomical cost? Why not explore the cheaper alternative of regular ferry services?
- Why construct an elevated monorail when the purpose can be served by a Bus Rapid Transit System at 1/100th the cost?
- Why construct multistory car parks when it is possible to restrict the issue of new vehicle permits?
- Why construct skywalks when it is possible to restore footpaths (usurped by hawkers) to pedestrians?
- Why not allow properties adjoining roads to incorporate stalls within their properties to rent to hawkers?
- Why concretize roads when a black top will do the job?
- Why use interlocking paver blocks (that are dislocated within a few days) for road junctions and pavements?
- Why spend on consultants for simple problems capable of simple solutions?

Because…

SELECT GLOSSARY

BRTS	Bus Rapid Transit System
CBD	Central Business District
CDP	City Development Plan
CIDCO	City & Industrial Development Corporation
CR	Central Railway
CRORE	1.00.00.000
CST	Chatrapati Shivaji Terminus
FSI	Floor Space Index
SQUARE FOOT	0.10 sq. mt.
HUDCO	Housing & Urban Development Corporation
LRT	Light Rail Transit System
MCGM	Municipal Corporation of Greater Mumbai
MHADA	Maharashtra Housing & Area Development Authority
MMR	Mumbai Metropolitan Region
MMRDA	Mumbai Metropolitan Region Development Authority
MRTP	Maharashtra Regional & Town Planning Act
PWD	Public Works Department
RTO	Regional Transport Office
SEZ	Special Economic Zone
SRA	Slum Redevelopment Authority
UDD	Urban Development Department
WR	Western Railway

SELECT INDEX

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I have been encouraged in writing this book by my own belief and faith in approaching all issues with a problem-solving attitude. Optimization of available resources is always the central theme of my endeavors. I am indebted to the Late J.B. D'Souza, for inculcating in me this constructive attitude. I am grateful to N.V. Merani, Ex. Principal Secretary, PWD, Government of Maharashtra, for having readily agreed to write the Foreword, despite his arduous task of guiding the technical officers of the MCGM and other organizations as Chairman of many committees. I must thank Dr. R.A. Maker, for readily conceding to my working on various projects related to Mumbai's problems, with various official and non-official organizations

I was the town-planner for the new capital of Gujarat. Thereafter I headed the Project division of the Housing & Urban Development Corporation (HUDCO), for 7 years, and would be away from my family for 15 days every month, visiting different states and their housing agencies. It was a time when my two sons needed parental guidance the most. My wife, Neela, took over the responsibility of bringing up our sons and encouraged me to keep going. She has been the most understanding wife and an excellent mother. I acknowledge this debt to her – to which I owe my success in life.

My sons, Dr. Shireesh Apte and Dr. Palash Apte, stalwarts in their own fields of pharmaceutics and physics, though busy, always spared time to read my articles and make suggestions. Their background in research helped me a lot in improving my solutions. Anil Darshetkar, who was Chief Architect of MHADA when I was a Consultant, took keen interest in my writing and provided valuable information. In his work and approach to urban problem-solving, I see hope for an innovative application of mind and perseverance in following the optimal solution path in the current scenario.

Many years ago, I was in Hyderabad to attend a seminar on redevelopment of slums. My wife had accompanied me. After listening to the oration of various speakers and later travelling in the car and observing the slum children defecating on the roadside, she exclaimed, "Why don't we first provide decent toilet facilities to these people and then talk about providing housing to them?" She is a classical vocal musician and not knowledgeable about urban problems. Yet, her remark, to my mind, was relevant and took us to the crux of the problem. Don't think big at the cost of realities. Provide quick relief at low cost. She echoed my own philosophy on urban growth strategies.

The current breed of politicians consider themselves as being not so much the servants of the people but as their masters. Bureaucrats no longer have the courage of their convictions, to stand up to politicians and say something cannot be done under the current scenario. Technocrats have become supine enough to suggest to politicians how acts/regulations can be bent or redefined to suit the objectives of the politicians.

My approach to the problems of a city like Mumbai, detailed in this book, may not be acceptable to politicians, bureaucrats and technocrats for obvious reasons. Hence, this book may be like *aranya rudan* (cry of a lone man in a dark forest). But slowly and surely, it is being increasingly realized that neither aping the West nor following the mirage of Chinese pseudo-prosperity, will help us find solutions to our own urban problems. Only rational thinking and optimizing our resources will. Someday, the validity of the solutions suggested here will be realized and accepted – I am confident about that.