

NEW BOMBAY
DRAFT DEVELOPMENT PLAN

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OCTOBER 1973

CITY AND INDUSTRIAL DEVELOPMENT CORPORATION
OF MAHARASHTRA LIMITED

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FOREWORD

The planning of a new city is an immense opportunity for useful creativity - but also, unfortunately, for serious error. And when it is to be a city of the size here contemplated, the planners' task is both challenging and awesome. Challenging because of the chance it gives to attempt sensible solutions to some of our least tractable urban problems. In older cities the constraints that already exist make a number of courses quite impracticable, or impossibly expensive. Freed from these constraints, the new city planner can devise arrangements that prevent or resolve some, at least, of the problems that beset older cities.

And so our planners have addressed themselves to their task with the object of setting up a community of citizens. Their emphasis is on convenience in living and travelling to work, on economy in the use of resources - land, building materials, money or whatever else - and on reducing the glaring disparities that often make urban living in our situation of shortages intolerable, particularly for the vast majority that is under-privileged. With this emphasis, our planners have kept constantly in view the limitation on the resources likely to be available for city building. If there was a temptation to plan a city of architectural grandeur, our planners have steadfastly resisted it. The effort has been to avoid the spectacular, to provide minimally for the affluent few and to promote the convenience of the greatest number. New Bombay, then, will not be another Grand City; it will be a city where the common man would like to live.

This is the orientation the planners have chosen; it is, I believe, a choice that few responsible persons will question. Yet - and this is the awesome side of the planning function for a task of this size - there is so much opportunity for error in the translation of this choice into a land use plan, into a transportation system, into the innumerable other options that the planners have to take in the course of their work. Errors in these options can have disastrous results reaching far into the future, as so many of us who live in cities know to our cost. It is for this reason that this plan proposes to keep as many options open as possible, instead of laying down detailed prescriptions for the entire plan area.

And it is for this reason that, before we begin really extensive activity on the ground, we must place our ideas before the public for comment. From such comment we expect the planning effort will benefit enormously for there are several concepts and policies implicit in this document that call for vigorous debate.

- * There is, for instance, the concept of a basically self contained city, as opposed to one that is either a dormitory for Greater Bombay or simply a work place for residents of Greater Bombay.
- * There is, again, a wide range of decisions and policies for the whole metropolitan region of Bombay that this plan for New Bombay entails;

some of them are new, while others were indicated in the Bombay Metropolitan Regional Plan. The time available for their adoption is slipping past rapidly.

- * Then there are, particularly for the entrepreneur, the findings of our Industrial Location study and the policies that logically flow from it, with so much promise for the State's underdeveloped regions.
- * And there is the heavy emphasis on public transport systems, with private car traffic given less importance. There is the possibility of using buses on reserved tracks (a faster and cheaper mode of transport than buses in mixed traffic, once a particular level of demand has been exceeded), and the possibility of providing special tracks for the exclusive use of cyclists, so that this very cheap mode of transport can be encouraged.
- * The entire urban development is proposed as a series of nodal concentrations strung out along mass transport axes. Each node is to be restricted in size and separated from the next by open spaces. Each node will contain accommodation for the entire range of income groups that can be expected in the city, so that there will not be any specially rich or any specially poor nodes.
- * There will be a system of cross subsidies in housing, so that on middle and higher income accommodation we realise a surplus which will subsidise the lower income groups. Some subsidy for the lower income groups is undoubtedly necessary, but we believe that it cannot be provided in a way that drains resources steadily. The cross subsidy proposal is internally consistent and can be expanded on a large scale without calling for additional sustained financial inputs.
- * There will be a "sites-and-services" type of development, where almost one-third of the city's residents, who cannot afford the smallest pucca construction, even after receiving subsidies, will be provided with developed plots on which they can build temporary dwellings. Since they will have security of tenure on their plots, we look forward to their gradually improving these dwellings over a period of time to a more and more permanent type of construction.
- * Particular stress is laid on the schooling system, which we want to improve considerably

in quality, spending more than twice as much per pupil as is spent in municipal schools in Greater Bombay. We also want this schooling system to be accessible to all residents, regardless of income.

Our comprehensive rehabilitation and village improvement programme is designed to meet the special needs of the locally resident population whose lands are being acquired for the project.

These are a few of the many aspects of this plan that merit serious consideration and discussion by the wider public body. Some of these features are being tried out in the projects chosen for early development, such as the residential estate at Vashi, which is already under construction, and the Belapur node of New Bombay's Central Business District, where work is just beginning. We may therefore be able to assess their utility in practice. But we shall still need comments, advice and guidance in our endeavour. We look forward to a creative and significant interaction between our planners and those outside our organisation who are interested in our project.

N. M. Wagle
Chairman

5 October 1973.

NEW BOMBAY

DRAFT DEVELOPMENT PLAN

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EVOLUTION OF NEW BOMBAYCALENDAR OF EVENTS

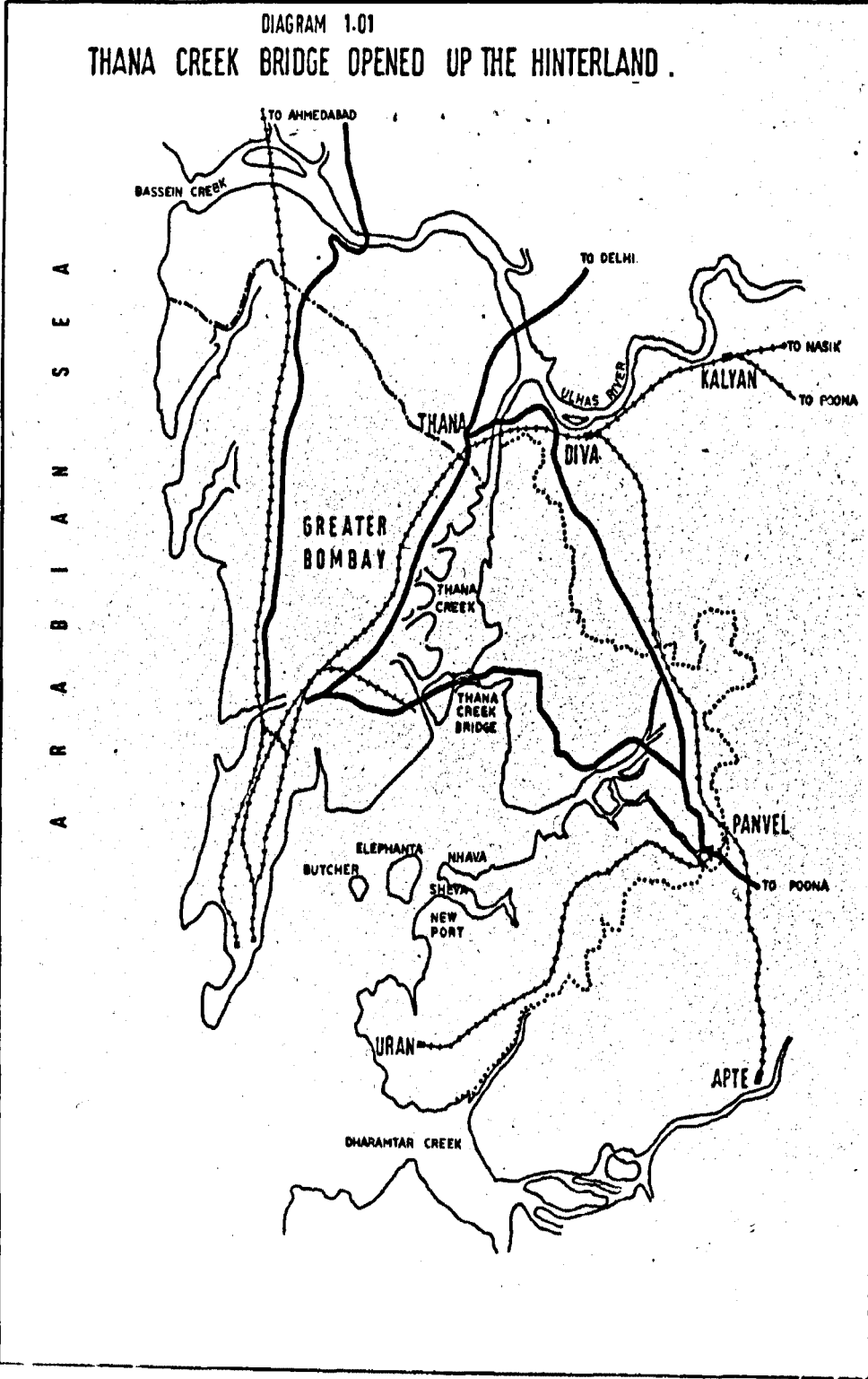
MARCH	1958	'STUDY GROUP ON GREATER BOMBAY' WAS SET UP UNDER THE CHAIRMANSHIP OF SHRI S.G.BARVE.
JULY	1958	BOMBAY MUNICIPAL CORPORATION DECIDED TO PREPARE A DEVELOPMENT PLAN FOR GREATER BOMBAY.
FEBRUARY	1959	THE 'STUDY GROUP ON GREATER BOMBAY' RECOMMENDED A RAIL-CUM ROAD BRIDGE ACROSS THE THANA CREEK.
JULY	1964	DEVELOPMENT PLAN FOR GREATER BOMBAY WAS SUBMITTED TO THE STATE GOVERNMENT. THE DEVELOPMENT PLAN HAD A TOTAL ESTIMATED OUTLAY OF RS.700 CRORES CALCULATED AT 1964 PRICES.
MARCH	1965	A COMMITTEE UNDER THE CHAIRMANSHIP OF DR. D.R. GADGIL WAS APPOINTED TO FORMULATE BROAD PRINCIPLES OF REGIONAL PLANNING FOR THE METROPOLITAN REGIONS OF BOMBAY AND POONA.
MARCH	1966	THE GADGIL COMMITTEE RECOMMENDED REGIONAL PLANNING LEGISLATION ENABLING CREATION OF REGIONAL PLANNING BOARDS.
JANUARY	1967	MAHARASHTRA REGIONAL AND TOWN PLANNING ACT 1966 WAS PASSED.
JULY	1967	BOMBAY METROPOLITAN REGIONAL PLANNING BOARD WAS CONSTITUTED UNDER THE MAHARASHTRA REGIONAL AND TOWN PLANNING ACT 1966.
JANUARY	1970	THE BOARD PUBLISHED THE DRAFT PLAN WITH A MAJOR RECOMMENDATION OF SETTLING UP A 'METRO CENTRE' ON THE MAINLAND.
FEBRUARY	1970	STATE GOVERNMENT NOTIFIED PRIVATELY OWNED LAND IN NEW BOMBAY FOR ACQUISITION.
MARCH	1970	CIDCO WAS FORMED.
MARCH	1971	CIDCO WAS DESIGNATED AS THE NEW TOWN DEVELOPMENT AUTHORITY FOR THE NEW BOMBAY PROJECT.
AUGUST	1973	THE BOMBAY METROPOLITAN REGIONAL PLAN WAS APPROVED BY THE STATE GOVERNMENT
OCTOBER	1973	CIDCO PUBLISHED ITS DRAFT DEVELOPMENT PLAN FOR PUBLIC COMMENTS, SUGGESTIONS AND OBJECTIONS.

- 1.01 This chapter describes the historical evolution of the New Bombay Project, spells out the genesis of the Development Plan described in the chapters that follow and brings out the broad outlines of the form and content of the Plan.

Evolution

- 1.02 A phenomenal rate of urban growth has been experienced by India during the 25 years following Independence and Bombay has had its due share in it. The population of Greater Bombay rose from 2.966 millions in 1951 to 4.152 millions in 1961 and to 5.970 millions in 1971, registering 40.0 and 43.80 per cent growths during the first and second decades respectively. The rapid rate of growth of population, made possible by the increasing industrial and commercial importance of the city, resulted in a fast deterioration in the quality of life for the majority of people living in the city. Developmental inputs could not keep pace with the rapidly growing population, industry, trade and commerce. Besides, there are physical limitations to the growth of a city built on a long and narrow peninsula, which has very few connections with the mainland.
- 1.03 The Government of Maharashtra has been alive to the emerging problems of this metropolis. Responsible public opinion was equally vigilant and several constructive suggestions appeared from time to time in the press and elsewhere. All this helped in keeping the problems of Bombay in the forefront of public awareness. In 1958, the Government of Bombay appointed a study group under the Chairmanship of Shri S.G.Barve, Secretary to Government, Public Works Department, to consider the problems relating to congestion of traffic, deficiency of open spaces and play fields, shortage of housing and over-concentration of industry in the metropolitan and suburban areas of Bombay, and to recommend specific measures to deal with these. In the same year, the Bombay Municipal Corporation decided to prepare its Development Plan for Greater Bombay as required by the Bombay Town Planning Act, 1954.
- 1.04 The Barve Group reported in February, 1959. One of its major recommendations was that a rail-cum-road bridge be built across the Thana Creek to connect peninsular Bombay with the mainland. The Group felt that the bridge would

DIAGRAM 1.01
THANA CREEK BRIDGE OPENED UP THE HINTERLAND .



accelerate development across the Creek, relieve pressure on the City's railways and roadways, and draw away industrial and residential concentrations eastward to the mainland. The Group hoped that the eastward development would be orderly and would take place in a planned manner.

- 1.05 The Bombay Municipal Corporation published its development Plan in 1964. The Plan outlay amounted to Rs.700 crores at 1964 prices, spread over a 20-year period. However, this Plan did not consider the possibility of substantial eastward growth across the Creek on the mainland as this area lay outside the Bombay Municipal jurisdiction.
- 1.06 The Government of Maharashtra accepted the Barve Group recommendation and also appreciated the reasons why the Bombay Municipal Corporation could not consider the eastward growth in framing its plans. This brought out the need to examine metropolitan problems in a regional context and to do this the Government appointed another Committee under the Chairmanship of Prof. D.R.Gadgil, then Director of the Gokhale Institute of Politics and Economics, Poona. The Committee was asked "to formulate broad principles of regional planning for the metropolitan regions of Bombay-Panvel and Poona and to make recommendations for the establishment of Metropolitan Authorities for preparation and execution of such plans".
- 1.07 The Gadgil Committee reported in March 1966 and recommended that a Regional Planning Act be passed by the Government to provide for the creation of Regional Planning Boards for notified regions; and that, to start with, such Boards should be set up for the Bombay and Poona regions.
- 1.08 The Gadgil Committee made a number of other recommendations which have influenced the planning for New Bombay. Evidence of such influence will be found throughout this document, but particular attention should be drawn to two important recommendations which are reflected in the policies suggested in this Development Plan. One concerns a planned decentralisation of industries with severe restrictions on further industrial growth in the Bombay region. The other concerns the development of the mainland area as a multi-nucleated settlement, each settlement smaller in size than 2½ lacs population. These multi-nucleated settlements are called nodes in the Plan, where the entire development is proposed as a series of nodes strung out along mass transit axes. The nodes proposed by us are, however, more closely spaced than the multi-nucleated settlements envisaged by Dr.Gadgil. But the principle remains of individual settlements, self-contained in respect of schools and shopping and other essential services and separated from each other by green spaces.

1.09 The Maharashtra Regional and Town Planning Act was passed in 1966 and brought into force in January 1967. The Bombay Metropolitan Region was notified in June 1967 and a Regional Planning Board constituted under the Chairmanship of Shri L.G.Rajwade, I.C.S. The Draft Regional Plan of the Board was finalised in January 1970. It proposed the development of a twin city across the harbour, on the mainland to the east, as a counter-magnet to the office concentration taking place at the southern tip of Bombay. This alternative growth pole was to siphon off the over-concentration of jobs and population which further growth would cause in the city and reallocate these on the mainland. In making this recommendation, the Board was influenced by various factors such as the existing industrial sites in the Thana-Belapur area and Talaja, the imminent completion of the Thana Creek Bridge and the proposal of the Bombay Port Trust to establish a new port at Nhava Sheva.

1.10 The Board recommended that the new metro-centre, or New Bombay as it is now called, be developed to accommodate a population of 21 lacs. This corresponds very closely to the population level of 20 lacs for New Bombay assumed by us in this Development Plan. The Board also recommended that simultaneously with the taking up of a new metro-centre project, attention should also be paid to the planning and development of a number of other smaller centres in the surrounding region, of which the most important were the Thana, Ulhasnagar, Bhiwandi, Khopoli, Kalyan and Dombivli complexes.

Formation of CIDCO

1.11 The recommendation to develop a twin city across the harbour made by the Regional Planning Board for the Bombay Metropolitan Region was accepted by the Government of Maharashtra. Accordingly, the City and Industrial Development Corporation Limited was incorporated under the Indian Companies Act (1956) in March 1970. CIDCO is a limited company, wholly controlled by the Government of Maharashtra. By February 1970, the Government notified for acquisition privately owned land covering 86 villages and measuring 15,954 hectares within the present limits of New Bombay. Land belonging to a further 9 villages and measuring 2,870 hectares was additionally designated in August, 1973 for inclusion in the New Bombay Project area. In March 1971, CIDCO was designated the New Town Development Authority for the New Bombay Project. In October 1971, CIDCO undertook to prepare and publish a Development Plan as required by the Maharashtra Regional and Town Planning Act (1966).

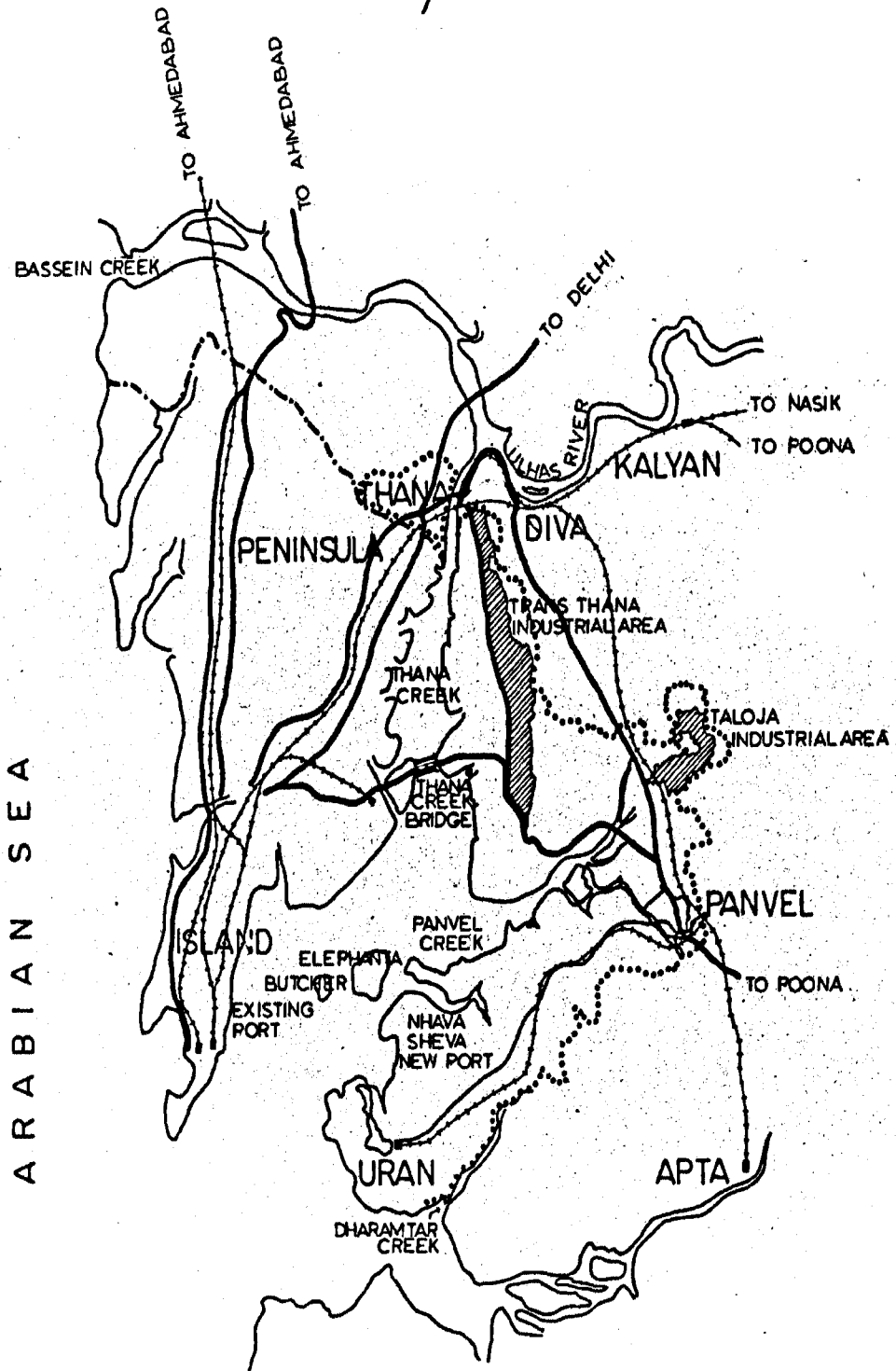


DIAGRAM I.02
GREATER BOMBAY AND NEW BOMBAY

- 1.12 CIDCO is a subsidiary company of the State Industrial and Investment Corporation of Maharashtra Ltd., (SIICM) and has an authorised capital of Rs. 5 crores and a paid up capital of Rs. 1 crore. It works under the control and supervision of the State Government. According to the financial arrangement between CIDCO and the Government, the land acquired by the Government together with other Government land in the Project area will vest in CIDCO, which will develop it, lease plots to other agencies and, after recovering the costs of development, will refund the balance to the State Government after retaining a nominal remuneration.
- 1.13 An important feature of CIDCO's financial arrangements is that CIDCO provides a means of tapping private capital and using it for a public purpose. The initial seed capital is a public loan which is to be returned with interest. But all development costs, including the costs of providing improved urban and social amenities are met by realising funds through the disposal of developed plots. Disposal is by lease and not by sale since it is desired that all land in the project always vest in the public authority, but the lease amount is to be realised by way of a premium paid at the time of taking possession of a plot, so that development costs are recovered as early as possible. Thus, private capital is employed to serve a public purpose.
- 1.14 As a New Town Development Authority, CIDCO's functions are planning, implementation, administration and maintenance of New Bombay and any other areas which may be entrusted to it by the Government. In the early years, while the area is developing and before it is handed over to a local body, CIDCO will also provide social services such as education, public health, medical care, social welfare, recreation, etc., amongst others, which it is normally the responsibility of the local body to provide. After development these functions as well as those of administration and maintenance will be transferred to a local authority.
- 1.15 The range of CIDCO's responsibilities consequently extends much beyond the aspects envisaged in Section 22 of the Maharashtra Regional and Town Planning Act. Other local bodies may also engage themselves in similar activities, but CIDCO's work is somewhat different both in nature and scope. First, New Bombay is a city planned with public ownership of its entire area. All land in the project area is to be publicly owned by CIDCO. Second, CIDCO starts city building on a virtually clean slate. This offers new as well as greater opportunities and, at the same time, imposes more responsibilities. Third, CIDCO has adopted a particular method of financing urban development which turns private capital to public use. Finally, the scale of the city is beyond anything so far undertaken in the country. It may well turn out to be the largest planned city project

so far undertaken anywhere. The experience gained by CIDCO in the New Bombay Project will hopefully be of value in urban planning projects elsewhere in the country and perhaps also in other development countries.

Objectives

- 1.16 A documented plan is a useful instrument for inviting public participation in the development effort, and for providing a commentary on policy guidelines which would be useful to those responsible for implementation. Section 22 of the Maharashtra Regional and Town Planning Act, (1966) envisages the clear designation of particular land areas for particular uses. An implicit assumption is that most of the land is privately owned, requiring the Planning Authority to indicate specifically which areas are to be acquired for a public purpose. The fact that the Development Plan proposals once approved shall be final and binding on the Planning Authority (Section 31 (6)), unless modified by the Government, ensures that, once a land use has been specified, uncertainties as to whether a particular type of use will or will not be permitted on an individual's parcel of land are ended and he can proceed with development, provided it conforms to the specified land use. The finality of the approved Development plan and the fact that it is binding on the Planning Authority, except for modifications which are difficult and time-consuming to secure, ensure that the pressures and frictions which would otherwise develop to obtain land use changes for particular land holdings are largely eliminated. Uncertainties concerning land use are ended, and both the private land owner and the public authority are free to concentrate on development.
- 1.17 This particular consideration has much less force in the case of the New Bombay project, where all the land is to be publicly owned by CIDCO. As each area is taken up for intensive development and released to occupants, the land use for that area will remain substantially frozen, open to modification only under the time-consuming and difficult procedure set out in the Act. However, in other areas where development is not immediately contemplated, the Development Authority should clearly enjoy a certain degree of freedom and flexibility in planning so as to modify its plans to suit changing circumstances. CIDCO, therefore, proposes to designate the land uses for the project area in broad terms only, except for those areas which have been taken up for development where land uses are set out much more specifically and in detail. The Development Plan presented here will consequently be reviewed and revised periodically. Each time such revision takes place, the Plan will be presented a fresh to the public for discussion.

1.18 The State Government had adopted the following objectives for the New Bombay Project :

- i) To reduce the growth rate of population in Greater Bombay by creating an attractive urban area on the land across the Bombay harbour which will :
 - (a) absorb immigrants who would otherwise come to Bombay,
 - (b) attract some of Bombay's present population,
- ii) To support State-wide location policies which will lead eventually to an efficient and rational distribution of industries over the State, and to a balanced development of urban centres in the hinterland.
- iii) To provide physical and social services which raise living standards and reduce disparities in the amenities available to different sections of the population.
- iv) To provide an environment which permits the citizens of the New City to live fuller and richer lives - free, in so far as this is possible, of the physical and social tensions which are commonly associated with urban living,
- v) To provide training and all possible facilities to the existing local population in the Project Area, to enable them to adapt to the new urban setting and to participate fully and actively in the economic and social life of the New City.

1.19 The broad objectives for the New Bombay Project as laid down by the State Government and stated above have guided all planning work in CIDCO, care being taken to ensure that all such work, including the detailing of objectives, is in conformity with the broad objectives as well as the overall interests of the region as a whole. Several more specific objectives emerging from those expressed above have been established in this regard. Some of the more important of these are set out below.

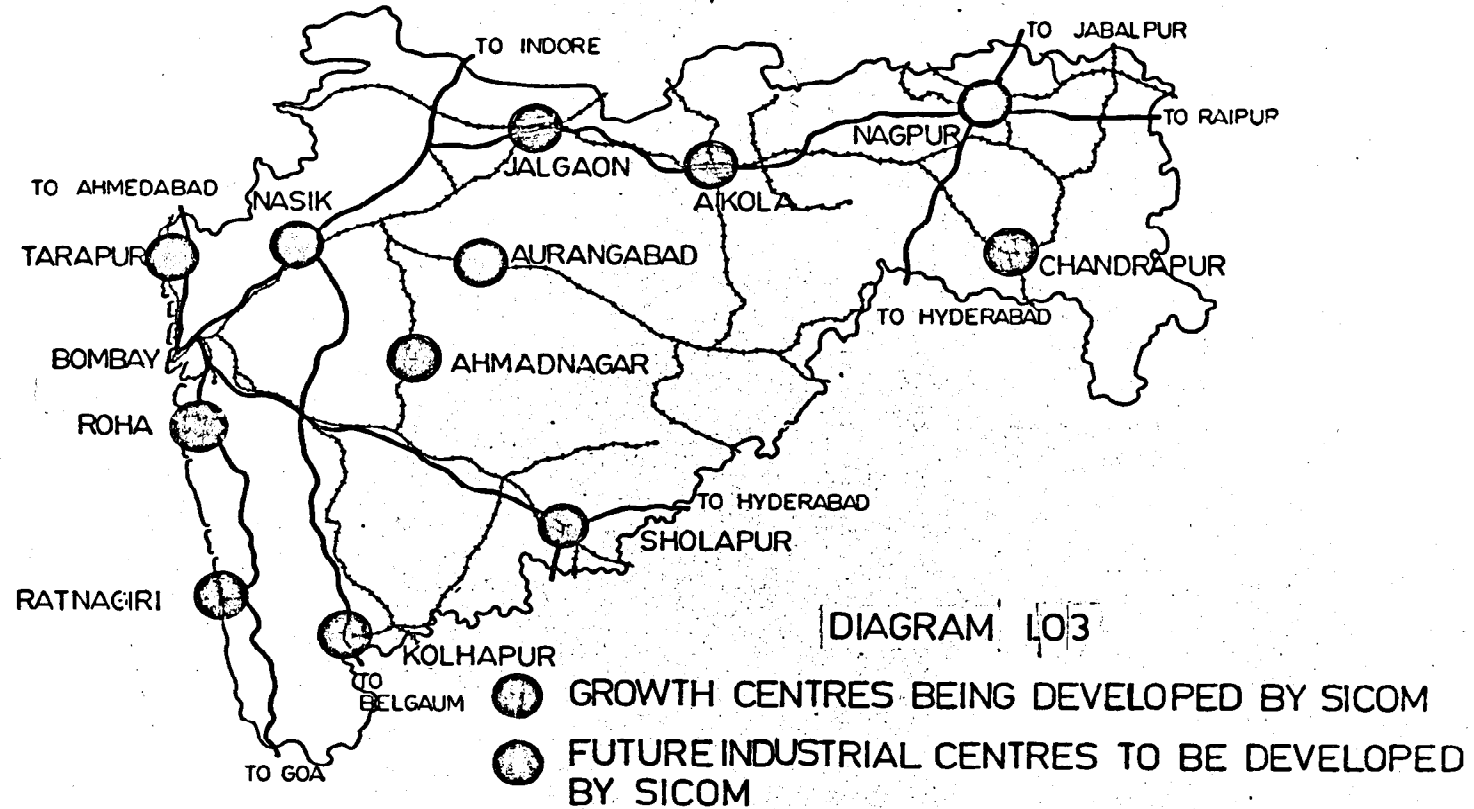
1.20 Firstly, CIDCO has made it clear that the New Bombay Project is not being developed as an area where new industries can concentrate. Only such industries as have a powerful economic reason to be located in this region should be located here, whereas all industries which can function satisfactorily in other parts of the State should be situated elsewhere. This policy is in consonance with that of SICOM, CIDCO's parent Company,

which is engaged in financing and otherwise encouraging industries to locate in Maharashtra in areas other than the already developed regions around Bombay and Poona.

1.21 In terms of specific actions which demonstrate CIDCO's approach to the location of industry in the New Bombay area, some of the more important ones are the following :

- a) Towards the end of 1970 CIDCO, jointly with the State Government, commissioned an Industrial Location Study for Maharashtra. The objective of this study was to develop an optimal location plan for future industrial growth in the State, which would reconcile certain social objectives of encouraging industrial development in the backward regions of the State with the economic objective of obtaining a development which was lowest in the total costs, both public and private, covering capital investment as well as operating costs. The study was carried out by a firm of consultants, supervised by a Steering Committee composed of distinguished economists. The study found that, in the present state of industrial development in Maharashtra, the industrial location plan which is most desirable in terms of distributing industries to the industrially backward regions of the State is also, as it happens, the least cost plan for the State. The study suggests an industrial location policy which virtually freezes organised industrial employment in the Bombay and Poona regions to something just above their current levels, to allow for certain expansions only which yield important economies of scale, while distributing the remaining growth in industrial employment to other regions. The study and its findings have been presented by CIDCO to the Chief Minister and the Industries Minister of Maharashtra.

If the recommendations made in the study are accepted by the Government, it would mean that apart from a limited expansion of the petro-chemical units already existing in the Trans-Thana area, the only new industries which would be welcome to New Bombay would be port-based industries, service units such as garages, furniture making, printing, soft drinks bottling, etc., which serve the locally resident population, and only those other who wish to shift out of Greater Bombay but require a metropolitan location. A final decision in this matter, however, rests with the Government and CIDCO will implement the decision taken by the Government in this regard.



- b) Chemical industries in Maharashtra which are effluent intensive require a sea-side location for disposal of liquid wastes. Some industries of this type also require to be close to a port. At present, there is no port in Maharashtra other than Bombay where such industries can be located. SICOM and CIDCO between them commissioned a number of studies which suggest that Ratnagiri is a suitable port for development as a second site in Maharashtra for an industrial complex of chemical industries. Both these organisations have been pressing for infrastructure development at Ratnagiri, particularly of a port and of railway facilities, which would make it possible for this site to be developed so that it can attract industries which would otherwise find no location in Maharashtra other than Greater Bombay.
- c) CIDCO has taken up for development other areas in Maharashtra with which it is entrusted, such development being intended to serve SICOM's objectives of encouraging industries to move to these areas. A development plan for an estate in Aurangabad has already been completed. It is expected that other areas in Maharashtra will similarly be taken up in future.

1.22 CIDCO believes that New Bombay should not grow at the cost of other areas in the region and that expenditure on New Bombay should not represent any major diversion of resources from other parts of the State or from other activities of the Government. Ideally, New Bombay should develop as a self-financing project. It has secured finance by way of loans which are to be eventually repaid. These loans are to be used as seed finance for development of infrastructure and other amenities needed for the development that is to take place in this area. Once houses are constructed or plots developed, houses will be sold and plots leased on payment of a premium to the new city's residents to recover the funds invested. It is intended that CIDCO-constructed housing be sold at cost, with a system of cross-subsidies so that a small surcharge recovered from the more expensive housing is used to subsidise the lower income construction. On commercial developments, however, the intention is that CIDCO recover as high a price as possible, using the competitive market mechanism, and utilise the surpluses generated in this way to pay off loans and also to provide certain improved social infrastructure in schooling, medical care, recreation and so on. It is expected that the residents of New Bombay will be, by and large, those who would be otherwise residing in Greater Bombay. Consequently the private funds available for New Bombay development represent money that would otherwise be expended in Greater Bombay, and not funds that are diverted here from other parts of the State.

1.23 CIDCO visualises the New Bombay project as a means of restructuring the metropolitan growth of this area in a way that will alleviate the growing ills of the old city. The population of Greater Bombay grew from just under 3 million in 1951 to 4.2 million in 1961 and to about 6 million in 1971. At this rate the Metropolis is expected to grow further to between 10 and 12 million by 1991. This is clearly a trend that needs to be changed and CIDCO's view is that the only way in which it can be effectively changed is to limit the growth of new jobs in the Bombay Metropolitan Region. Of the kinds of jobs in the Bombay Metropolitan Region that come to the city, the most important basic jobs are in industries and offices. Other service employment follows the growth of this basic employment and follows also the consequent growth of population. In controlling the growth of basic employment, therefore, lies the key to controlling the growth of total employment and consequently the population in this region. Of the two important categories of basic employment, industry and offices, it should be possible to cut back very sharply on the growth of new industrial jobs. Diverting such jobs to other parts of the State would, as indicated earlier, be in the best interests of the State as a whole, apart from being a measure to curb growth in this region.

1.24 However, with office jobs the picture is somewhat different. Inherently these are not the kinds of jobs that can easily be dispersed to hinterland locations. These jobs need a metropolitan environment for their efficient performance and employers are prepared to pay a high price, for land and buildings and also by way of higher salaries to urban employees, to secure this kind of metropolitan environment and all that it implies by way of improved communications to other urban centres and improved contact with other office-based functions. Until we have in the interior of Maharashtra urban complexes of the importance of present day Bombay, Calcutta, Delhi or Madras, there is little hope of arresting the growth of these office jobs in Greater Bombay. The only limited possibility that remains is to reorganise growth patterns for such jobs within the metropolitan area to best advantage. It is evident that concentration of further growth on the southern extremity of Greater Bombay is certain to worsen living conditions in the area, besides requiring greatly increased investments in transport and other facilities to service such growth. The alternative is to develop a counter magnet to the office sector at the southern end of Greater Bombay - away from the city and yet sufficiently close to it - that may provide a new focal point for the growth of office jobs away from the Fort area at the southern end of Greater Bombay because this is essential if this growth is to take place without further damaging the old city yet sufficiently close to it because offices must be persuaded to move to the new

location, which implies guaranteeing that access to the Fort area is rapid and convenient. It is with this end in view that the New Bombay project has been conceived, as a major new centre for office growth, to draw off further growth in office jobs to the new city - these being jobs that would otherwise concentrate in the old city. Both New Bombay and Greater Bombay should be seen as essentially part of the same metropolitan area so that what is being attempted in the New Bombay project is essentially a physical reorganisation and relocation of the jobs and population in the region, while simultaneous efforts are made to minimise the overall growth in this region in every possible way.

- 1.25 CIDCO realises that the very fact of undertaking the New Bombay project as a planned development may bring about a certain amount of growth in this area which would not otherwise have occurred; for instance, its own activities in infrastructure and other development may result in some amount of new employment. There is also the possibility that the provision of improved infrastructure and improved social amenities in New Bombay may attract to the area migrants who would otherwise have stayed away from the metropolitan region. This argues that migration to this region can be reduced by allowing the quality of urban life to further deteriorate, which of course may be true. However, the social, political and economic consequences which could result from a deterioration in the quality of life in urban centres should be obvious from social tensions and urban conflicts experienced elsewhere in India and abroad. To invite such a state of affairs to Greater Bombay would seem to be decidedly not in the best interests of Maharashtra. What would appear to serve the interests of the State and the country best, therefore, seems to be to freeze industrial jobs in Greater Bombay, to relocate office jobs in New Bombay, and, simultaneously, to develop the hinterland. For Bombay, it means that in so far as self-sustaining schemes can work and in so far as physical reorganisation can lead to an improved urban situation, this should be encouraged. Discouraging excessive migration to this region as a consequence of this planned development can best be done by locating in the interior whatever jobs can be located there, and by simultaneously undertaking and encouraging the development of other urban areas in these regions.

- 1.26 CIDCO has undertaken a very large programme for the rehabilitation of the project-affected persons in New Bombay. Nearly 19,400 families, representing a population of about 1,17,000 are already living in 95 gaothans (village communities). Although these gaothans fall within the project area they are excluded from acquisition. Unlike what happens in irrigation projects, gaothans in New Bombay area are being left intact and are in fact being developed by providing social amenities like a

piped water supply, approach roads, proper gutters, septic tanks, upgraded school facilities, medical care services and so on. The rehabilitation programme aims at providing at least one member in every family unit an opportunity of earning a livelihood as remunerative as its lands afforded, and also at giving some secure income from investments to those who are physically incapable of work, besides providing them loans for petty trade. In order to equip the local people for employment, crash training programmes have been instituted in specially set up technical training institutes for various technical trades and occupations allied to agriculture. Many have also been trained as bus and scooter drivers. CIDCO's placement service keeps a close liaison with industry, commercial houses and government offices and has been successful in placing many local people. Schemes exist for giving scholarships, stipends and grants-in-aid to local students, and for providing subsidies for village improvement and other social facilities. All these measures, it is hoped, will go a long way in enhancing the competitive ability of the local people and in their ultimate integration with the wider population of the new city.

- 1.27 Finally, CIDCO is anxious that the new city develop its own identity as quickly as possible. It should contain its own jobs, shopping, recreational and other social facilities and should not become a dormitory for Greater Bombay. It is equally important that the new city offer a quality of life for residents of all income and occupational groups which is a distinct improvement on life and living conditions in Greater Bombay. Several measures are proposed to try to achieve this.
- 1.28 One of the most significant measures proposed is in respect of schooling. We propose to establish a system which will be equally available and satisfactory to children from all income groups. The standards of teaching proposed are such as would match those of the better private schools in Bombay. Two years of pre-primary schooling are proposed to be added to the publicly financed schooling system. Without these it may be difficult to integrate the children of poorer as well as wealthier parents into the same educational system. The increased costs of such a system are proposed to be met through a separate system of taxes which apply to the economic activity in the urban area.
- 1.29 The entire development is proposed as a series of nodes varying in size from 50,000 to perhaps not more than 200,000 population. In each such node it is proposed that accommodation be made available for the entire range of income groups expected in the city. While some nodes may, of course, be more generally preferred over others by the local residents for locational climatic, scenic or other advantages, the intention is that there should be no "rich" nodes and no "poor" nodes. It is expected that this accommodation of residents from various social and income groups within the same

physical area will not only make for a healthier urban environment, but will also ensure a uniform standard of maintenance of social and urban infrastructure services in all neighbourhoods so that no one class of residents is better served than another.

- 1.30 It is further desired that every family living in New Bombay shall have a dwelling of its own, however small, and if pucca construction is not possible, then made of temporary materials. Apart from ensuring that each family shall have access to a round-the-clock potable water supply, good sanitary facilities, availability of power and access to the city school system as well as to common recreational facilities in the area, an important consideration is that each family shall have sufficient security of tenure on its plot of land and, if it cannot afford a pucca dwelling, to encourage it to improve its temporary dwelling to a more and more permanent type of construction.
- 1.31 The orientation of public health services will be shifted from mere prevention to positive action. Mass immunization against communicable and notified diseases, maternity and child care, under-five clinics and other health programmes are expected to be so organised that these services go out and reach people rather than having people queueing up for attention. School health and child nutrition programmes are to be carried out aggressively. It is hoped that medical care will be both adequate as well as of high quality and it will be available to all irrespective of the paying capacity of patients. All these services need funds which CIDCO expects to find, not necessarily from direct users only.
- 1.32 The transportation system is crucial in determining the life style of people. Jobs and residences are to be located in close proximity so that commuting time could be saved and used for creative purposes. The mass rapid transit system and the area developments are being so designed that walking distances to the transit system do not exceed one kilometre for most users and bus stops are conveniently located.
- 1.33 CIDCO's intentions as well as its visualisation of the new city are not utopian; they are within the range of possibility. What is called for is an imaginative use of resources, both of funds and of manpower. Of crucial importance is a cadre of administrators and planners who are technically competent, socially motivated, and other person centred. This requires CIDCO to accept the training and re-training of its personnel as a legitimate demand on its resources.

- 1.34 New Bombay, its social composition and economic mix may take some time to emerge. The effort made will be to avoid traditional incompatibilities in urban living and to provide the ordinary man with social and civic services that are his due as a member of a decent and egalitarian society.

Planning Mechanism

- 1.35 The approach that we have followed in the preparation of this Development Plan differs in many ways from the approach we foresaw when we first started our planning work. This may partly be because of the scale and complexity of our project, but an important cause of difference is also the very high degree of uncertainty that attaches to some of the policies and physical developments that affect our own programmes.
- 1.36 We started by setting up a Planning Team, consisting of eight members drawn from different disciplines who had each achieved some eminence in their respective professions. The disciplines represented included architecture, economics, engineering, literature, physical planning, social sciences, and systems analysis. Work started with this group trying to visualise the new city with as high a degree of precision as possible. It was expected that different individuals would carry different pictures in their minds of the new city as it was likely to emerge, some parts of the picture being more clearly seen than others. The first task was to try to reconcile these images into a commonly agreed image, with the blurred portions being brought more and more sharply into focus, so as to have finally a clear and agreed forward visualisation which could form the basis for decisions on site and implementation. The ultimate image would be used as a basis for defining a series of forward images at intermediate points in time, which were needed to have a clear visualisation of the phasing of the development.
- 1.37 Before agreeing on a common image, it was important to agree on objectives. These were broadly defined, and a series of tentative sub-objectives were also set out. The more important of these have been discussed from section 1.20 onwards.
- 1.38 It was also important to define the context within which these objectives were to be achieved. This meant establishing a data base of factual information which could support the decision making process. This included screening the existing sources of information to extract all that might be valuable and relevant for our own planning work, leaving out a mass of other information which might be available but not useful for our needs.

Very often the information needed to be carefully assessed for its reliability and only then accepted, or, in some cases, accepted with reservations because no better information was available. Some of the information which has been put together in this way is shown in Appendix S.

- 1.39 Besides this, it was found that there existed a number of gaps to be filled for a reasonable understanding of the physical, economic and social aspects of the proposed development. To cover these a number of studies were launched to understand these aspects of the project as well as to create a data base for further work, and the results of these studies are described in Appendix S. The physical studies included a study of the extent of fresh water availability and the possible sources of fresh water for the new city; an investigation of wind directions, wind intensities and air quality in the project area, with a view to determining which sites would be best climatically for establishing the more important urban concentrations; a soil study to map the soil conditions in the entire project area to some depth below the surface, in order to determine which locations would be most favourable for construction so as to minimise civil engineering costs and which alignments for road and railway lines would be cheapest; an investigation of the possible rail and road links ultimately between Greater Bombay and the new city and the hinterland; an investigation concerning the probable site for a second airport in the region which it was important to know in drawing up the transport alignments for the New Bombay area; and so on.
- 1.40 Other studies included a survey of sample house-holds in Greater Bombay to bring out the demographic characteristics, attitudes to housing, preferences in terms of transport, and trends in migration of the expected population; a study to project the kinds of economic activities that might be expected to develop in the metropolitan area in the future, with a view to identifying their inter-linkages and growth potential, so that if the lead activities were shifted from Greater Bombay to the new city, they would bring other activities in their wake; an Industrial Location Study to determine an optimal location pattern for future industry in the State, considering social objectives of dispersing industry to under developed regions of the State, as well as a criterion of minimising overall costs, so as to determine which industries should be permitted or encouraged to move into the New Bombay area and which industries should be persuaded to locate elsewhere; and so on.

- 1.41 However, as work proceeded it became evident that the approach originally envisaged would not be adequate. There seemed to be far too many uncertainties in the surrounding situation to permit the use of an approach which required the drawing up of plans in the context of certainties, if not given then assumed.
- 1.42 In most planning situations, the end state visualised ahead is very different from the actual state achieved at the end of the planning period. Consequently, solutions determined to be 'optimal' for the situation originally visualised cease to be so if actual events shape the development differently. Decisions taken on the basis of the end state visualisation may, therefore, not be the best. To illustrate, we originally assumed for New Bombay a population level of 1 million by 1983 and of 2 million by 1990-91. The assumption was necessary to work out a programme for the laying of physical and social infra-structure in the area. This assumption is based on the fact that Greater Bombay is expected to grow by 4 to 6 million during 1971-91 and to have any kind of impact on Greater Bombay's problems, New Bombay should be able to draw off about half of this anticipated increase. However, the anticipated growth may take place differently and the location of this growth will depend on industrial development and location policies of the State Government, as well as policies followed in Greater Bombay. The state of the national economy will also matter and will, among other factors, influence the future of the port and railways, which are administered by the Central Government. Apart from other unforeseen events, CIDCO's own programmes are a part of the State's development plans and several actions that may or may not be taken, but which may affect New Bombay profoundly, are beyond CIDCO's control. Similarly, some information may become available which was not available earlier and this will modify the factual background against which planning decisions are to be made. Visualisations concerning the future may also alter in the light of political and economic events in the country. It is also possible that CIDCO's own objectives may be modified in less or more important respects. Thus the context of the planning situation will continuously change and all these changes will call for modifications in planning decisions. Keeping all these considerations in view, our planning mechanism is that at any point in time, when a decision affecting development has to be taken, this decision is optimised within the current planning context, which includes in particular visualisations concerning what the future might be under various alternative assumptions. Subsequent decisions are similarly to be optimised

at the time each decision is taken. It seems to us that this procedure of sequential decision making in which the planning context is continuously updated and each decision is optimised at the time it is taken, keeping in mind both current as well as forecast circumstances, will tend to produce a better planned future situation than a solution based on a mechanism where the entire planning solution would be given before hand, after being worked out in response to a visualised end state which will almost certainly never exist.

1.43 The procedure followed in the preparation of the development plan and the series of steps leading to its formalisation are stated below :

- a. Objectives : These were first defined by the State Government and then spelt out in more detailed terms by the Planning Team. They have formed important guidelines in determining the Development Plan.
- b. Data Base : A clear understanding of the situation or context in which planning decisions are to be taken is of first importance. This context contains many elements which are difficult to define and some of these are discussed in the sections that follow, but there is also a certain amount of "hard" information needed for understanding the conditions circumscribing the project, or describing the background against which planning decisions must be taken. This hard information consists largely of data which one might call incontrovertible, in the sense that it pertains to facts such as soil conditions, climate characteristics, census information regarding population and population characteristics, employment and income statistics and so on. In some cases, the information is readily available and is of high quality. In other cases it can be secured or abstracted only with great difficulty and the quality of the information is uncertain. In some instances the information is missing altogether and has to be built up through a series of fresh surveys or investigations. We have made substantial efforts to create a data base for our own planning work and these efforts will continue in the coming years. The data base so far established is described in Appendix S.

- c. Other agencies : CIDCO is only one of many agencies that will be active in the New Bombay project area. The programmes and policies of other agencies are of central concern and relevance in framing CIDCO's own programmes. It is clearly important that these programmes should not be in conflict and, wherever possible, should be carefully dovetailed with each other. A brief description of the other agencies which are important for us to take into account for our project is shown in Appendix R. In addition we have some information concerning these agencies' future programmes, which we have taken into account in our planning work, but which it would be incorrect for us to publish in advance of these agencies' own publications in this regard.
- d. Visualising the future : In drawing up the context within which planning decisions are to be taken, an important component is a visualisation of what is likely to happen in future. It means taking some broad features of certain aspects of the metropolitan region and trying to foresee these as far ahead as one can. For instance it is important to visualise not only what the population of the metropolitan area may be in 20 years' time, but also to visualise the kind of level to which it might grow even further into the future. Similarly, it is important to try to visualise the activity-mix as it will occur in future, the probable extent of future migration to this region, the probable alignments of future road and rail connections between Greater Bombay and New Bombay and into the interior, and so on. Some aspects can be forecast with more confidence than others; some can also be foreseen much further ahead in time; and all need to be foreseen under varying assumptions of how development will take place. This visualisation is also to some extent a repetitive process in the sense that the success or failure of CIDCO's own programmes and policies will modify the visualisations. Our present visualisations are set out in Chapter 2.
- e. Development Plan : The inputs listed earlier are finally drawn together in the formulation of a series of specific programmes and policies for implementation in the immediate future. The land use plan shown also sums up and reconciles alternative growth possibilities so that under varying conditions it can still serve as a dependable framework for further work.

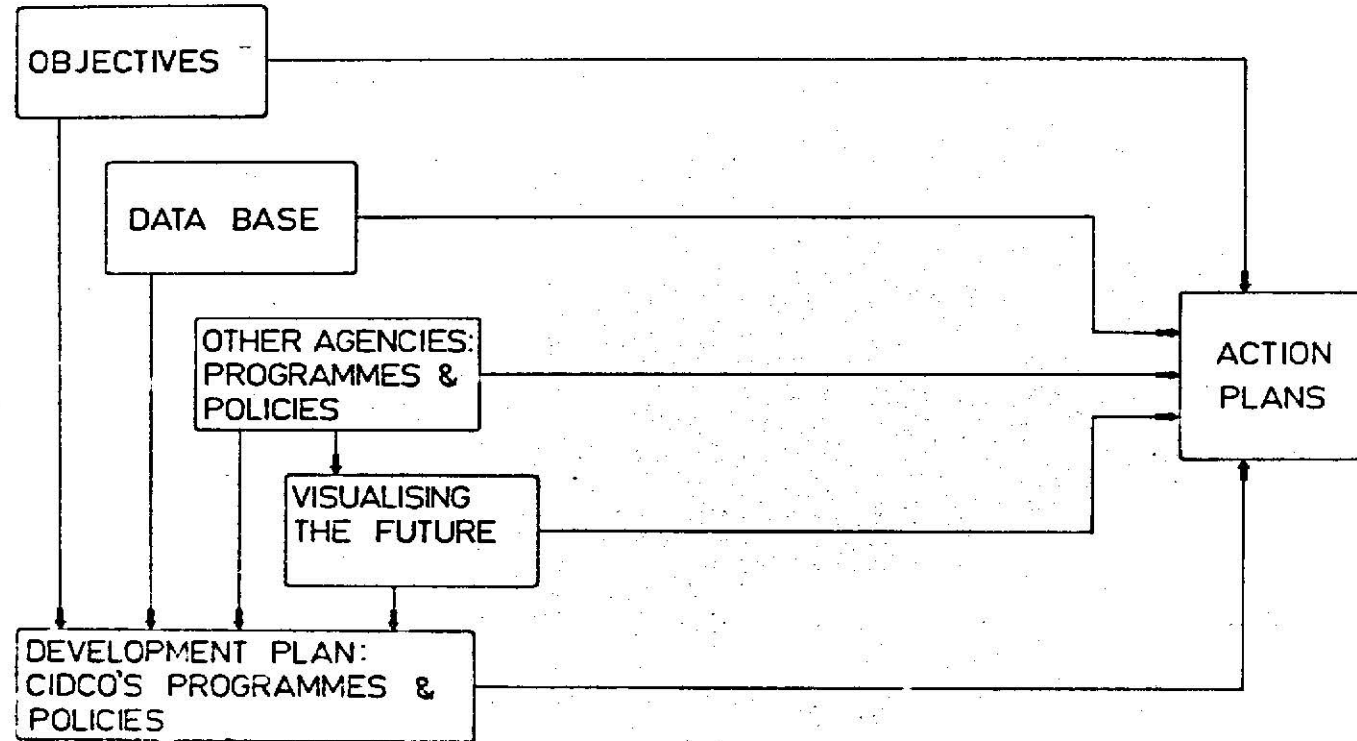


DIAGRAM 105
PLANNING MECHANISM

It is expected, furthermore, that the Development Plan as currently envisaged will undergo periodic review as work proceeds and circumstances change. Given the uncertainties of the situation, it seems important to retain a considerable degree of flexibility in formulating the plan. The Development Plan as proposed is described in Chapter 3.

Wider participation

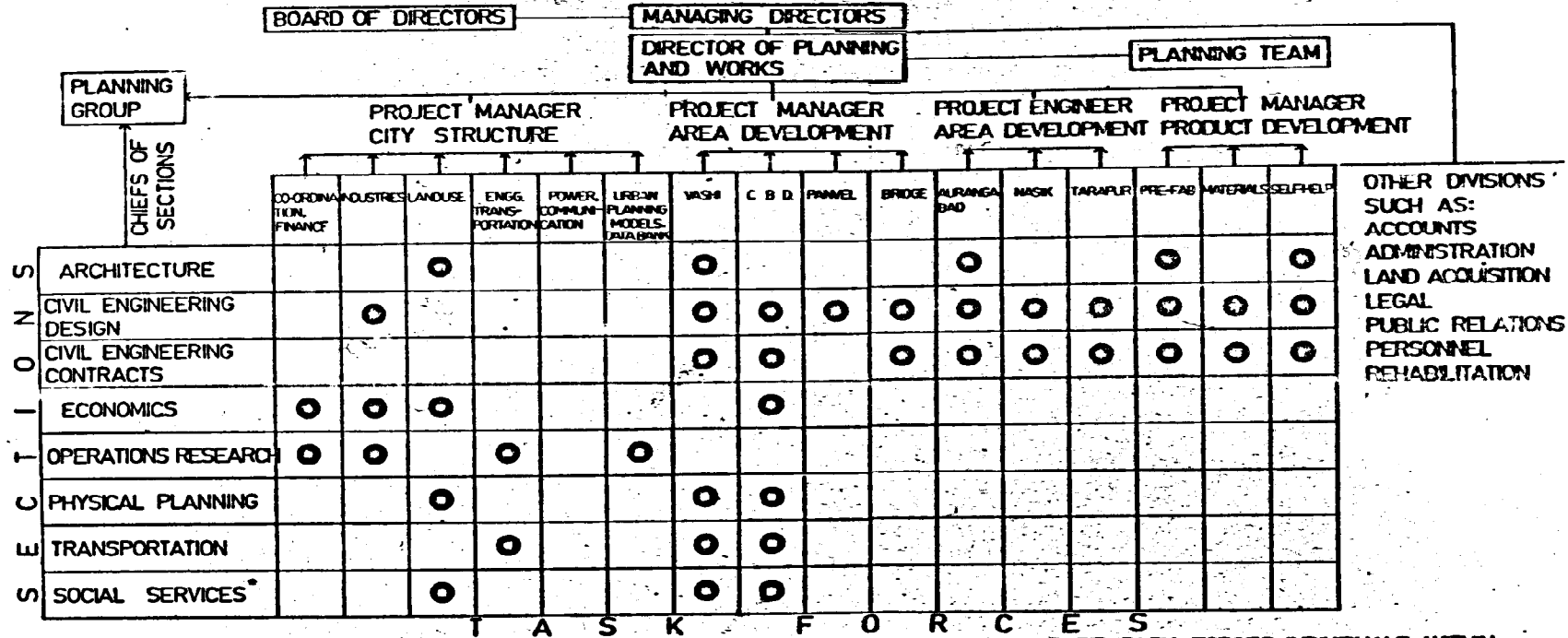
- 1.44 CIDCO believes in a wider participation of public and professional groups in its work. So far, CIDCO's activities have been confined to mostly planning work, which limits public participation but affords more opportunities for non-CIDCO professionals to join in the work. In addition to the apex level Planning Team of CIDCO, a large number of specialists such as architects, engineers, town planners, soil specialists, land surveyors, social scientists, social workers, educationists, doctors, etc. have been associated at various times with the planning work; some of them are still working with CIDCO as consultants. Several advisory committees exist to advise CIDCO on a variety of subjects, CIDCO has not involved foreigners in its planning work though full advantage has been taken of the work of others through a literature search, personal meetings and visits.
- 1.45 The process of public participation in CIDCO's work will begin with the publication of this Plan and it is hoped that citizens will give it their attention. It may be noted that throughout the period of CIDCO's existence, the press and news media have taken full note of CIDCO's work and have commented on it from time to time.

APPENDIX A

INTERDISCIPLINARY APPROACH AND STAFF ORGANISATION

- A.01 The composition of the Planning Team has already been described in section 1.35. The Team members worked part time with CIDCO, and were supported by full-time staff engaged by CIDCO who worked under their direction. A Planning Team Member, although part-time, was in full executive charge of the full-time staff from his own discipline. The arrangement had the advantage that CIDCO was able to begin its planning work very rapidly, since the Planning Team was quickly formed and able to get to work.
- A.02 From the inception of CIDCO in March 1970 until October 1971, the planning staff was grouped along professional disciplinary lines, there being an architectural section, an economics section, an engineering design section, and so on. The works execution staff were separately grouped, and taken to be at all times distinct from the planning staff. Working on these lines, where grouping was on a disciplinary basis, it was found that lateral co-ordination took place only at the level of the Planning Team, and work was being seriously delayed. In October 1971 the Planning and Works Divisions were grouped together and reorganised into Task Forces. Task Forces for area development were essentially multi-disciplinary groups assigned the specific task of planning, design and execution of all works for that particular area development. Other task forces also had a greater or lesser degree of multi-disciplinary participation depending on the nature of the task. Each Task Force was headed by a Task Force Leader whose work was essentially to co-ordinate the work of his entire group, programme it, ensure that realistic target dates were set for sub-tasks within the overall task, and ensure also that these were met. In this reorganisation it was made clear that Heads of Sections such as the Chief Architect, Chief Economist, Chief Physical Planner, etc. and a small staff working directly under each were kept free of Task Force responsibilities. It was expected that individuals working in Task Forces would be responsible to their Task Force Leaders for the programming and progress of their work, but would be responsible to their particular disciplinary Section Head for the quality of work done. The Heads of Section, in addition to ensuring that members of their own discipline were producing work of satisfactory quality in whatever task force to which they might be assigned, were also required to keep a broad view of the entire planning effort, to ensure that it was taking a satisfactory direction, and also to indicate where their particular discipline might intervene in any work that was being done.
- A.03 Simultaneously, efforts were begun to encourage promising individuals to become individually inter-disciplinary. Strong task force leadership would require, as leaders, individuals who had an understanding of all disciplines and competence, if possible, in more than one. Training programmes for CIDCO staff were selected particularly to fill this need.

DIAGRAM A. 01



PROJECT MANAGERS HAVE OVERALL RESPONSIBILITY FOR THE WORK WITHIN THEIR TASK FORCES. INDIVIDUALS WITHIN ENCLOSURES ARE ACCORDINGLY RESPONSIBLE TO THEIR PROJECT MANAGER FOR ALL ASPECTS OF THEIR WORK BUT WILL RECEIVE GUIDANCE AND INSTRUCTIONS REGARDING METHODOLOGY OF APPROACH TO BE FOLLOWED FROM THE HEAD OF SECTION OF THEIR PARTICULAR DISCIPLINE.

- * INCLUDES EDUCATION, MEDICAL, SOCIAL WELFARE, RECREATION
- REPRESENTS INDIVIDUALS

CHAPTER - 2VISUALISING THE FUTURE

	Starting Section
* Population and Employment projections	2.02
* Population distribution in the Metropolitan Area	2.12
* Employment patterns in New Bombay	2.15
* Transport	2.29
* Telecommunications	2.33
* Appendix B : Urban Growth Model	
* Appendix C : Employment Projection Model	
* Appendix D : Land Use Planning Model	
* Appendix E : Office Growth	

- 2.01 Population and employment forecasts are clearly of central importance in drawing up plans for a metropolitan area. The forecasts for a particular area obviously need to be framed within a wider context. The situation anticipated in the country or in the State of Maharashtra in future years in respect of population and jobs and anticipated changes in trends in migration and urbanisation will affect predictions for the Bombay Metropolitan Region. And the predictions for New Bombay will be strongly determined by forecasts for the region as a whole.

Population & Employment Projections

- 2.02 The Bombay Metropolitan Regional Planning Board has made an attempt to forecast population in the Bombay Metropolitan Region in 1981 and 1991. The area considered by the Board, which we call the Bombay Metropolitan Regional Planning Area (BMRPA) comprises Greater Bombay, Thana town, New Bombay, Ulhasnagar, Kalyan, Bhiwandi, Ambernath, Dombivli and a number of other smaller towns. In 1971, the population of this region was approximately 77.23 lacs, with 81.45% of this population concentrated in the Greater Bombay-Thana-New Bombay area. The BMRPB made several forecasts based on different assumptions. The forecast with the high growth assumption indicated population levels as follows:

Table 2.01

BMRPB's Projected Population for BMRPA & Greater Bombay (High Growth Assumption)

		(in '000s)				
Area		1971	1976	1981	1986	1991
Greater Bombay	Projected	5760	6745	7870	9160	10626
	Actual	(5970)				
BMRPA Region	Projected	7280	8520	9941	11580	13470
	Actual	(7720)				

- 2.03 We have ourselves made no effort to project population growth in the region, preferring to accept the Board's estimates as reasonable for our work, although, as will be seen from the table above, by 1971, growth in Greater Bombay and the region had already exceeded the highest projections by the Board. Instead, we have concentrated on developing predictive models which would be able to take into account the effect of policy changes on population growth in the metropolitan area. We may define the Greater Bombay-Thana town-New Bombay complex as "Metropolitan Bombay" (MB), which is the principal area of our concern and forms a part of the larger BMRPA.

2.04 The Urban Growth Model (UGM) is described in greater detail in Appendix B. We may call it a dynamic model, in the sense that it links the numbers of population and employment in a particular category in one time period with the numbers in the succeeding time periods. The census data available from 1901 to 1971 has been used as the source of basic information to establish the relationship between variables during one time period and those in the succeeding period. For any Census year, we can compare the predictions offered by the model on the basis of input information from earlier Census years with the factual observations during that Census year. This gives an indication of the model's reliability and we find that for medium-term projections of 10 and 20 years the model can be considered fairly dependable. It assumes, of course, that the dynamics of growth will be the same for the future as has been observed in the past. The model enables us to predict the demographic and economic implications of certain policy changes e.g. the effect of restricting additions to organised manufacturing jobs to 2000, as has been suggested in the Industrial Location Policy Study.

2.05 The following table indicates employment and population projections for 1981 and 1991 using this model:

Table 2.02
Projections for Metropolitan Bombay:
Urban Growth Model

Variable	('000s)				
	1971 Actual	1981 Low	1981 High	1991 Low	1991 High
Manufacturing employment	969.00	1287.95	1390.19	1711.12	2016.07
Total employment	2299.00	2641.94	3031.34	3222.67	4017.84
Population	6291.00	8363.00	8792.00	11039.00	12005.00

Notes: 1. The natural addition to population is assumed to decline by 1.5% every decade.
2. Net migration is generated within the model.
3. The low and high figures are at 95% confidence limits.

2.06 A second model which we call the Employment Projection Model (EPM), is based on data available, year by year, from 1961 to 1971. It is a static model, establishing the relationships between the variables in one sector (called the exogenous variables) with a series of other dependent variables. The exogenous variables are employment in chemicals, engineering and textile industries, public service, import-export tonnage handled by the port and population. Finally, we have the dependent variables, consisting of employment in a series of other sectors, which are determined both by the exogenous as well as by the first stage dependent variables. The relationships have been worked out so as to give the best possible

fit with the observed data for the period 1961-71. Population, which is an exogenous variable introduced as an input to the model, also emerges as an output. The procedure is that one starts with an assumed value of population as input and uses the output value as the input for the next iteration, repeating the process until the value stabilises. The model is described in greater detail in Appendix C. It permits the study of the effect of policy changes. These will affect the exogenous variables, such as total manufacturing employment in engineering or textiles, or tonnage handled within the port. These changes will finally reflect in the predicted occupational structure and population of the city.

- 2.07 For reasons that are explained in Appendix E, it has been assumed that for the coming decades there is little that can be done about shifting office jobs outside the metropolitan area. This type of activity requires a metropolitan location for its effective functioning and the best that can be done with such jobs is to re-site them within the metropolitan area to best advantage. But in terms of overall growth induced by such jobs, this is taken as inevitable.
- 2.08 However, new manufacturing jobs can very well be located in parts of the State other than the Bombay Metropolitan Region and, as the Industrial Location Study indicates, this would be in the best interests of Maharashtra. But doing this would represent a substantial policy change from what has happened in preceding years. The following table describes the growth in manufacturing employment in Metropolitan Bombay in the past.

Table 2.03

Growth of Industrial Employment in M.B. (1951-71)

Year	Employment ('000)	% annual growth during the preceding decade
1951	523.00	N.A.
1961	708.00	3.05
1971	969.00	3.18

Source: Census of India - 1951, 1961, 1971

- 2.09 If the recommendations of the Steering Committee supervising the Industrial Location Study for Maharashtra are accepted (details of the study are given in Appendix O), this will imply a growth of not more than 2,000 jobs in basic manufacturing activity in Metropolitan Bombay upto 1981. Beyond this, we may expect some additional jobs in ship building and perhaps an Export Processing Zone attached to the Nhava Sheva port. With these assumptions, the anticipated number of jobs and population in Metropolitan Bombay in 1981 and in 1991 are indicated in the following tables:

Table 2.04

Projections for Metropolitan Bombay :
Employment Projection Model

	(employment in 000's)	
	1981	1991
Chemical & Engineering (basic industrial jobs)	258.07	286.57
Total employment (Establishment)*	2031.00	2479.00
Population	7854.00	9945.00

All projections are mean values at $\pm 10\%$

* 'Establishment' as defined by census is a place where goods are produced or manufactured not solely for domestic consumption, or where servicing and/or repairing is done such as factory/workshop, or a place where retail or wholesale business is carried on, or commercial services are rendered, or an office (public or private), or a place of entertainment, or where educational, religious, social or entertainment services are rendered. It excludes self-employed individuals who do not report to any establishment either as an employer or as an employee and those engaged in agriculture and allied activities.

Assumptions :

- 1) Addition of 2000 basic industrial jobs by 1981.
- 2) Addition of 28,500 jobs in ship-building, ship building ancillaries and an Export Processing Zone (EPZ) during 1981-1991.
- 3) Commissioning of Nhava-Sheva port after 1981 but before 1991, with port traffic assumed to grow at 4 per cent per annum during 1971-1991.

2.10 From the preceding paragraphs it will be clear that if existing trends continue we can expect a population in Metropolitan Bombay of between 11 and 12 million by 1991. This projection assumes that the natural addition to population declines by 1.5% every decade, a condition that may quite possibly not be met, in which case even the figure of 12 million may be too low. On the other hand, if industrial growth in the metropolitan area is effectively controlled, we can expect a population of just under 10 million by the same date. But this assumes a degree of success in implementing industrial location policy which past experience would suggest is extremely difficult to achieve and we should consequently expect Metropolitan Bombay to have, by 1991, a population varying from 10 to 12 million depending on how successfully further industrial growth in Metropolitan Bombay is controlled.

- 2.11 These are projections upto 1991. What happens thereafter? Quite obviously, planning decisions taken now should remain sound far into the future and it becomes important to anticipate the kinds of population concentrations to expect in this area in 2000 or 2020 and beyond. One of the components in analysing the growth of this metropolitan area will be a study of urbanisation and migration trends. We would like to know, for instance, what prevailing economic and educational trends will do to migration towards the metropolitan area. What will the increase in population, as well as the increase in the educated unemployed do to migration towards Metropolitan Bombay? We have so far been unable to make any satisfactory projections concerning this.

Population distribution in
the Metropolitan Area

- 2.12 The planning experience of many cities has been that actual development, when it occurs, is different from what was foreseen by the planners. Jobs and people choose to locate at sites other than those which planners expected would be preferred. Clearly, it would be extremely useful to have a predictive instrument which can indicate, even if only in the broadest terms, where jobs or population would locate in an urban area given the overall figures of anticipated growth. A predictive model serving this purpose should obviously be sensitive to policy changes which affect location. We have adapted such a model (the Land Use Planning Model developed by LUBFS, Cambridge, U.K.) for our purposes and this is described in Appendix D. The model has been developed for 1971 data, and before it is used for predictive purposes, it is necessary that it be tested against data for some other point in time, say 1961. The information needed for 1961 is not in the required form, nor are the 1971 data, on which the model is based, as complete as we would like. However, as soon as this information is available, the model will be tested and if it is shown to be reliable it will be used for short term predictive purposes and to test broadly the impact of policy changes such as variations in permitted Floor Space Index (FSI) or changes in the transport fare structure on the probable distribution of further growth. This model uses as inputs the amount of developable land available and intensity of development permitted in each zone of the city, the assumed or given distribution of basic employment over the city and the given transport network and fare structure. Other parameters required for the operation of the model are determined from the data for the given point in time. The output of the model is the probable distribution of service jobs and population consequent on the existence of basic employment. A study of the effect of policy changes as indicated by the model would be useful not only to assist in determining what policies to adopt but also to modify the probable land use pattern in New Bombay to more closely match the situation that will arise as a result of people's natural preference operating within the given policy framework.

2.13 Metropolitan Bombay's population in 1971 was just over 6 million. The predictions set out earlier indicate that by 1991 there will be an addition of a further 4 to 6 million population in this area. How will this growth distribute between Greater Bombay and New Bombay? Preliminary cost analyses show that it would be desirable to have as much of this growth as possible in New Bombay rather than Greater Bombay, since for an assumed level of standards and amenities, development is cheaper in New Bombay than in the old city. In the absence of a dependable predictive model, we cannot say with any confidence how the population will distribute between the old city and the new, nor can we decide what are the most important policies which could affect the distribution and bias it in favour of New Bombay. However, we have carried out an analysis to establish that even in the absence of further major industrial growth in this area a population distribution which places 2 million out of the expected growth of 4-6 million on the New Bombay side is feasible, provided a certain number of office jobs are moved to the new city. This analysis is shown from section 2.15 onwards.

2.14 A question to which we have not been able to find a well substantiated answer is whether an office centre can be created in New Bombay which can rival the old city centre in terms of attractiveness for new offices. Our linkage analyses, as well as the experience of other cities abroad, seem to suggest that the administrative function can be physically separated and placed within a reasonable distance from the trading or business function without damaging the functioning of either of these two types of activity. How this is to be achieved in practice is not clear. Obviously, if the Sachivalaya, the seat of the State Government, were to shift to New Bombay - a move that could be financed from the sale of its existing property in Greater Bombay - this, besides providing better living conditions for most of its employees, would provide a powerful and prestigious focus for new office growth. If such a move is not made, we do not know whether we can be successful in locating in New Bombay the numbers of offices needed to draw off a substantial amount of the new growth in Metropolitan Bombay to the new area .

Employment patterns in New Bombay

2.15 We examine below first how New Bombay can achieve a population level of 1 million or more under different conditions of employment growth. In section 2.26 we take up the question of employment composition for a 2 million population. The various cases examined consider the possibility or absence of a new port at Nhava-Sheva, an export processing zone (EPZ), new ship-building activity, and the possibility or otherwise of shifting industries from Greater Bombay to New Bombay. The cases considered are:

Table 2.05

Case	New Bombay population	Nhava Sheva Port	EPZ	Ship building	Shifting industries GB to NB
i)	1,000,000	No	No	No	No
ii)	1,000,000	Yes	No	No	No
iii)	1,000,000	Yes	Yes	No	No
iv)	1,000,000	Yes	Yes	Yes	No
v)	2,000,000	Yes	Yes	Yes	Yes

- 2.16 Other combinations are of course possible, but we believe the cases considered will suffice for an understanding of the possible activity-mixes likely to arise in New Bombay under different conditions.
- 2.17 As far as new industrial jobs are concerned, it is assumed that the Industrial Location Study will be accepted by the Government and fully and successfully implemented. In other words the growth in industrial jobs in Metropolitan Bombay will be held down to the minimum. This is the most severe assumption one can make against the growth of New Bombay, and it has been adopted throughout in the following analysis.
- 2.18 Greater Bombay had about 4.5 lakh people employed in 1971 in Central and State government offices, local bodies, banking institutions, railways and other quasi-government bodies when the population level was 59.7 lakhs. Since the population of Metropolitan Bombay may be around 80 to 110 lakhs by 1981 and 1991, the number of jobs in this category of public sector employment at these dates is taken as 6 lakhs and 8.25 lakhs respectively, assuming a growth rate identical with that of population. In practice the growth of public sector jobs may be higher.
- 2.19 The number of jobs in the non-manufacturing private sector is at present approximately the same as the number of jobs in the government and quasi-government non-manufacturing sector. This proposition is assumed to remain the same in future.
- 2.20 Bombay port currently employs about 30,000 workers with an annual handling capacity of 16 million tonnes. Since Nhava Sheva will be a modern port with modern techniques for traffic handling, it is assumed that 5,000 workers will be employed to handle a traffic of 5 million tonnes. Another 5,000 people are likely to be employed in activities like warehousing, transportation, processing, grading, liaison offices of the manufacturing, exporting, importing concerns etc.

- 2.21 Our studies suggest that the setting up of an export processing zone around New Bombay port is likely to employ at least another 8,500 people.
- 2.22 The deep draught facilities to be provided at Nhava Sheva port would be very useful for a ship-building yard. Ship building has also an enormous potential for the development of ancillary industries. Ship building with ancillary industries may employ 20,000 people.

Development of New Bombay with assumptions (i) to (iv)

- 2.23 The following tables show the likely employment pattern of New Bombay with a population level of one million under the assumptions indicated earlier.

Table 2.06

Employment Pattern in New Bombay for 1 million population

Total No. of jobs if labour participation rate is 36.5%					3,65,000
Of these, (a) basic manufacturing will be	20,000*				
and the following jobs will be population based:					
b) non-basic manufacturing	37,500				
c) private non-manufacturing	75,000				
d) public non-manufacturing	75,000				
e) self-employed	50,000				
	Total (a) to (e)				2,57,500
Balance to be met from other activities					1,07,500
Assumption	(i)	(ii)	(iii)	(iv)	
Total jobs to be filled	1,07,500	1,07,500	1,07,500	1,07,500	
Filled by:					
f) traffic handling at port	-	5,000*	5,000*	5,000*	
g) port-based trade etc.	-	5,000	5,000	5,000	
h) EPZ	-	-	8,500*	8,500*	
i) Ship-building	-	-	-	10,000	
j) Ship-building ancillaries	-	-	-	10,000	

k) Balance to be filled by re-locating government and quasi government jobs from Greater Bombay to New Bombay	1,07,500*	97,500*	39,000*	69,000*
l) No. of jobs in Govt. and quasi Govt. bodies by 1981 in Metropolitan Bombay	6,00,000	6,00,000	6,00,000	6,00,000
m) 'k' as percentage of jobs in this sector by 1981 in MB	17.9%	16.3%	14.8%	11.5%
n) 'k' as percentage of jobs in this sector plus non-manufacturing private sector	9%	8.2%	7.4%	5.8%

* Indicates lead functions

2.24 The figures above indicate that the number of government and quasi government jobs required to achieve a one million population in New Bombay by 1981 is not likely to exceed 11.5% to 17.9% of the total jobs in the metropolitan area in this sector by 1981. If one takes into account the jobs in the non-manufacturing private sector also, the percentage of jobs to be relocated to New Bombay is further reduced to 5.8% to 9% of the total jobs in these sectors by 1981.

Development of New Bombay with port, export processing zone, ship-building, and the industries which are to be shifted from the non-conforming zones of Greater Bombay

2.25 The Maharashtra Economic Development Council has estimated that about 800 units of the 3000 units located in the non-conforming zones employing about 27,000 workers can be shifted out of Greater Bombay without much difficulty. We may assume that at least one third of these units can be relocated in New Bombay. This will mean an addition of 9000 employment. To this we may add the possibility of shifting textile mills managed by the Government of Maharashtra. This will increase the employment level of New Bombay by another 30,000.

2.26 If these assumptions come true there will be a need for relocating only 30,000 jobs from the Government, quasi-government and private non-manufacturing sector of Greater Bombay to New Bombay to reach the level of one million population, since the need under assumption (iv) above is

only 69,000. It seems that if all these favourable factors including shifting of offices are considered, New Bombay can as well achieve a population level of 2 million by 1991.

2.27 The following table shows the likely employment pattern in this case (Case (v) above):

Table 2.07
Employment Pattern in New Bombay - 1991

a.	Basic manufacturing	20,000*
b.	Non-basic manufacturing	75,000
c.	Private non-manufacturing	1,50,000
d.	Public non-manufacturing	1,50,000
e.	Self employed	1,00,000
f.	Traffic handling at port	10,000*
g.	Port-based trade etc.	10,000
h.	Export processing zone	8,500*
i.	Ship-building, and and ancillary units	10,000 10,000
j.	Sub-total a. to i.	5,43,500
k.	Gap to be filled by re- locating government and quasi-government jobs from Greater Bombay to New Bombay	1,86,500*
l.	No. of jobs in government and quasi-government bodies by 1991	8,25,000
m.	k as percentage of jobs in this sector by 1991	22.6%
n.	k as percentage of jobs in this sector + non-manufac- turing private sector	11.3%

Note: The capacity of Nhava Sheva port has been assumed as 10 million tonnes by 1991.

2.28 All the above tables have been calculated on an assumption that the work force will be 36.5% of the population by 1991. There are indications, however, that by this date and perhaps even earlier this figure may fall to 30%. In that case the number of jobs to be moved in the office sector will be even smaller.

Transport

- 2.29 The probable transport links by road and by rail between New Bombay and Greater Bombay and between New Bombay and the hinterland are dictated, principally, by topographical considerations. We have indicated the location of these links in the relevant maps of the Development Plan. However, these link locations give us no idea of the expected volume of inter-city passenger travel demand between Greater Bombay and New Bombay for the various population levels in the two areas. To determine this, a crude prediction model has been developed based on observed behaviour in Greater Bombay. It serves to provide an order-of-magnitude indication of the levels of demand likely to emerge between Greater Bombay and New Bombay :

Trips exchanged between Greater Bombay and New Bombay

Assumptions : (a) A gravity type model is used, in which trips between any two zones are a function of the characteristics of those zones and of the distance between them. Mathematically, the expression for trips between any two zones is :

$$\text{trips} = \text{Constant} \times (\text{Functions of zonal characteristics}) \times e^{-\lambda d}$$

where d is the distance between zones and λ is called the "friction factor"

For Greater Bombay, the friction factor is as follows :

Table 2.08

Values of friction factor λ

Purpose	Modes			All modes
	Bus	Train	Car/Taxi	
Work	0.0863	-0.0315	0.0521	0.0212
All purpose	0.0950	-0.0219	0.0533	0.0241

- (b) For predicting trips between Greater Bombay and New Bombay, we assume a friction factor of 0.02 within each area, which corresponds to observed values in Greater Bombay for travel by all modes and, for travel between the two areas, a friction factor of 0.1, which is close to the observed value in Greater Bombay for bus journeys alone. This presumes that Greater Bombay and New Bombay will be connected by buses only and not by trains, a reasonable assumption for the present.

- (c) We assume a population distribution of 85 lakhs in Greater Bombay and 20 lakhs in New Bombay.

On this basis, travel demand between the two areas will be as follows:

Table 2.09

Passenger trips between Greater Bombay & New Bombay

(Each way trips in '000s)

	Purpose					
	Busi- ness	Soc.& Rec.	Others	Total non- work	Work	All total
Only Thana Creek Bridge	32	18	12	62	181	243
Two bridges (Thana Creek)	28	15	9	52	152	204
(Sewri-Nhava)	12	7	4	23	64	87
Total	40	22	13	75	216	291

2.30 The preceding table indicates the number of trips that can be expected between Greater Bombay and New Bombay if only bus services (not trains) operate between the two cities and if commuters move freely from one city to the other for work. In practice, we hope that the provision of residences close to work places in New Bombay will permit and encourage most New Bombay employees to reside in New Bombay. In that case, the number of trips exchanged between Greater Bombay and New Bombay will be the total non-work trips as indicated in the table, plus some small fraction of the work trips.

2.31 The capacity of the Thana Creek Bridge is 3000 Passenger Car Units (PCU's) per hour each way. If we assume the proportion of cars to buses to be as in Greater Bombay, this implies a maximum number of 2250 cars and 250 buses (each bus is equivalent to 3 PCU's) per hour over the bridge each way during peak hours. This represents a capacity of 16500 bus and 4500 car passengers, or 21,000 passengers per hour at the peak. Converted to daily demand, this represents approximately 175,000 daily trips each way as the capacity of the Thana Creek Bridge. Comparing this with the predicted demand as indicated in Table 2.09 and assuming that a large proportion of work trips between the two areas will not materialise, as discussed in Section 2.30 above, we see that the Thana Creek Bridge alone would be adequate to cater to inter-city traffic between the new city and the old when the population of New Bombay reaches a level of 2 million, with 8.5 million on the Greater Bombay side.

- 2.32 We have investigated the kinds of new transportation systems likely to emerge in future. Most of these, however, seem to be designed to cater to the complexities and enormous difficulty of improving transport within existing built up environments. For a new area, it appears that ground track systems are still the cheapest and, provided that development is concentrated along mass transit axes, they are also the quickest for most of the city's population. Consequently, the plans being currently defined assume ground track systems of the traditional type only, for the present. Presumably, the same reservations could be used for faster, more efficient ground track systems if these emerge in future.

Telecommunications

- 2.33 It is frequently said that improvements in telecommunication techniques in the future will alter the living and working patterns of the city's population. Presumably, the change will be in the direction of smaller concentrations of jobs and population, with communication between these concentrations taking place largely over an improved telecommunication system, with physical movement between concentrations being reduced. As it happens, the physical development pattern which has been preferred for New Bombay, that of a series of nodal concentrations set on mass transit axes, lends itself to functioning with these improved telecommunication facilities. Perhaps more immediately important from the point of view of boosting the new office development would be a means of communication with the old city centre which would permit, besides the usual telephone and telex facilities, document transmission from office to office over a telephone circuit. The technology appears to be available and this facility could perhaps be developed in India.

Visualising the Future

- 2.34 In the preceding paragraphs, we have discussed population and employment forecasts, as well as aspects of transportation and telecommunications which will affect future development. In all these areas, much additional work is obviously required. Apart from these aspects, there are other features of development which we should also attempt to visualise if possible. The volume of goods movement per capita, which is likely to increase as the economy develops, changing patterns of demand for consumer goods, changing attitudes to housing and to the preferred disposal of leisure time, are some of the many other aspects which are relevant, but which we have not yet had the opportunity to examine seriously. We hope to be able to address ourselves to some of these problems in coming years.

APPENDIX B

URBAN GROWTH MODEL

Objective

- B.01 The development of the model was taken up with a view to derive a set of demographic and economic equations which can be used to forecast the overall growth of the metropolitan area and the growth of particular activities within it.

The Model :

- B.02 It is basically a predictive model. The economy is divided into different sectors representing activities such as manufacturing, transport, public administration, trade, etc. The model seeks to analyse the inter-relationships among the various sectors in order to explain the growth process of the economy as a result of the inter-actions of economic activities.

Possible inter-relationships among different sectors of the economy were first hypothesised, on the basis of everyday experience. These were tested against the data available, presuming linear and log-linear relationships and the cases in which a significant relationship did not emerge were discarded. The rest were retained and are described below as a set of mathematical equations :-

- 1) $MFG_t = f(MFG_{t-1})$ where MFG_t = No. of jobs in manufacturing sector at time t.
- 2) $TOT_t = f(MFG_t)$ where TOT_t = Total No. of jobs in the economy at time t.
- 3) $MIG_t = f(TOT_t - TOT_{t-1})$ where MIG_t = Net migration into the metropolis between t-1 and t.
- 4) $P_t = P_{t-1} + MIG_t + NET_t$ where NET_t = Natural addition to the population between t-1 and t, and P_t and P_{t-1} are populations at time 't' and 't-1' respectively.
- 5) $COM_t = f(P_t)$ where COM_t = Number of jobs in the commercial sector at time t.
- 6) $TRAN_t = f(P_t)$ where $TRAN_t$ = Number of jobs in the Transport sector at time t.
- 7) $GAS_t = f(P_t)$ where GAS_t = Number of jobs at the Power and Gas supply services at time t.

- 8) $EDU_t = f(P_t)$ where EDU_t = Number of jobs in the Educational and Scientific services at time t.
- 9) $SAN_t = f(P_t)$ where SAN_t = Number of jobs in the sanitary service at time t.
- 10) $HEL_t = f(P_t)$ where HEL_t = Number of jobs in the health and Medical services at time t.
- 11) $CON_t = f(TOT_t)$ where CON_t = Number of jobs in construction sector at time t.
- 12) $PUB_t = f(t)$ where PUB_t = Number of jobs in public administration (at all levels) at time t.

and lastly the number of remaining jobs is expressed as an accounting identity in

$$13 \text{ SERV}_t = \text{TOT}_t - (\text{MFG}_t + \text{TRAN}_t + \text{COM}_t + \text{GAS}_t + \text{EDU}_t + \text{SAN}_t + \text{HEL}_t + \text{CON}_t + \text{PUB}_t)$$

The time interval at which data are available is 10 years from 1911 to 1971, and the period $(t-1, t)$ therefore represents the decade between $t-1$ and t .

Data and method of estimation :

- B.03 The model is calibrated on Census information from 1911 to 1971. The parameters of the system are derived using a single equation least-squares method. For each equation two functional forms are tried, linear and loglinear.

Model performance :

- B.04 The tests of goodness of fit together with error analysis reveal that the model, as a whole, performs very well if the forecasting period is 2 to 3 decades.
- B.05 The analysis is based on time series data. Since the presence of a time trend is not uncommon in economic time series, the method of trend analysis was used to study the presence of 'trend'. This revealed a systematic time trend in each individual time series. Whether the time trend itself contributes significantly in explaining a relationship was studied by making time an independent variable in equations 2 to 12 (excluding the immigration equation (3) above. The analysis, however, revealed that 'time' did not contribute anything significantly as an explanatory variable in any of the equations. Equations 2 to 11 (again excluding equation 3) were also tried using first differences of the variables concerned. This analysis also supported the hypotheses already tested and accepted as significant.

Main findings :

B.06 The main findings emerging from the model are :-

- (a) The manufacturing activity is a self generating activity,
- (b) The manufacturing activity attracts other economic activities in the region, which ultimately results in substantial immigration to the region.

The parameters of the various equations in the model are set out in tables B.01 and B.02.

Table B.01 : Results - UGM-I

Relationships assumed : Linear

Sr. No.	Dependent Variable	Constant of the Equation	Co-efficient attached with independent variable					R ²	F
			P _t	TOT _t	MFG _t	MFG _{t-1}	t		
1	2	3	4	5	6	7	8	9	10
1.	MFG _t	- 27.21 (84.38)				1.41* (.19)		.93	54.78**
2.	TOT _t	-304.47** (48.92)			2.04** (.07)			.99	396.00**
3.	COM _t	- 54.94 (25.15)	0.07** (.01)					.97	129.30**
4.	TRAN _t	- 22.17 (20.02)	0.04** (.004)					.94	63.66**
5.	GAS _t	- 2.80 (0.83)	0.003** (.002)					.98	196.00**
6.	SAN _t	- 1.10 (1.65)	0.004** (.006)					.94	51.01**
7.	HEL _t	- 4.38* (1.08)	0.006** (.002)					.99	396.00**
8.	EDU _t	- 10.29* (2.35)	0.01 ** (.005)					.99	396.00**
9.	CON _t	- 13.77 (0.579)		0.03** (.004)				.95	70.31**
10.	MIG _t	-239.92* (59.27)		1.19** (.11)\$.97	129.80**
11.	PUB	- 3.56 (4.91)					12.73** (.93)	.98	192.00**

Notes :- (1) Number of observations in 6 in all the cases (1941 observation are not considered, as the economic classification is not available).

(2) The figures in brackets are the standard errors of the coefficients.

(3) * indicates significance at 5 per cent level and
** at 1 per cent level.

(4) \$ (TOT_t - TOT_{t-1})

Table B.02 : Results - UGM-I

Relationships assumed : Log-linear

Sr. No.	Dependent Variable.	Constant of the Equation	Co-efficient attached with independent Variable					R ²	F
			P _t	TOT _t	MFG _t	MFG _{t-1}	t		
1	2	3	4	5	6	7	8	9	10
1.	MFG _t	- 0.40 (.29)				1.11*(.25)		0.83	19.22*
2.	TOT _t	2.64**(.05)			0.74**(.03)			0.99	396.00**
3.	COM _t	- 0.40* (.09)	0.75**(.06)					0.97	129.30**
4.	TRAN _t	- 1.57**(.27)	0.80* (.18)					0.84	20.79*
5.	GAS _t	-11.92**(.10)	1.68**(.07)					0.99	396.00**
6.	SAN _t	- 3.97**(.18)	0.33* (.16)					0.99	396.00**
7.	HEL _t	- 8.83**(.19)	1.44**(.12)					0.99	396.00**
8.	EDU _t	-11.22**(.08)	1.75**(.05)					0.99	396.00**
9.	CON _t	- 7.39**(.24)		1.50**(.21)				0.92	48.71**
10.	PUB	2.80**(.18)					0.87**(.11)	0.94	62.66**

Notes : (1) to (3) as for Table B.01

APPENDIX - C

EMPLOYMENT PROJECTION MODEL

Objective

- C.01 The main objective of this model is to project the size and character of sectoral employment growth in Greater Bombay.

The Model

- C.02 The model is a predictive type of model. It is a set of inter-relationships among the different sectors of the economy. Each of the relationships is expressed as a mathematical equation and tested for its significance. The economy is divided into the following 27 sectors for the purpose of this model :

<u>No.</u>	<u>Sector</u>
1.	Food, Beverages and Tobacco
2.	Textiles
3.	Rubber and chemicals
4.	Basic Metal and Engineering
5.	Printing and Publishing
6.	Misc. Manufacturing Industries
7.	Non-Metallic Mineral Products
8.	Repair Services
9.	Construction
10.	Communications
11.	Power, Gas etc.
12.	Wholesale Trade
13.	Retail Trade
14.	Hotels and Restaurants
15.	Railway Transport
16.	Road Transport
17.	All other Transport
18.	Banking and Allied Services
19.	Business services
20.	Insurance and Providents
21.	Miscellaneous Commerce
22.	Public Services
23.	Professional Services
24.	Educational and Scientific Services
25.	Medical and Health Services
26.	Recreational and Cultural Services
27.	Personal Services.

Data and analysis :

- C.03 The sectoral activities are expressed in terms of establishment employment and the model equations are calibrated on year to year information on employment in these sectors from 1961 to 1971. The method of calibration is single equation least squares and the functional form tried is linear. An important feature of the model is that though population enters the model as an exogenous variable its consistency is ensured with the population figure generated within the model. This is achieved by using the method of iteration.

Main findings :

- C.04 (i) The economy of Greater Bombay is very sensitive to changes in the capacity of Bombay port in terms of tonnage of traffic handled.
- (ii) The public services and employment in chemical and engineering industries (registered) are leading activities which generate the maximum further employment in the economy.

The accompanying table sets out the relationship established as significant :

TABLE C.01
EQUATIONS ACCEPTED FOR EMPLOYMENT PROJECTION MODEL

Dependent Variable	Independent Variables									Constant term	R ²
	Exogenous Variables					1st Stage Dependent Variables					
	Public Service Employment	Chemical & Engineering Industry Employment	Population ('000s)	Import/Export ('000 tonnes)	Textile employment	Wholesale Trade	Banking	Professional Service	Retail Trade		
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. Insurance			(1) 0.17 (2) 5.82							5510.15	0.809
2. Banking			(1) 0.95 (2) 17.13							-20917.31	0.976
3. Retail Trade			(1) 1.07 (2) 50.78							58090.96	0.997
4. Wholesale Trade		(1) 0.24 (2) 4.97								- 7373.33	0.755
5. Road Transport				(1) 0.78 (2) 3.78						12288.62	0.635
6. Utilities			(1) 0.43 (2) 7.88							- 2446.76	0.886
7. Communication			(1) 0.54 (2) 17.38							- 8204.95	0.974
8. Professional Services	(1) 0.09 (2) 9.84									6098.64	0.983
9. Educational Services	(1) 0.61 (2) 15.28									3576.87	0.956
10. Medical & Health			(1) 0.92 (2) 4.97							-22656.99	0.755
11. Personal Services	(1) 0.09 (2) 4.00		(1) 0.10 (2) 1.98							16939.44	0.990
12. Construction				(1) 2.61 (2) 4.01						- 8760.43	0.667
13. Food and Beverages			(1) 0.39 (2) 5.02							9107.34	0.759
14. Misc. Manufacturing		(1) 0.53 (2) 7.32								- 6476.98	0.870
15. Non-Metallic Minerals		(1) 0.07 (2) 4.15			(1) 0.21 (2) 4.97					-15812.18	0.805
16. Printing and Publishing			(1) 0.46 (2) 18.71							4625.45	0.944
17. Unregistered Textile			(1) 0.52 (2) 41.10							-16791.04	0.995
18. Unregistered Chemical and Rubber			(1) 0.35 (2) 16.31							- 6578.92	0.971
19. Unregistered Engineering			(1) 1.21 (2) 19.58							-26478.97	0.979
20. Repairing			(1) 0.51 (2) 30.18							- 2860.54	0.955

Contd./-->

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
21. Business Services							(1) 0.51				4128.11	0.900
22. Hotel and Restaurants							(8) 0.51				3886.31	0.977
23. Miscellaneous Commerce							(1) 0.49				12469.99	0.943
24. Recreation and Cultural Services							(8) 1.50				8451.73	0.720
25. All other Transport Services							(2) 11.48				-90470.46	0.977
							(1) 0.47					
							(2) 4.94					
							(1) 0.77					
							(2) 9.33					

Population = 1721.59 * 4.74 (Total Employment in brackets)

$$R^2 = 0.977$$

Note: Number of observations in all cases is 10

1. Regression Coefficient

2. t Statistics for coefficients

APPENDIX D

LAND USE PLANNING MODEL

(as developed by LUBFS, Cambridge U.K.)

- D.01 The Land Use Planning Model is a spatial allocation model at an aggregate level. The model formulation rests on three important tenets:
- (a) The gravity principle - that the interaction between two activities is directly proportional to some function of the product of these two activities and inversely proportional to some function of the distance between these activities.
 - (b) The economic base principle - that the city forming process is brought about by basic employment. Basic employment generates population which in turn needs a service employment to cater to it. The service employment generates more population which in turn needs more service employment. This process feeds on itself as the city grows to some point of equilibrium.
 - (c) That statistical distributions can be used to quantify behavioural characteristics of people and also land use trends. The behavioural characteristics are their travel to work and service patterns. The land use can be statistically quantified in terms of the intensity and distribution of existing land development.
- D.02 The model consists of three sub-models:
- (a) Stock Model
 - (b) Basic Activity Model
 - (c) Service Activity Model
- D.03 The Stock sub-model quantifies the demand for land and floor space generated by "employees" or jobs in the city. The total floor space required for all jobs and population is generated by basic employment and is distributed over different areas of the city in relation to the specified location of basic jobs, the relative accessibility of each zone, and the amount of land each contains.
- D.04 The Basic Activity sub-model quantifies the travel from work to residence and correspondingly distributes residences between zones in direct relation to their relative accessibility and the relative availability of floor space as indicated by the Stock sub-model.
- D.05 The Service Activity sub-model quantifies the number of trips made in connection with population supporting services, and distributes service employment between zones depending upon their relative accessibility and relative attractiveness for services.
- D.06 The three sub-models are singly constrained and involve calibration of one parameter each in the case of the stock and

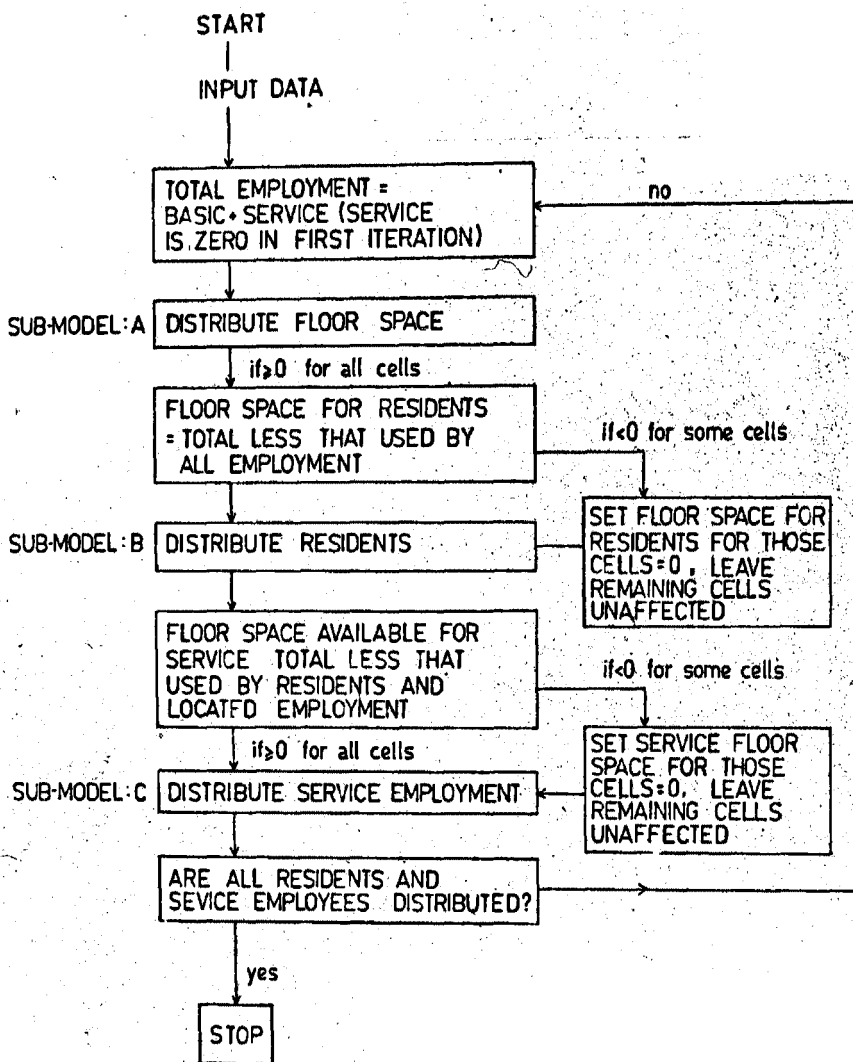
basic activity sub-models, and two parameters in the case of the service activity sub-model. Calibration is by suitable algorithms, and the criterion for calibration is the optimal 'fit' between the model's distribution and that occurring in reality. The procedure involves selection of a range of possible values for each of the four parameters and systematic testing of different combinations to achieve the best fit.

D.07 The calibrated model is then used to allocate floor space, population and service employment over different zones given the following as inputs:

- basic employment locations,
- the inter-zonal travel time (or cost) matrix,
- the ratio of basic activity to population
- the ratio of service activity to population:
- floor space ratios for different land uses in different zones.

D.08 The iterative procedure followed in the model is given in Diagram D.01.

DIAGRAM D.01
 LAND USE PLANNING MODEL
 (LUBFS CAMBRIDGE UK)



APPENDIX E

OFFICE GROWTH

E.01 It is unlikely that the office function can be shifted away from Metropolitan Bombay somewhere into the interior of Maharashtra. The experience of big cities all over the world has been that they continued to grow, despite restrictions on increases in industrial employment, and this growth has been caused largely by increases in office employment which require a metropolitan location. The following tables taken from the Greater London Development Plan will illustrate that the office activity in Greater London continues to increase, although manufacturing employment is declining.

Table E.01

<u>Employment Trends in Greater London</u>					
					(in 000s')
<u>Year</u>	<u>Population</u>	<u>Primary</u>	<u>Manu- facturing</u>	<u>Const- ruction</u>	<u>Services</u>
1951	4,228	NA	NA	NA	NA
1961	4,383 (100)	11 (0.3)	1,451 (33.1)	274 (6.2)	2,647 (60.4)
1966	4,430 (100)	11 (0.2)	1,326 (29.9)	304 (6.9)	2,789 (63.0)

E.02 As the table above indicates between 1961 and 1966 the proportion of service jobs in total employment increased from 60.4% to 63.0%, whereas in the same period manufacturing jobs declined from 33.1% to 29.9% of total employment. This indicates an increasing bias away from manufacturing and towards service jobs. The total number of manufacturing jobs declined in Greater London between 1961 and 1966 but the total number of jobs in the area continued to grow.

Table E.02

Occupational structure of Greater London's
Labour supply (1961-66)

<u>Occupation Group.</u>	<u>Residents</u>	<u>Residents</u>	<u>1966 Commuters</u>	
	<u>'61</u>	<u>'66</u>	<u>Out</u>	<u>In</u>
1. Operatives	35.8	34.0	41.8	19.4
2. Office(admin. and professional)	8.4	9.4	17.0	31.0
3. Office (Clerical)	21.4	22.4	13.9	27.5
4. Transport	6.0	5.8	4.7	3.8
5. Sales	11.8	12.4	7.9	8.3
6. Others	16.6	16.1	14.7	10.0

E.03 This table also show a bias away from manufacturing and towards office jobs in the changing occupations structure of Greater London's residents between 1961 and 1966. It also show that for manufacturing jobs, more operatives were commuting out of Greater London that commuting in, whereas for office jobs there were more commuting into the city than commuting out of it.

E.04 The following table shows the population growth of a few major cities in the world in recent years. It must be remembered that this growth has taken place despite planners' attempts to contain it. The major force propelling the growth is the increasing concentration of office jobs within the metropolitan area.

Table E.03
Growth of selected cities.

Area	Population			Population as % of national total		
	1800	1950	1960	1800	1950	1960
London	8,50,000	1,09,56,000	1,15,47,000	8.1	22.4	22.5
Paris	5,47,000	67,37,000	78,10,000	2.0	15.7	16.8
Randstad	4,00,000	32,97,000	39,37,000	21.3	32.9	33.1
Rhine-Ruhr	2,80,000	81,39,000	1,04,19,000	2.2	17.1	19.3
Moscow	3,60,000	56,00,000	78,84,000	0.5	3.3	3.8
New York	60,000	1,29,12,000	1,47,59,000	1.1	8.5	8.2
Tokyo-Yokahama	14,00,000	90,49,000	1,36,28,000	4.7	10.9	14.6

Source : World cities - Peter Hall

E.05 The case of Moscow is particularly revealing. In 1935, limitation of the city's growth was made into a central planning objective. The future population target was to be five million, which the city would reach eventually by natural increase alone; net immigration was to be cut to zero. Despite intense efforts to control growth, by 1963 the population of the extended city region was already 6.4 million, with a rate of increase averaging 90,000 a year. Most of this growth resulted from pressure to permit in Moscow more and more offices whose functioning required that they be in that city.

E.06 Innumerable examples can be found in the literature to suggest that office type activities will continue to concentrate in metropolitan areas, and this trend will be difficult to alter. The following quotations are typical :

"High educational attainments and highly specialised occupations mark the new cosmopolities. As frequent patrons of the airlines and the long-distance telephone lines, they are intimately involved in the communications networks that tie them to their spatially dispersed associates. They contribute to and consume the specialised journals of science, government, and industry, thus maintaining contact with information resources of relevance to their activities, whatever the geographic sources or their own locations. Even though some may be employed by

corporations primarily engaged in manufacturing physical products, these men trade in information and ideas. They are the producers of the information and ideas that fuel the engines of societal development. For those who are tuned into the international communications circuits, cities have utility precisely because they are rich in information. The way such men use the city reveals its essential character most clearly, for to them the city is essentially a massive communications switchboard through which human interaction takes place.

Indeed, cities exist only because spatial agglomeration permits reduced costs of interaction. Men originally elected to locate in high-density settlements precisely because space was so costly to overcome. It is still cheaper to interact with persons who are nearby, and so men continue to locate in such settlements. Because there are concentrations of associates in city places, the new cosmopolities establish their offices there and then move about from city to city conducting their affairs. The biggest settlements attract the most long-distance telephone and airline traffic and have undergone the most dramatic growth during this era of city-building." - From Melvin M. Webber "The Post-City Age", Daedalus, Fall 1968.

"In the United States, total white-collar employment rose from 5.1 million in 1900 to 21.6 million in 1950, or from 17 to 37 per cent of the total United States labour force, and women white-collar workers also increased from less than one million to 8.6 million.

These changes had a critical effect on urban development. For while neotechnic industry might be decentralised, the neotechnic office was not. Under finance capitalism, the new types of office - the headquarters of railways; of public utilities, of industries, of foreign investment trusts - developed next to the financial institutions in the traditional banking centres. Soon, ancillary offices sprang up to provide specialised services for the new head-quarters offices: accounting, law, advertising, management consultancy. Around the turn of the century, the increasing role of government in economic and social life manifested itself in a big increase in office employment in the political capital of each country - which, in many cases was the commercial metropolis also. Increasingly, formal organisations grew up to represent economic or professional interest: trade unions, employers' federations, professional institutes. These needed to have the ear of government and of government officials, and so they naturally gravitated to the administrative capital or the administrative quarter of the metropolitan city. (A little later, in communist countries, head-quarters offices of productive and transport organisation were grouped near the government offices, from which overall economic plans came). The new communications industries, which combined factory and office functions - newspapers, magazines, radio, television - naturally located in the centres of affairs. For all these activities, the transmission of news was all-important; and it could most readily and economically be obtained in the metropolitan centre.

The growth of white-collar occupations of all kinds, then, is without doubt the most important single explanation for the

growth of the world cities in the period since 1850". Peter Hall "The World Cities".

E.07 Thus it will be seen that while we may succeed in re-locating industrial jobs outside Metropolitan Bombay - such a limitation of industrial growth has effectively been established in several cities all over the world - there seems little possibility of containing the growth in office jobs that an improving economic situation and continued population growth will inevitably bring to the metropolitan area.

CHAPTER - 3DEVELOPMENT PLAN : CIDCO'S PROGRAMMES AND POLICIES

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Land Use

3.01 The total area designed for the New Bombay project is 343.7 sq.kms. However, much of this area is not available for urban development:

- (a) An area of 34.2 sq.kms. is low lying and unsuitable for development on account of very poor foundation conditions and prohibitive costs of reclamation.
- (b) The Maharashtra Industrial Development Corporation, in its trans-Thana and Taloja estates, has an area of 28.10 sq. kms. which falls within the New Bombay area. If the Industrial Location study discussed elsewhere in this document is accepted, much of this area which is at present vacant would become available not for establishing basic industries, but for accommodating industries shifting out of Greater Bombay.
- (c) An area of 4.56 sq.kms. has been reserved for Defence use.
- (d) The Bombay Port Trust requires a reservation of 12 sq.kms. for the proposed Nhava Sheva port, and it would be wise to keep this area free of all encumbrances and other development, regardless of whether the Nhava Sheva port development is to be taken up immediately or at some later point in time.

3.02 Excluding these areas which are not available for development, the net area remaining is 264.84 sq.kms. Within this area, the following special uses peculiar to this project have been provided:

- (e) Regional parks account for 72.25 sq.kms. These are areas which are already under forest and hills, which are not suitable for any kind of major urban development. These regional parks happen to be well distributed and will provide major recreational facilities for the citizens of New Bombay.
- (f) An area of 9 sq.kms. has been set aside for sewage farming. At present, in India, there is a total of approximately 121.5 sq.kms. of land devoted to sewage farming. These sewage farms consume 223 million gallons of sewage per day, which indicates an average area of 54 hectares per mgd of sewage. Our own estimates are that approximately 40 hectares of farm could be served by 1 million gallons per day of sewage. On this basis, the 9 sq.kms. of sewage farm provided will require 22.5 mgd, which is approximately the quantum of sewage that can be expected from a 500,000 resident population. The production on the sewage farms will be mainly vegetables and flowers,

which will find a ready market within the urban area. The area provided for sewage farming in the current plan thus caters to only one-fourth the ultimately expected population. However, if the sewage farms are successful and additional areas for this purpose are needed, it is expected that they can be found beyond the perimeter of the project area.

- (g) For fisheries, an additional 9 sq.kms has been provided near the Karanja Creek. This area will also accommodate boat repairing and boat construction yards. The area may also accommodate cold storage facilities as well as processing units for canning marine products.

3.03 Excluding the areas indicated above, the area remaining for urban development is found to be 174.59 sq.kms. For this area, a nodal type of development, as discussed in succeeding sections, is proposed. The detailed land use within each zone will be determined as each node is taken up for development. However, it is expected that the overall distribution of land use between different uses will be as indicated in Table 3.01.

Table 3.01

Proposed Land use Pattern in New Bombay

1.	Total Project Area	343.70 sq.kms.
2.	a) Low lying area unsuitable for development	34.20 sq.kms.
	b) MIDC industrial areas in Trans-Thana and Taloja	28.10 "
	c) Defence Area at Uran	4.56 "
	d) Port at Nhava-Sheva	12.00 "
	Sub-total	<u>78.86</u> "
3.	Proposed special land uses	
	e) Regional Parks	72.25 sq. kms.
	f) Sewage farming	9.00 "
	g) Fisheries	9.00 "
	Sub-total A	<u>90.25</u> "
4.	Net area available for urban development (1-2-3)	174.59 sq. kms.

	<u>Area in sq.kms</u>	<u>% of sub-total</u>
5. Proposed land uses		
Residential	60.76	34.80
Commercial (including commercial within residential areas)	13.85	7.93
Service industries & warehousing	11.06	6.34
Public & Semi-Public Institutions	27.55	15.77
University	4.10	2.35
State Reserve Police & other Civil Defence Agencies	4.10	2.35
Intra-city transportation	11.10	6.36
Inter-city transportation	24.95	14.29
Parks and Playgrounds	17.12	9.81
Sub-total B	<u>174.59</u>	<u>100.00</u>

3.04 For comparison, Table 3.02 indicates land uses as existing in different cities in India.

Table 3.02

Land use Patterns in some Cities & Towns of India

Sr. No.	Name of Town/City	Residential	Commercial	Public & Semi-Public	Parks & play-grounds	Roads	Others	Industry as % of 3 to 8
1	2	3	4	5	6	7	8	9
1.	New Bombay	34.80	7.93*	15.77	9.81	20.65	11.04	16.09
2.	Greater Bombay	38.53	9.15*	18.40	8.92	12.20	12.80	14.29
3.	Delhi	45.46	2.46	18.75	25.10	8.21	NA	5.78
4.	Bangalore	56.30	3.20	12.00	12.30	NA	16.20	16.40
5.	Bhopal	68.00	2.74	10.10	5.15	NA	14.01	11.95
6.	Siliguri	58.00	6.16	3.90	3.14	21.40	7.40	13.08
7.	Kanpur	43.70	3.97	17.80	16.02	12.38	6.13	13.80
8.	Patna	78.55	2.16	9.26	4.45	NA	5.58	6.05
9.	Gauhati	70.81	5.54	10.80	12.85	NA	NA	8.90
10.	Mangalore	48.73	4.62	11.55	15.80	19.30	NA	5.35
11.	Lucknow	52.80	7.20	14.40	14.50	11.10	NA	12.50

1	2	3	4	5	6	7	8	9
12. Ranchi		53.65	3.60	19.20	23.18	0.37	NA	11.40
13. Aurangabad		35.29	2.36	37.10	13.80	13.45	NA	8.67

* including commercial within residential areas.

NA : Not Available.

Structure of the City

3.05 The structure of the city has been evolved in a manner which keeps options open. It can cater satisfactorily to a wide degree of variations in the type of development, whether primarily office-based or more strongly port and industry oriented, which is likely to emerge in New Bombay. The structure found most suitable is in the form of a circular ring of intense development around the Waghivali lake with four corridors emanating towards Thana, Nhava Sheva, Panvel and Taloja. The form chosen for the structure of the city was influenced by the following factors:

- (a) Inter-city transport links between Greater Bombay and New Bombay: The Sion-Panvel Expressway passes through the New Bombay area just north of Panvel Creek. A probable future transport connection would be the Sewree-Nhava Bridge which also passes close to and just south of Panvel Creek. The future link between these two inter-city roads that is now being constructed is the Panvel Creek Bridge. This network forms an important enclosure of inter-city transportation around the central part of the city, making it a logical location for the business area. The present inter-city railroad connection via Diva and Panvel and future links towards Poona and Konkan would also emanate from the fringe of this central area.
- (b) The major industrial employment locations as foreseen are the trans-Thana industrial area, the Taloja industrial area and Nhava Sheva port. To minimise the length of home-to-work journeys, the best location for residential concentrations would be central to these three areas, that is, around the Waghivali island. Since a substantial volume of service activities is population based, this central location would also be the best location for office based activities. From this central concentration of office activities and residential population, the Thana and Taloja corridors would lead to concentrations of industrial activity, the Nhava Sheva corridor to the new port and its associated industries and the Panvel corridor towards Panvel town which lies on the main

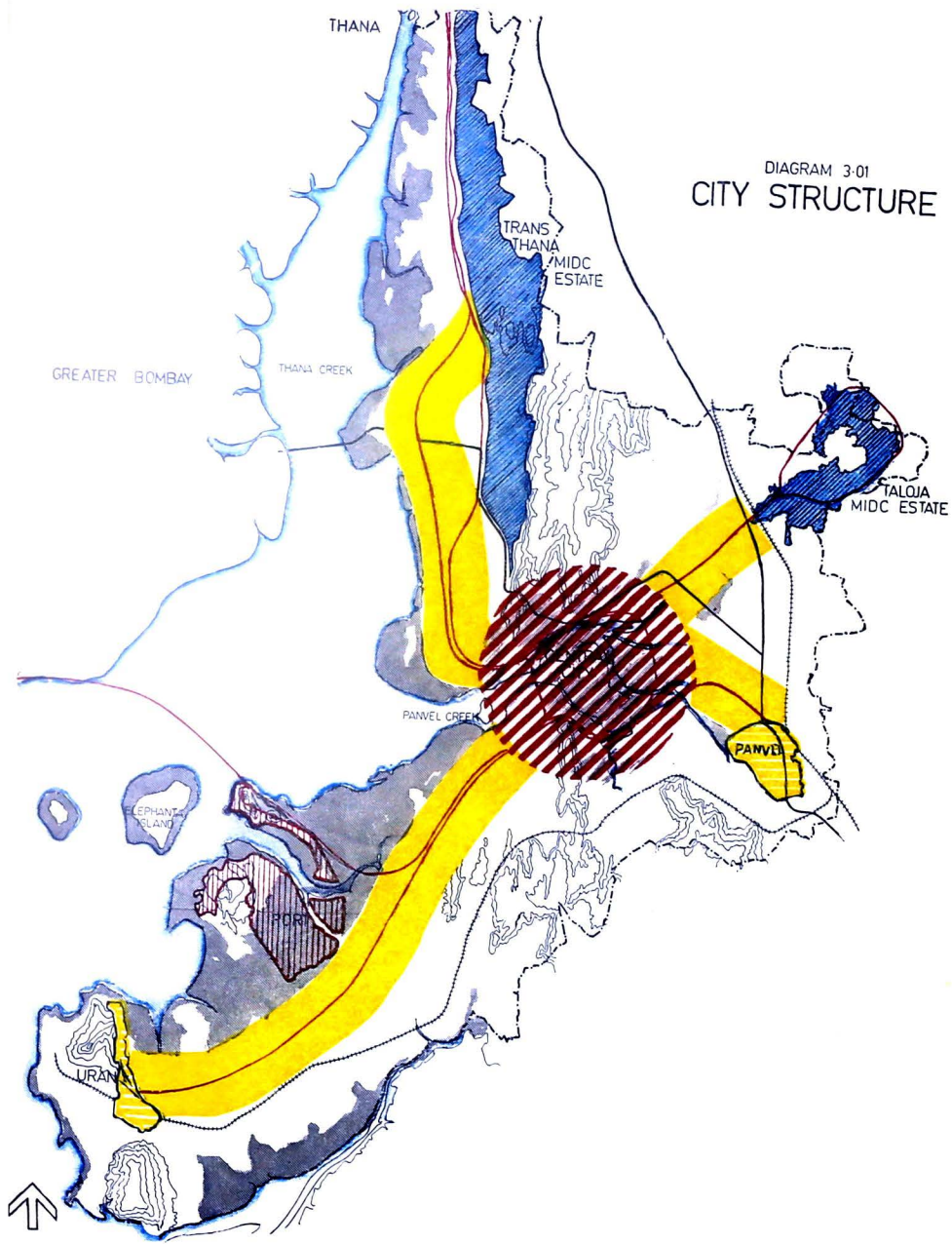


DIAGRAM 3-01
CITY STRUCTURE

road towards Poona. Further residential development would take place along these four mass transit corridors.

- (c) **Intra-city Transportation:** Our investigations have indicated that a closed circular loop, with an evenly loaded trip distribution, is the cheapest and most efficient way of serving transportation demand. In the central area, the form of the city which we have chosen allows such a closed loop of buses on reserved tracks which can provide efficient transportation in the Business area of the new city. This business district will be in the form of a series of developments distributed around the circle.
- (d) In addition to the above mentioned factors, an important advantage of locating the Business Area in the central part is because of environmental considerations. There is a possibility of damming the Panvel Creek eventually to create an inland lake over the Waghivali island. A high density commercial development around such a water front will be particularly attractive from the point of view of environment and landscape.

Nodal development along transit axes

3.06 Most people in the metropolitan area depend on public transport for daily movement. The following table highlights this fact:

Table 3.03

City	Year	Population (lakhs)	% of work trips made by mass transportation	% of total trips made by mass transportation
Greater Bombay	1968	53.8	89.3	78.0
Greater London	1966	78.6	89.0	NA
New York	1960	78.0	54.8	"

NA : Not available

Given the prevailing economic conditions, as well as what we can see of the fate of other cities that have catered excessively to the demands of private transport, it seems important for us to develop an urban form based on maximum convenience for the mass transit rider.

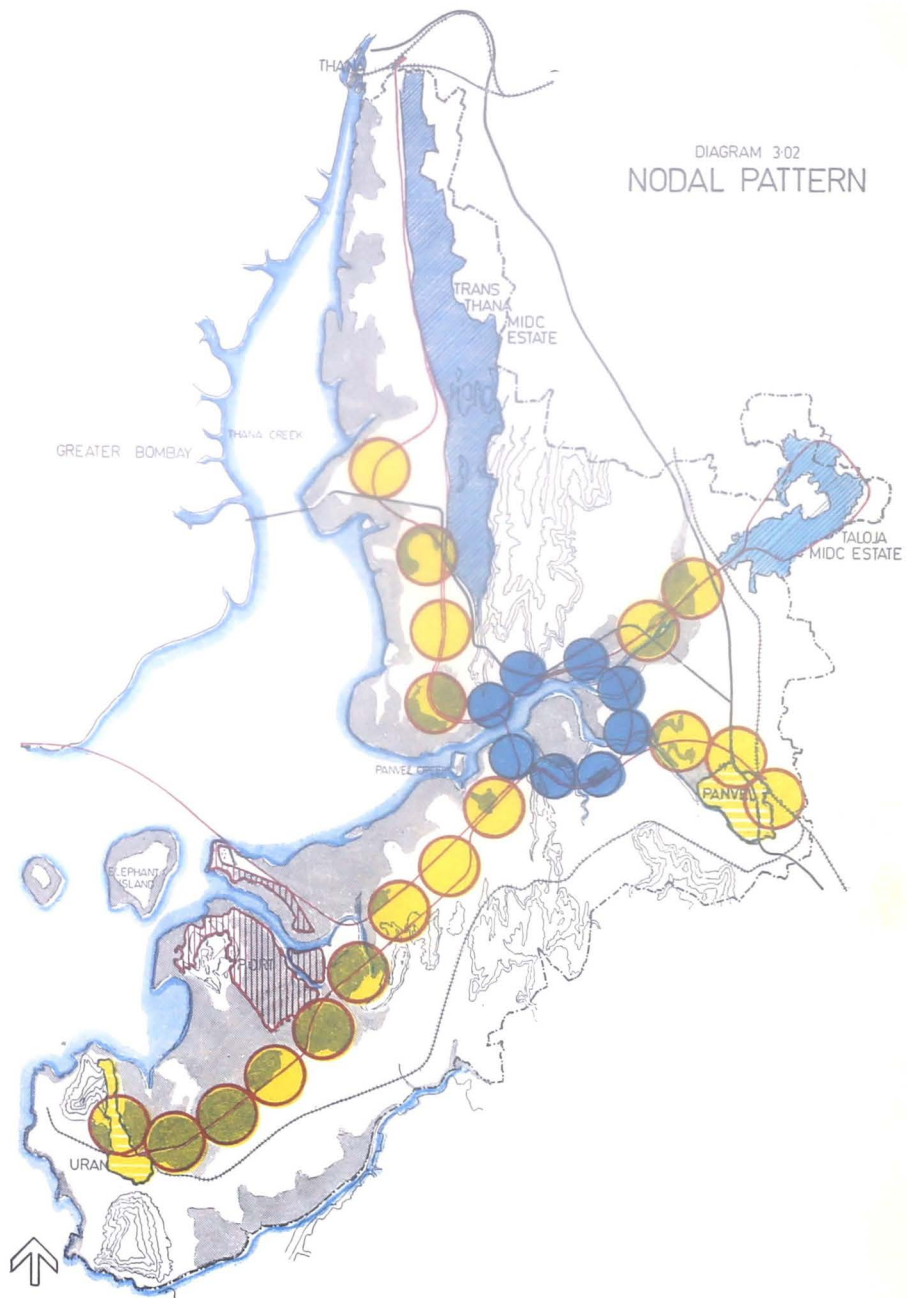


DIAGRAM 3-02
NODAL PATTERN

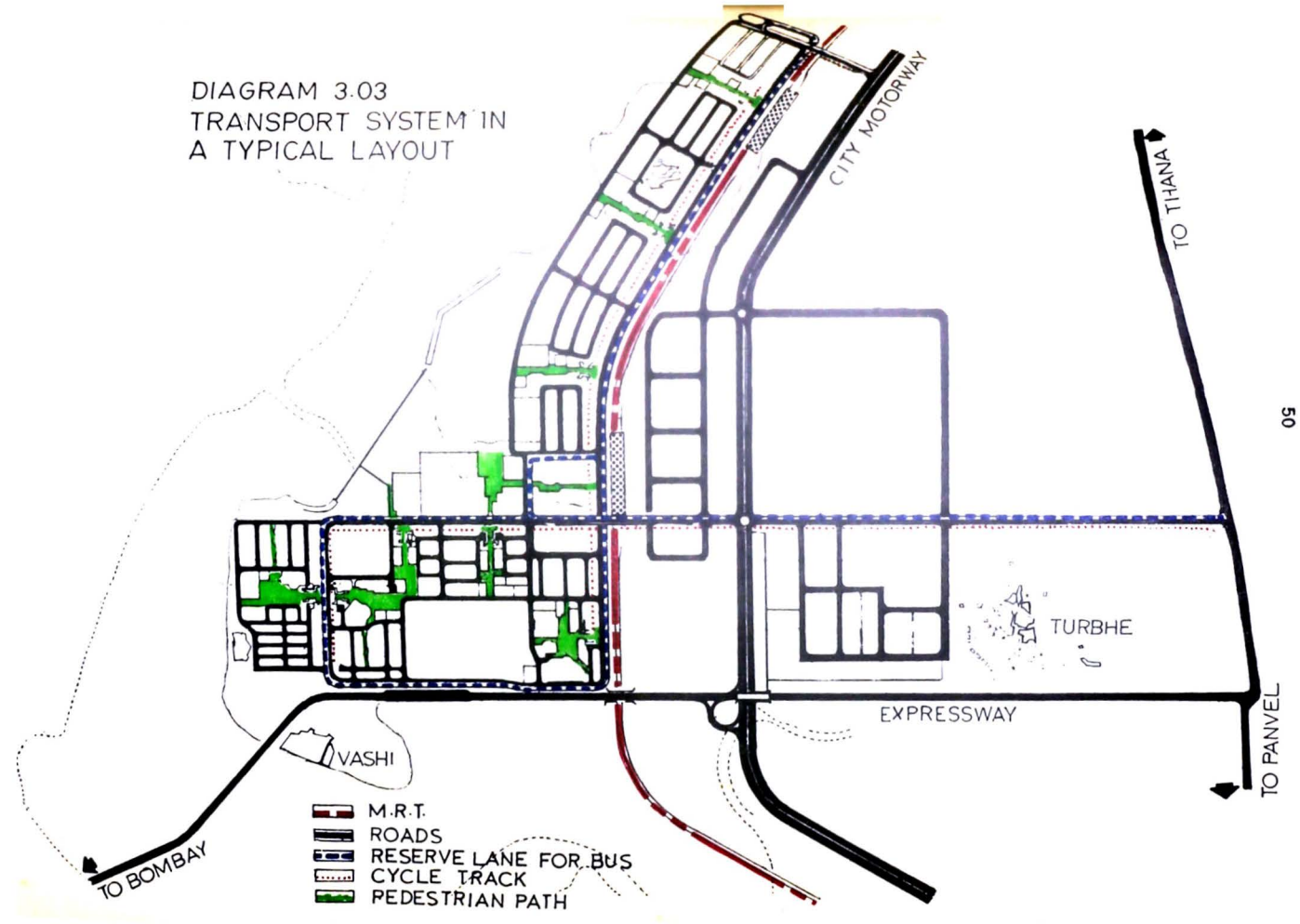
- 3.07 As will be seen from Appendix F, the stops on a mass transit system should not be located closer than say 1 km. At each stop there should be a sufficient concentration of population to make the transit system viable. The population should, as far as possible, be located within walking distance of the mass transit stop. This condition imposes a constraint on the upper limit of population size within a node. The figure is unlikely to exceed 200,000 without resulting in unacceptable densities.
- 3.08 Our analysis of costs of water distribution, sewage collection, roads and other infrastructure indicate that the higher the concentration of population within a given area, the lower are infrastructure costs per capita. This suggests that for any single concentration of development the land extensive uses, such as large recreation areas, playgrounds, etc., should be located on the perimeter of the concentration.
- 3.09 These considerations lead us to suggest a type of development consisting of nodes of population and job concentration strung out on mass transport axes. The size of each node is determined by several factors, among them the conditions that as far as possible the population in the node should be within walking distance of the mass transit stop, and that the complex should be sufficiently large to justify the provision of schools, shopping and other essential facilities so that these can be found within the node and do not require the population of one node to go to another for such services. In practice, topographical constraints also become material.
- 3.10 A decision that has been taken concerning the content of a node is that, within a node, housing is provided for all income groups, in proportion to the percentage of each income group expected in the composition of the city as a whole, the intention being that there should, as far as possible, be no "rich" nodes and no "poor" nodes. To accomplish this, CIDCO will construct housing for a wide range of income groups within a node. And for housing built by private developers, plots leased to them will carry a stipulation concerning the minimum and maximum sizes and numbers of apartments that may be built on the plot.
- 3.11 A further decision is that in each node there should be, as far as possible, a balance between the number of jobs and the proportionate numbers of population. In other words, if about one-third of the population is employed, within each node there should be about one-third the number of jobs that there are numbers of population. The intention is that it should be made possible for someone wishing to reside within walking distance of his job to find residential accommodation within the same node. There is, of course, no certainty that those who work in one node will also reside in that node, but to the extent that this balance between jobs and population within a node is maintained it will imply that as many commuter will travel out of that node as will travel into it for work. This will clearly result in a more evenly loaded transport system.

- 3.12 In addition there is a stipulation that each node shall contain the schools, shops, recreation and medical facilities needed to service the population of that node and one of the important factors in determining nodal size is that it is sufficient to ensure a reasonably high quality of these services. Our calculations indicate that this implies a nodal size of 50,000 population or more.
- 3.13 The sequence in which nodes will be taken up for development will depend on the opening up of various transport arteries. As a transit system is offered to the public, it will naturally be most economical to develop nodes along that transit system and build up traffic on that axis to as high a level as possible, since transport economy is directly related to the level of demand. The opening up of one transit axis or another will depend on certain external factors. For instance, if the Nhava Sheva port development starts, we will clearly need to establish a transport link between Dadar and Nhava Sheva via Vashi and Shahabaj. Once this transit axis is established, nodal development along that axis can begin.

Transport

- 3.14 For the foreseeable future at least, transport systems operating on the ground surface are the most economical. Cycling is by far the cheapest form of transport, and we will construct an experimental cycle track (for design details see Appendix 'G') between Vashi through the Agricultural Produce Market of MAFCO to the Thana-Belapur area, to judge its popularity. We believe the reason bicycles are not used more in Greater Bombay is quite simply the hazard of cycling in heavy traffic. In public transport, for low levels of demand buses are the cheapest system, buses on reserved tracks (busways) being cheaper than buses in mixed traffic as soon as a certain level of demand has been exceeded. When demand has built up to a sufficiently high level along any transport corridor, the train system becomes cheaper than buses on busways and along such a corridor one would then switch over from buses to trains. The economies of a bus system, a system of buses on busways and a train system is given in Appendix 'H'. Our current planning is to make reservations for an eventual train system on the transit axis serving a node and to operate, for the present, busways on the same reservation. Diagram 3.03 shows a typical layout, this being an example from our Vashi development, of the pattern of pedestrian paths, roads, cycle tracks, busways and MRT.
- 3.15 In addition to busways, we will have a normal road system inter-connecting nodes and penetrating such nodes, care being taken, however, to segregate pedestrians in a way which introduces certain car free areas and minimises pedestrian - motor vehicular conflict.

DIAGRAM 3.03
TRANSPORT SYSTEM IN
A TYPICAL LAYOUT



- 3.16 For pedestrian movements, we are proposing that, as a general rule, until more detailed studies can provide a different indication, the span of footpath widths on any street be at least as much as the carriageway width on that street. This is based on observation in Greater Bombay, where footpaths are generally found to be inadequate unless provided in the manner suggested above. However, in quieter residential areas where there may be very little car penetration, this condition may be relaxed.
- 3.17 The analysis of our parking policy is described in Appendix 'I' and deals with the fixing of standards of parking and organisation of parking areas.
- 3.18 To persuade offices to move to the new city, we believe that an essential pre-requisite will be the provision of a fast transport service between the two areas. The road journey between the old and the new business districts is expected to take about an hour and this may increase if traffic conditions in Greater Bombay deteriorate further. The alternative is a fast water ferry service, which would need to be by hovercraft or hydrofoil, if the journey time is to be at all reasonable. Conventional craft would operate at about one-third of the hovercraft or hydrofoil's speeds. The hovercraft service is essentially a means of providing rapid communication between the two business centres for business purposes and, as such, is expected to be patronised largely by executives or office workers whose travelling cost is paid by their company. It is seen essentially, at this stage, as a promotional measure to persuade offices that, in shifting to the new city, they will not lose the possibility of quick contact with the existing business district. As the traffic demand builds, slower, more conventional and cheaper craft can be added to cater to demand for such a service.
- 3.19 The land use plan arrived at for New Bombay consists of a circular form of the main city development around the Waghi-vali island in Panvel Creek, with two long arms towards Thana and Uran and two short arms towards Taloja and Panvel. Our findings are that, for mass transport, a system which forms a closed loop has a more evenly balanced demand and is cheaper to operate than a system which runs along a straight line. (See Appendix 'J').
- 3.20 The flow diagram of the transportation planning process for New Bombay is shown in Appendix 'K'. Intra-city traffic has been predicted with the help of the Gravity Model with friction factor and this has been described in Appendix 'L'. The mass transportation system will eventually have a suburban train system in addition to buses on reserved tracks. The criteria for determining the mass rapid transit (MRT) or suburban train layout is described in Appendix 'M'. The primary transportation network for New Bombay consisting of railways and roads is described and shown in Appendix 'N'.

Densities

- 3.21 We believe that densities, by themselves, are not a particularly meaningful criterion since at equivalent densities one can have very different environmental conditions. Instead, we should consider, among other factors, the proportion of land area within any development which is given over to vehicular circulation, what is available for pedestrian movement, as private open space and what is built upon. In addition, we should examine for each point what is the distance to a mass transit stop, the distance to various essential facilities, especially schooling and shopping and the distance to public recreation areas of various sizes. The concept of "distance" should include not just the measured distance but such factors as travel time, mode of travel and a measure of the quality of journey as well. Some studies on this extremely complex subject are currently in hand.
- 3.22 An important though easily ignored factor in determining densities is the type of house which each family can afford and the type of house that it ideally desires. More than one-third of the Greater Bombay population at present is not able to afford pucca construction. New Bombay will have its share of residents belonging to this income group and our development therefore, should be such as this group could afford today and improve upon later. Incremental housing may provide the answer. Only ground floor construction may be possible initially, some with the cheapest possible materials and the rest with more durable materials. Thus, a family would be provided a plot of land with reasonable security of tenure and encouraged to put up its own dwelling and subsequently improve it. The types of construction that may eventually emerge may not be higher than ground plus one storey. This means that at least one-third of the city's population must necessarily be accommodated in ground level construction. For the remaining two-thirds, which include the families that are relatively better off and can afford pucca construction, a choice has to be made as to whether accommodation should be mainly in low buildings (ground or ground + 1) or walk-up types of apartments (upto ground + 4 or ground + 5 if ceiling heights are lowered), or highrise apartments (where lifts are required).
- 3.23 Compact development permits a larger concentration of people within walking distance of a mass transit stop and shortens their access time to other facilities. It also lowers the cost of infrastructure development. If the total size of a node is kept within limits and access to the periphery of the node and the open spaces is easy, local densities within the compact development could be quite high. Overall densities will, of course, be much less, after taking into account the open spaces and the space extensive uses at the periphery of each development.

Housing

- 3.24 Assuming an average of five members per household, which is approximately correct for the metropolitan area, the number of dwelling units required to house a population of 2 million would be 4,00,000. But the problem is not so much in the numbers of houses required, as in the funds available with residents for spending on housing. This will become apparent on a reading of the following table.

Table 3.04

Income distribution & Capacity to pay for Housing

Income Group No.	Household income Rs per month	% of Total population	Assumed monthly capacity to pay for dwelling unit in New Bombay		Assumed monthly Municipal charge Rs	Capital cost of unit, if rental covers outgoings only (no profit)
			% of income	Rs (on median income)		
	Less than					
1.	200	20	10	15	5	1200
2.	201-300	16	11	27.5	6	2580
3.	301-400	15	12	42	7.5	4140
4.	401-500	14	13	58.5	9	5940
5.	501-600	12	14	77	12	7800
6.	601-800	9	15	105	15	10800
7.	801-1000	7	17	153	23	15600
8.	1001-1200	3	19	209	34	21000
9.	1201-1500	2	22	300	50	30000
10.	1501 & above	2	25	375	60	37800

Notes: 1. For the purpose of deriving capital cost in col. 7, rent is computed as follows:

- interest on capital at 8% p.a.
- sinking fund with 8% rate of return and 60 years life of asset
- maintenance at 2% p.a.

2. The table is based on information available for Greater Bombay.

- 3.25 This table shows the expected distribution of households by income levels, based on observations for Greater Bombay, and the ability of each income group to spend on accommodation. The assumptions regarding capacity to pay are tentative and based on information concerning existing rentals in Greater Bombay, as well as on responses obtained in various surveys of households in the city. The capacity to pay towards accommodation which is not rented but is to be eventually owned by the occupant may be substantially greater than the figures indicated in the table, common experience being that families are prepared to raise loans from relatives or other sources, or dip into other savings in order to pay for ownership accommodation.

- 3.26 Here we may assume, for simplicity's sake and since precise data are unavailable, that the additional capacity to pay in the case of ownership rather than rented accommodation will just cover instalments for the repayment of capital over the 15 or 20 year period for which a loan may be available. The figures in column 7 of table 3.04 are for rented accommodation and cover interest charges on capital as well as maintenance costs and a sinking fund over a 60 year period, but provide for no profit and no repayment of a housing loan. If loan repayment is required, the monthly instalments needed will be higher than those indicated in Column 4 and we assume each family will be able to afford this as it is purchasing ownership accommodation. Consequently, the capital cost of the unit each family can afford is taken as that given in column 7, regardless of whether housing is rented or owned.
- 3.27 Table 3.04 reveals how small is the capital amount that each family can afford towards housing. Our own experience so far, in the Vashi development, has been that developed land costs approximately Rs. 40 per sq. meter, the recurring monthly charge for various services is Rs. 0.60 per sq. meter of land and building construction costs vary from Rs. 450 to Rs. 550 per sq. meter of carpet area, depending on the quality of finishes desired. For our present approximate calculations, we have assumed an average construction cost of pucca building of Rs. 500 per sq. meter of carpet area.
- 3.28 Assuming each household's capacity to pay towards housing is as indicated in Table 3.04, Diagram 3.04 reveals the range of choice for each household between area of land and area of pucca built up construction on that land. It will be seen that for the lowest but one income group, constituting approximately 16% of the total population, it is not possible, within their means, to provide them with anything other than a plot of land of about 30 sq. meters per family. For the lowest income group, a further 20% of the population, it is not possible to provide even this.
- 3.29 Until now, the Government's policy in publicly financed housing has been to construct nothing smaller than a minimum sized tenement of approximately 21 sq. meters per family. Since a large proportion of the families are not able to afford this, it has meant that these houses need to be heavily subsidised in order to place them within the economic reach of the poorest classes. Since resources are not adequate to sustain a massive construction programme involving heavy subsidies, the result has been that the actual volume of construction of minimal tenements has been far short of the demand. As a result, the gap between the housing need and the housing supply has steadily increased and an increasing number of the population find themselves forced to live in unauthorised hutments. To make matters worse, the hutments are considered illegal and are demolished by police action from time to time. Since they are illegal, no sanitary or other facilities are provided to these tenements and, as a consequence, a large segment of the population lives in conditions of extreme degradation.

DIAGRAM 3.04

INDIFFERENCE CURVES OF HOUSEHOLDS' PREFERENCES BETWEEN PLOT AREA AND BUILT-UP CONSTRUCTION AREA, FOR PAYING CAPACITIES AS IN TABLE 3-04

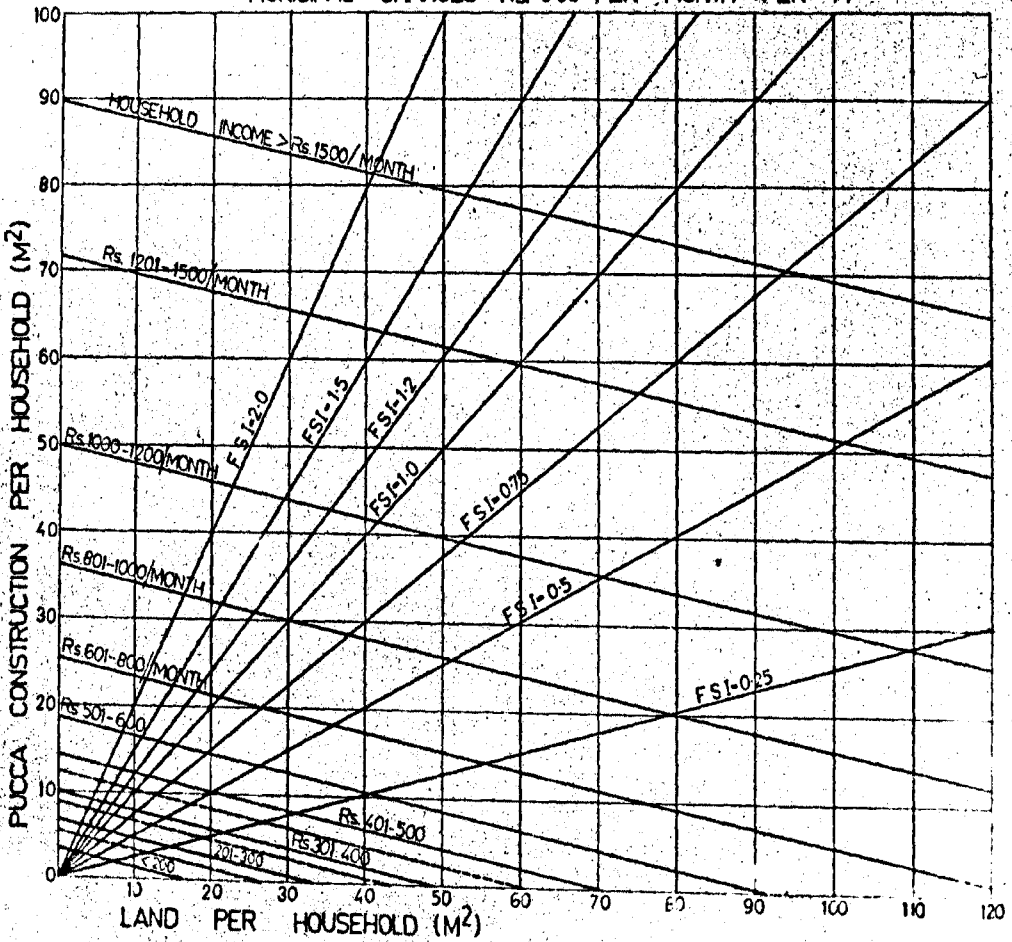
ASSUMPTIONS: * LAND COST Rs. 40 PER M²

* CONSTRUCTION Rs. 500 PER M²

— WITHOUT SUBSIDY OR SURCHARGE

--- WITH SUBSIDY OF Rs.1000 PER HOUSEHOLD

* MUNICIPAL CHARGES Rs. 0.60 PER MONTH PER M²



- 3.30 In New Bombay, two important measures are proposed to deal with this situation. First, since the lowest income groups cannot afford even a reasonable sized plot of land per family without subsidy and, since the subsidy must not be of such a type that it constitutes a drain on resources, it is proposed to introduce a system of cross subsidies in housing. This means that in a typical development, CIDCO would undertake construction of housing for the entire range of income groups expected in the development. The more expensive housing for the upper income groups would be priced with a slight surcharge, not so high as to make it unattractive in price compared with commercial construction in Greater Bombay, but sufficient to recover an amount which can provide a substantial subsidy to the lower income housing. The extent of surcharge and subsidy proposed is progressive, so that the lowest income groups receive the highest percentage subsidy and the highest income groups pay the highest percentage surcharge.

Table 3.05

Cross-Subsidies in Housing Per 100 Households

Income Group No.	Household income per month	No. of households	Assumed cost of dwelling which is with-in means of household (See Table 3.04)	Amount of subsidy/surcharge per household	%age subsidy/surcharge	Total amount of subsidy/surcharge for 100 households
1.	Less than 200	20	1200	-1000	-45.45	-20,000
2.	201-300	16	2580	-1000	-27.93	-16,000
3.	301-400	15	4140	-1000	-19.84	-15,000
4.	401-500	14	5940	Nil	Nil	Nil
5.	501-600	12	7800	+326	+ 4.01	+ 3,912
6.	601-800	9	10800	+852	+ 7.31	+ 7,668
7.	801-1000	7	15600	+1694	+ 9.79	+11,858
8.	1001-1200	3	21000	+2646	+11.19	+ 7,938
9.	1201-1500	2	30000	+4222	+12.33	+ 8,444
10.	1501 and above	2	37800	+5590	+12.88	+11,180
					Total	0

- 3.31 Table 3.05 shows a worked example of such cross subsidies, assuming a 13% surcharge over the cost of apartments for the highest income groups, reducing to 4% for the income group Rs. 500-600 per month. The next lower income group is assumed to have neither surcharge nor subsidy. For the 3 lowest income groups a uniform subsidy of Rs. 1000 per household is applied. This works out to a 45% subsidy for the lowest income group and a 20% subsidy for the income group Rs. 301-400 per month. It will be seen that the total amount of surcharge matches the total subsidy. The example is typical and is not intended as an indication of the precise amounts

of surcharge or subsidy that CIDCO proposes to apply. However, it reveals clearly that it is possible to operate a system of cross subsidies in which the lower income groups can be subsidised through surcharges realised from the higher income groups, with the subsidies being substantial and the surcharges being by no means excessive.

- 3.32 The second measure proposed to provide "sites and services" developments. Diagram 3.04 shows that for the lowest income groups even after providing a subsidy it is not possible to provide any kind of pucca dwelling. For this income group, which constitutes about 20% of the population, we, therefore propose to provide only developed plots of approximately 30 sq. meters per family, with electricity and water supply and with sanitary facilities shared by 4 families. However, the design is to be such that it is possible, eventually, for each family to have its own private bath and WC in addition to its individual water supply and power connection. Initially, the families will be permitted to construct huts on their plots in a material of their own choice. It is expected that despite the cheap construction these developments will be very much better, environmentally, than typical hutment areas in Greater Bombay, mainly because the space between hutments will be paved and provided with street lighting and families will be provided with electricity, water supply and sanitary facilities.
- 3.33 However, the main feature of this type of "sites and services" development is that families will be expected and encouraged to improve their own initially temporary dwellings to constructions of a more and more permanent type. To achieve this, the first requisite is that families should have security of tenure on their plot and, consequently, it is proposed that these developed plots be allotted to households on the normal 60 years residential lease. Precautions will be taken to ensure that families which are allotted subsidised plots in this way do not sell out to speculators, who would then rent out the same plots at an exorbitant price. Further encouragement to improve their dwellings will be provided by making available to these families building construction materials on a retail scale, so that it is possible for each family to invest a small amount at a time and incrementally improve its house over a period of years to a better and better construction. Designs will also be made available, which show how a house can be incrementally improved. With this type of incremental improvement, it is expected that eventually each family will have its own 30 sq. meter plot and a ground plus one construction on that plot providing a living area of approximately 30 sq. meters.
- 3.34 There is no reason why the principle of incremental housing should apply only to the lowest income groups. For the middle and high income groups also, we believe that an arrangement which permits a family to purchase a plot of land and invest in a small amount of built-up accommodation initially and permits it to add to this construction, from time to time, as its needs increase and as it is able to find the investment needed, would be extremely popular. The normal type

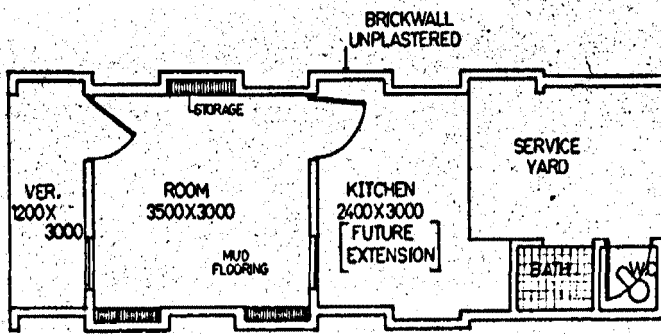
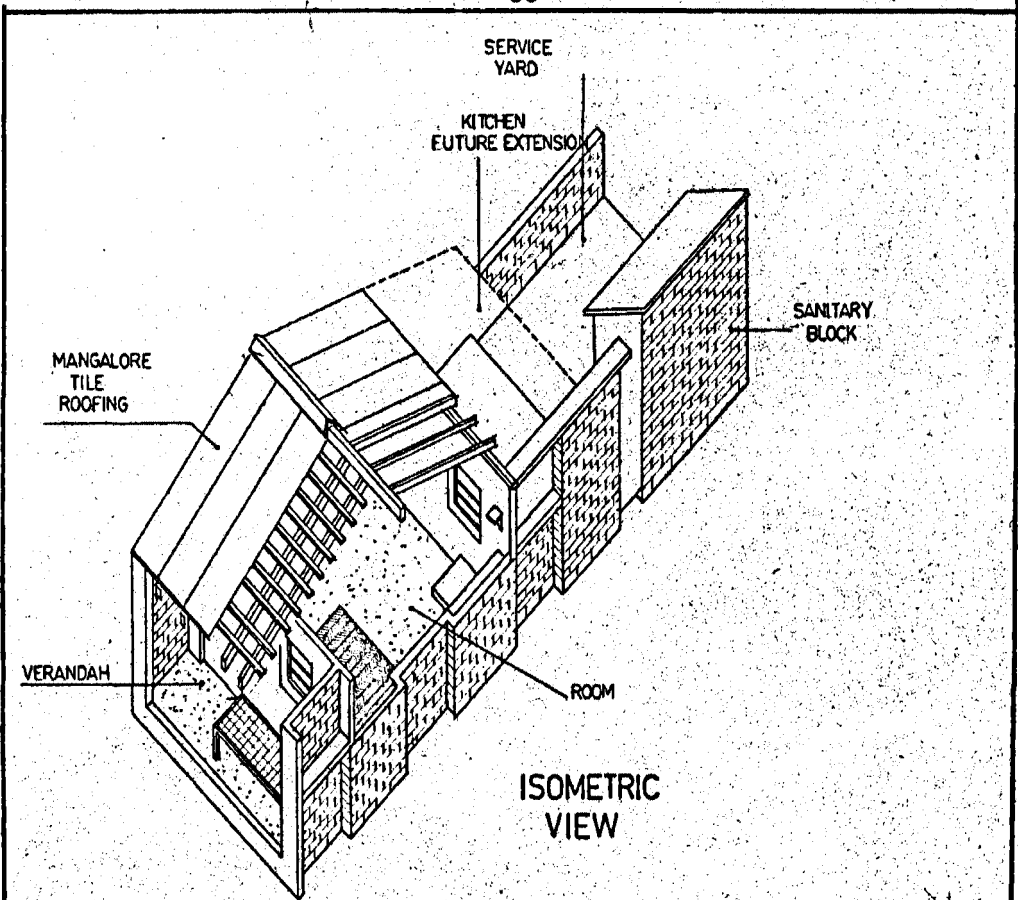
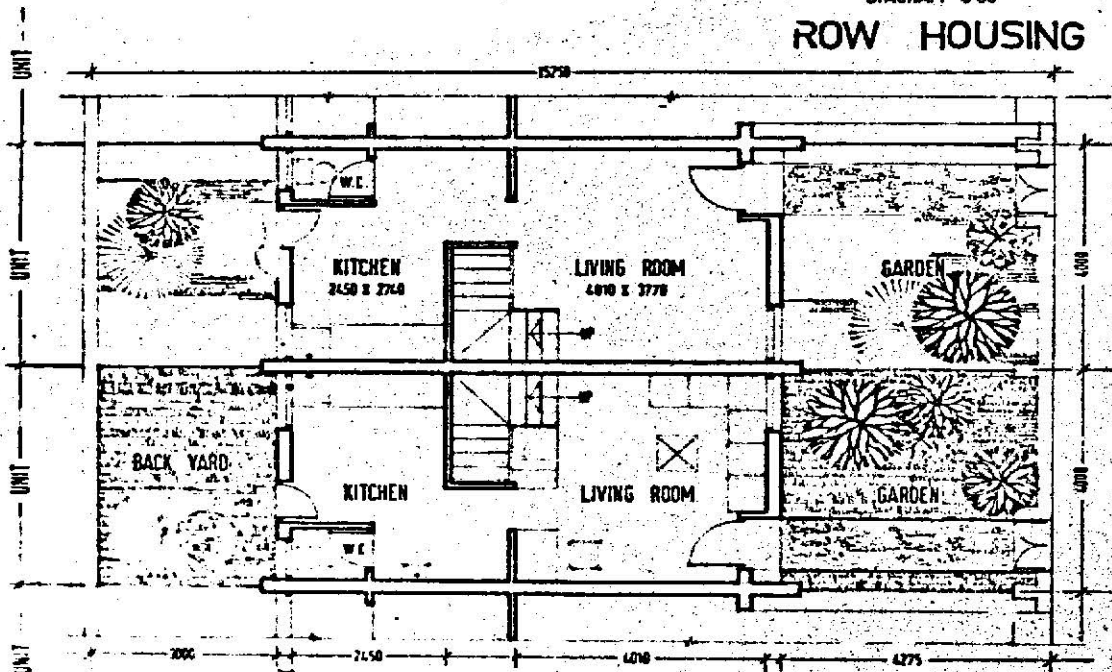


DIAGRAM 3.05B
HOUSE DETAILS
SITES AND SERVICES

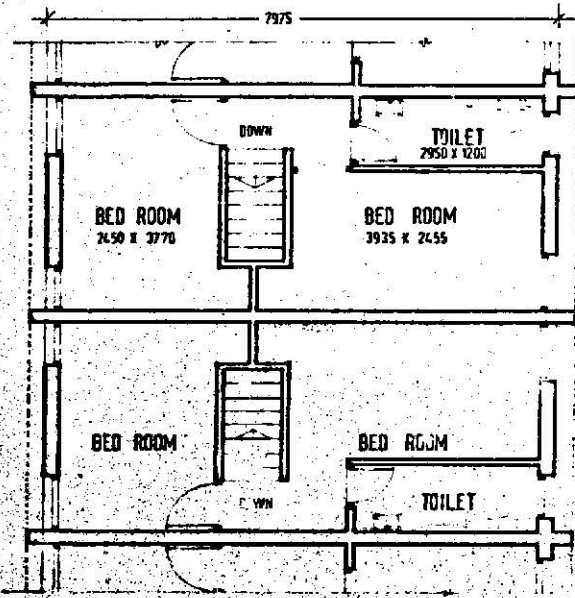
of apartment construction does not permit a family to expand its house later. Nor is it possible, as will be seen from Diagram 3.04, to provide each family with a large enough plot of land for it to build its own semi-detached or completely detached house. But there is an interesting solution which offers this possibility of an incremental house to the middle and higher income groups and this is with row housing. Plots are long and narrow, and each family is assigned a plot and permitted to build up to the common boundary with its neighbour.

- 3.35 The advantages of row housing seem to us to be several. First, the costs of construction per sq. meter of carpet area are lower than in the case of walk-up apartments for a variety of reasons: a considerable amount of the cost of walls is shared with neighbours; with reasonable foundation conditions, walls are load-bearing and the need for columns and beams is eliminated; and there is no wasted space in the form of publicly shared entrance foyers, staircases and landings. Second, row housing consumes less cement and steel per unit of construction and, since these are both nationally scarce materials, any design solution which economises on them appears desirable. Third, row houses can be built more speedily than walk-ups or high-rise apartments and this quicker turn around of capital results in some savings in interest charges, besides making a more extended construction programme possible. Fourth, with houses being built individually, the field is open to smaller contractors, resulting in some saving in cost. Fifth, we believe the prospect of owning their own plot of land will attract a great number of families to invest in this type of development. And finally and perhaps most importantly, the row house lends itself readily to expansion as the family's needs increase and more funds become available.
- 3.36 The case for row housing becomes even stronger when one realises that over 80% of the households will live in units of 25 sq. meters or less of carpet area. For families living in such small accommodation, a private space within the plot both in front of and behind the building construction would be extremely valuable. Our own experience in our villages is that although families may live in fairly compact enclosed shelters, family life extends beyond the roof to include living in the open spaces adjoining the shelter. A scheme of development which permits families living in very small built up accommodation to extend their activities into outdoor living spaces on either side appears to us particularly valuable. Moreover, as mentioned above, as the family's income rises it has the option of adding to the enclosed accommodation by constructing over some of the space that was previously kept open.
- 3.37 A word of caution is perhaps required here. Diagram 3.04 is drawn assuming prices of Rs. 40 per square meter of land and Rs. 500 per square meter of construction. At these prices, an FSI of 1 appears ample. However, as land prices rise and if FSI's are increased, row housing may no longer seem as economical. Another aspect to be examined is the relative cost of transport between developments with high and low FSI's. These questions are being gone into.

DIAGRAM 3-06
ROW HOUSING



GROUND FLOOR PLAN
TOTAL CARPET AREA = 52.00 Sq. Mts.



FIRST FLOOR PLAN

3.38 In any case, it is neither possible nor right for a planning agency to prescribe what type of housing shall be lived in by those who can afford pucca construction. Evidence concerning expressed preferences is hazy and we find cases where families have opted for low rise buildings and others where they have opted for apartments, in both cases with the alternative also being available. Particularly for the high income groups, it seems possible that apartment style living may be preferred by some families. Consequently, the most sensible course seems to be to offer in our early developments a range of choice which permits families to choose the type of dwellings they prefer. Plots will be laid out as individual plots for row housing, but if a group of persons wishes to combine a number of such adjoining plots and use them for construction of a walk-up or high rise type of building, this will be permitted. In the case of CIDCO's own construction programme, the early developments will include examples of row housing as well as of walk-up apartments. On the basis of observed responses and preferences in the sale of these, the further construction programme will be modified to reflect actual citizen preferences.

3.39 Apart from these planning considerations, CIDCO is actively concerned with lowering the costs of building construction and securing finance for individual families, both measures being intended to maximise the volume of construction that each family can afford. The following steps have been taken:

- a) CIDCO has approached the Housing & Urban Development Corporation (HUDCO) and the Life Insurance Corporation (LIC) for long term, low interest bearing finance for construction of dwelling units. CIDCO has also approached commercial banks to persuade these to finance individual families wishing to invest in housing, and has obtained a favourable response.
- b) It is hoped to improve the quality of building materials by using improved technologies (for example mechanised brick plants, seasoning and preservative treatment of inexpensive timber to make it suitable for construction, mechanised and improved quarrying methods etc.). It is also hoped to reduce the cost of these materials by countering artificial shortages, for example in the supply of sand, or bricks, or seasoned timber, by setting up large plants which can assure a large supply of these materials at competitive prices. The development of new building materials which are likely to result in savings in construction is also being encouraged.
- c) A pilot scheme of prefabricated building construction is also in hand. The large-panel construction technique is being used, with entire walls and entire slabs being cast as single units and bathrooms and kitchens being cast as box units. The prefabrication of the various building components is carried out in a prefabrication yard and the elements, after casting, are transported to the

erection site and assembled into the final building. So far, it is seen that the cost of construction using prefabrication is comparable to that of conventional framed structure construction. However, the cement and steel required are slightly less with prefabricated construction than for framed buildings. Although there may be no immediate savings in cost apparent from the use of prefabrication technique, it is expected that some savings will develop if this scheme is found satisfactory and expanded on a larger scale. These economies are expected to be further improved by the use of new materials which it would be difficult to incorporate into traditional construction. Admixtures of fly-ash in cement will be possible under the close control available in a prefabrication yard and there is also the possibility of using bamboo which has been suitably impregnated as a substitute for steel reinforcement in much of the precast panel construction. It is these potential savings rather than any immediate differences in cost, which make the prefabricated building construction a promising venture.

- 3.40 We will welcome private participation in housing and will be leasing plots for development. To curb speculation, we will require that anyone securing a plot commence construction within a particular time and also complete it within a reasonable time. We will also be applying local taxes on the plot that has been released on the basis that it is fully built up to the permissible limit, regardless of whether it is actually built up to that limit or not.
- 3.41 We will not be selling plots outright but leasing them. The terms of the leases at present are 60 years for residential and commercial plots, but a revision of this is contemplated, particularly in view of the State Legislature's Estimates Committee's recommendation that a 30-year period only be adopted. The lease amount will be recovered by way of a premium to be paid initially, as well as a recurring annual charge to cover the cost of services.
- 3.42 We will be constructing a certain amount of housing ourselves though the extent of our involvement is not as yet clear. But it seems unlikely that private agencies would be willing to construct low income housing. If this happens, CIDCO will construct low cost housing and simultaneously construct larger sized apartments as well. As mentioned earlier, this strategy will be necessary to generate a small surplus in upper class apartment in order to subsidise the lower cost housing. We will also need to sell and not rent all the accommodation we build in order to recover the funds needed for further development.

Utilities

- 3.43 A study was carried out in CIDCO to determine the cost of utilities such as water distribution lines, storm water drains, sewerage lines and roads for various concentrations of popula-

tion. This revealed that the higher the concentration of population within a given area, the lower the cost of providing utilities. For an approximately square area 1 km. by 1 km., as the population concentration is increased from 50,000 to 2,00,000, the cost of providing utilities reduces by 50% per capita. This study forms part of the complex investigation of desirable densities mentioned in section 3.21.

Water supply

- 3.44 We would aim at providing adequate water and a 24 hour supply for all activities and at making the water filtered, bacteriologically pure and chemically acceptable to industries and trade.
- 3.45 The demand for water in 1991 was estimated to be 250 mgd on the basis of the following standards of use:

<u>Use</u>	<u>Per day requirement</u>
Domestic	50 g. per capita
Trade	10 g. per capita
Industry	200-2000 g. per employee (depending on the nature of the industry)
Parks and Gardens	1000 g. per acre.

- 3.46 A study was commissioned to investigate fresh water sources for New Bombay and, after taking into consideration the capital cost of developing the various water sources, as well as the cost of piping to the New Bombay area, it was found that for a population of 2 million, the following were the most economical fresh water sources in diminishing order of size.

Table 3.06

<u>Sr.No.</u>	<u>Stream</u>	<u>Basin</u>	<u>Potential in million gallon per day (mgd)</u>
1.	Barvi	Ulhas	130
2.	Balganga	Patalganga	80
3.	Matheran	"	60
4.	Patalganga	"	20
			<u>290 mgd</u>

Further studies have been carried out to determine the most economical sequence of harnessing these water sources depending on the pace and location of development.

3.47 The existing water supply in New Bombay is from MIDC schemes. Details are as follows:

a) HOC Trans-Thana Scheme (12 mgd): The Patalganga river has been tapped at Rasayani and 4 mgd reserved for the Hindustan Organic Chemical Complex there. The rest of the water (8 mgd) is carried 31 kms. by a 27" diameter main to supply water to industries located in the Thana Belapur area. A branch line taking off from this main also supplies water to the Taloja industrial area.

b) Ransai Scheme (4.5 mgd): This scheme supplies water to the Uran municipal area and the defence establishments nearby through a 30" diameter main which has been laid from Ransai to Jasai, and through an 18" diameter main from Jasai to Uran. This scheme can be augmented to supply 10 mgd.

c) Barvi Scheme: The first stage development of this scheme (65 mgd) is expected to be completed by the middle of 1974. Conveyance will be through a 69" diameter main over 17 kms. and a 27" diameter main over 5 kms. The 27" main over 5 kms. will be converted to a 69" main by the end of 1975. The Barvi main is taken to a reservoir at Shil which has a capacity of 5 million gallons.

3.48 Since its inception, CIDCO has undertaken a programme of providing water to the villages in New Bombay. So far, piped water supply has been given to 16 villages. This is in keeping with our objective of raising the standard of living of the project affected people.

3.49 MIDC has agreed to undertake the construction of water supply schemes according to the demand in New Bombay and it will supply water at suitably located reservoirs. We will undertake construction of the local water distribution systems.

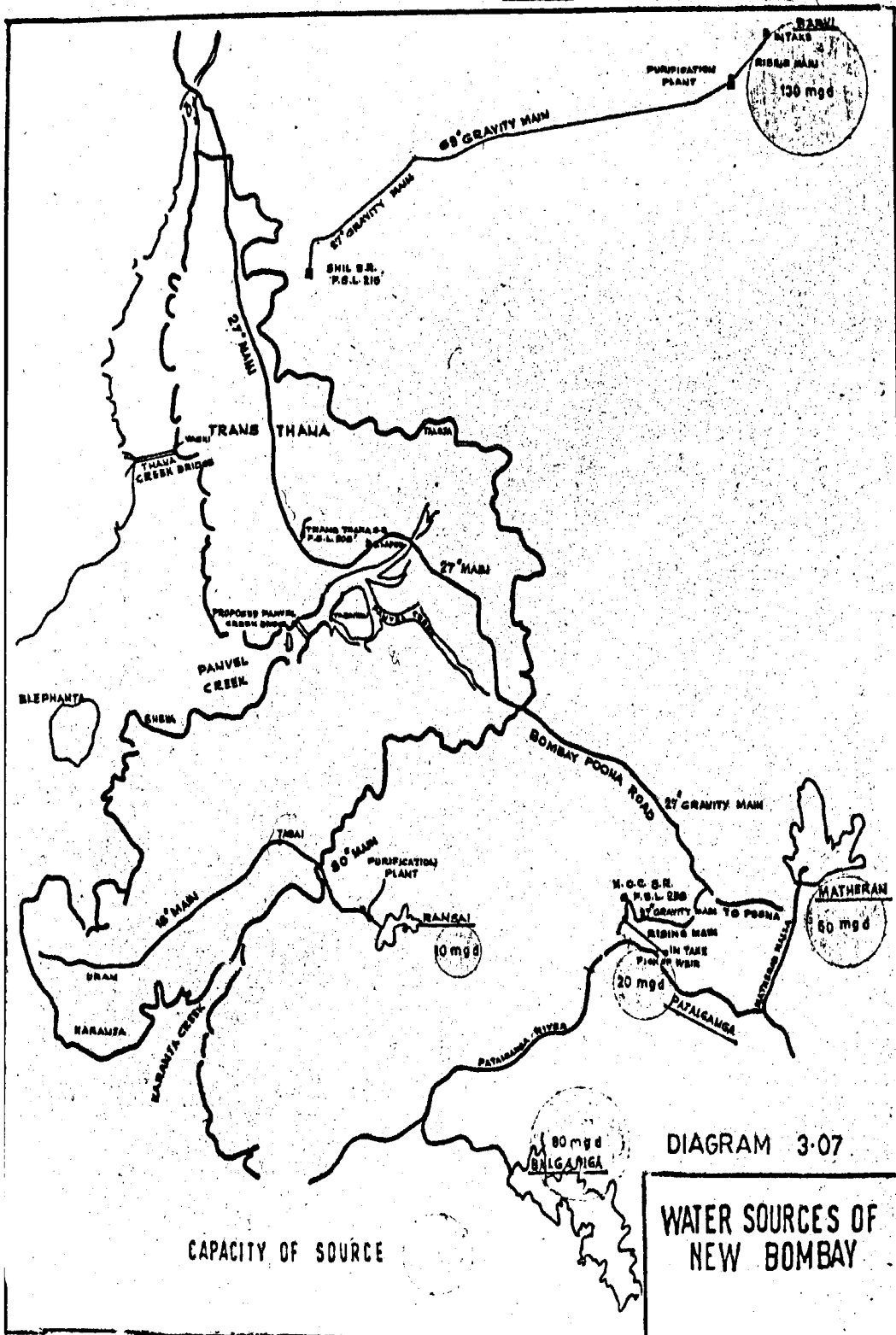
3.50 In consonance with our general policy of taxing, as far as possible, the economic activities of the city in preference to residential premises, we would normally prefer to have a differential water charge - higher for industries and commercial activities and lower for domestic consumption.

Sewerage

3.51 The alternatives we have examined regarding the types of sewage treatment plants to be installed are with respect to our Vashi development. At Vashi we compared the following two types of sewage treatment plants:

- 1) Aerated lagoons
- 2) Oxidation ditch

The capital cost of the equipment of the oxidation ditch type of sewage treatment was found to be 33% higher than the aerated lagoon type. But the land required for aerated lagoons was 20 acres and for oxidation ditch 8 acres. If the opportunity cost of land was taken into consideration, it was found that the oxidation ditch was more economical. Moreover, the oxida-



tion ditch type of sewage treatment plant has a Biochemical Oxygen Demand (BOD) removal efficiency of 95 to 98% as compared to 80 to 90% with aerated lagoons, and the oxidation ditch also has less of an offensive odour. The oxidation ditch method can also treat a certain amount of industrial wastes mixed with the domestic effluent. Accordingly for Vashi this arrangement has been preferred.

Reclamation

- 3.52 In the New Bombay Project Area (about 34,000 hectares) about 20% of the land is low-lying and prone to tidal action. The average level of low-lying lands is about + 1.00 Mt. mean Sea Level (MSL). The tidal range is from a low of -2.43 mt. (MSL) to a high of + 3.50 mts. (MSL). As a result, saline water enters these areas during the rising tide and recedes with the low tide.
- 3.53 When heavy rains and the high tide coincide, the rain water also drains into these areas and flows out into the sea as the tide starts receding. At present, part of this area is used for salt making, while the rest is a vast expanse of marsh. All this area cannot be reclaimed, partly because tests on a hydraulic model of the harbour have shown that doing this would have an undesirable effect on the harbour deep channels, which are kept flushed and require minimal dredging on account of the daily surge of the tide in and out of Thana Creek; and partly because the reclaimed area is much costlier to develop and build on than firm land. However, some waterfront development is required and some of the low-lying areas occur in particularly desirable locations for development.
- 3.54 Reclamation and drainage of these areas can be achieved in two ways. One of these methods, referred to as the conventional method, involves raising the level of these lands by undertaking a programme of earth filling on a massive scale. The extent of fill is decided by keeping the invert level of the storm-water drainage trunk main just above the high tide level at the sea (or creek) face. Further, the mains are laid to slopes as are necessary to attain self-cleansing velocities which eliminate silt deposition. It is also normal practice to bury these mains in areas of high density development and to provide a cushion of one metre of fill over their crest. The sea-face of the land is provided with a sea-wall and in case this is exposed to wave action a sufficient apron of tetrapods or other energy dissipating structures is also needed. The reclamation of Nariman Point and Marine Drive in Greater Bombay provide illustrations of the conventional method.
- 3.55 An alternative is the Folder or Dutch Method. This method involves construction of bunds (or dykes) along the coastline to face the sides and block their entry into the area proposed for reclamation. The bunds are faced with tetrapods as in the case of a sea wall in conventional construction. The area proposed for development is given adequate slopes for surface run-off and given a nominal topping to provide a comfortable working surface over the very soft marine deposits that

normally cover the area under the tides. Apart from this topping, the level of the area does not undergo any appreciable change. Since the level of the ground still remains lower than the high tide level, the run-off during rainstorms cannot flow into the sea by gravity except when the tide level is lower than the minimum water level specified within the polder. It is then necessary to resort to pumping. The water is brought to the lowest point in the area by a network of trunk mains. A sump is provided at this point from which water is lifted by pumps and thrown across the bund (or dyke) into the sea.

3.56 Each of the methods described above has certain advantages and becomes the preferred choice under certain conditions. The major advantages of the conventional method are -- follows:

- a) Comparatively less risk of flooding of the area as storm water flows by gravity into the sea.
- b) Low maintenance cost as no mechanical equipment is required.
- c) Easier to execute in stages, each area being reclaimed as it is taken up for development.

On the other hand the method has certain disadvantages:

- d) If the entire area is to be taken up, it calls for a heavy initial capital investment.
- e) The method is slow and time consuming because it requires massive filling and in new areas (where garbage types of waste material for fill are not generated) natural features may have to be levelled off to procure fill.
- f) Foundation costs will be high for any but the shallowest buildings, when the additional depth of fill has to be penetrated to reach a founding stratum. Even for the smaller buildings founded on the fill a long waiting time is required to allow for fill consolidation and this is a slow process.

3.57 The Dutch method on the other hand has following advantages:

- a) It has, comparatively a much lower initial cost. But there is a replacement component in this cost arising out of the need for periodic renewals of mechanical equipment. The requirement of funds is more evenly spread over a longer time. In a situation where severe conditions of capital scarcity prevail, this is a significant advantage.
- b) If taken in a single stage, the Dutch method of reclamation is faster from the point of view of overall development.

- c) Foundation costs are comparatively reduced for most buildings.
- d) The method does not call for extensive cutting to procure fill.

As against these, it has the following disadvantages :

- e) Maintenance of the scheme calls for a continuing use of resources in terms of funds and personnel.
- f) The method is dependent on equipment running on electricity or diesel fuel and hence has a dependability marginally less than the conventional method.

However, system reliability with the Dutch method can be increased to a great extent by provision of stand by capacity, duplication of power sources and provision of by-pass arrangements to allow gravity flow when the tide is low.

- 3.58 The choice of the reclamation method crucially hinges on the size and shape of the area proposed to be reclaimed, the catchment area contributing run-off to it, the difference between the average existing ground level and the high tide level and the design rain-storm. These factors all affect the total capital outlay and recurring costs for reclamation and hence the relative economies of the two methods. The detailed design calls for considerable skill. It is possible to effect major savings through a close examination and understanding of the topographical features occurring in the area. The following examples are relevant:

Reclamation of 100 hectares for Belapur node

- 3.59 A careful analysis was carried out concerning the suitability of each of the two methods of reclamation for the area in the node. In this area, about 100 hectares of land are low lying and subject to tidal effects. Here the Dutch Method was found to be more economical than the conventional method which costs 1.5 times as much, considering present value discounted costs and 4.3 times as much, considering present investment levels only. Apart from the financial analysis which argued in its favour, there were many other considerations which were taken into account before deciding on the Dutch method. Some of the most significant were as follows :

- a) The topography of the area facilitated construction of a diversion channel to effectively intercept 70% of the run-off and prevent it from entering the proposed area. This would be diverted to an adjacent valley where no future development was envisaged. It also reduced the pumping costs considerably.

- b) The area had two outcrops separated by a short coast-line. This not only made the dyke shorter and cheaper but also facilitated anchoring of the dyke into the two outcrops.
- c) The saucer-like shape of the area with two outcrops at the two sides and steep hills further north facilitated the drainage of the area so that run-off from all areas could be conveniently brought by gravity to a single point (by a network of trunk-mains) from where it could be pumped out. This reduced the number of pumping stations, and the numbers of maintenance and operational staff.
- d) On landscaping considerations, it was considered unwise to make deep cuts in the hills and destroy considerable natural vegetation to obtain soils which would be required for the conventional method.

The possibility of using dredged sand from the creek as a fill material was also examined. It was found that dredging was unlikely to result in any major savings in cost. Further, dredging required specialised skills and was likely to involve a foreign exchange component in the capital outlay.

Reclamation of 250 hectares
for the Vashi node

- 3.60 The Vashi development which constitutes the first residential nucleus of New Bombay has a total area of 375 hectares of which 250 hectares are low lying and need to be reclaimed. Here too, the economics were in favour of the Dutch Method because the conventional method of reclaiming cost 1.5 times as much as the Dutch Method, at present value discounted costs, and 2.1 times as much in terms of initial outlay.

Fire fighting

- 3.61 The fire fighting services have been studied in detail with respect to our Vashi development which is to have an ultimate population of 100,000. The typical requirements of the fire fighting services for 100,000 population are given below:

Table 3.07

Fire fighting services equipment required for 100,000
population

Equipment	Nos. of each equipment	Approx. Cost (Rs. lakhs)
1. Trailer Pump 400 gpm -IS 944 1966	1	0.30

Equipment	Nos. of each equipment	Approx. Cost (Rs. lakhs)
2. Jeep	1	0.35
3. Hose Pipes - 100 ft.	15	0.15
4. Integrated Fire Engine with 400 gpm pump & 35 ft. extension ladder -IS 950/1970	1	1.50
5. Towing Tender - IS 949 1967	1	1.02
6. Rescue Tender - IS 949 1967	1	2.50
7. Ambulance	2	2.00
8. Integrated Fire Engine with 400 gpm pump & 50-60 ft. escape Ladder- IS 950/1970	1	1.50
9. Turn Table Ladder/Snorkel	1	9.0
		18.32

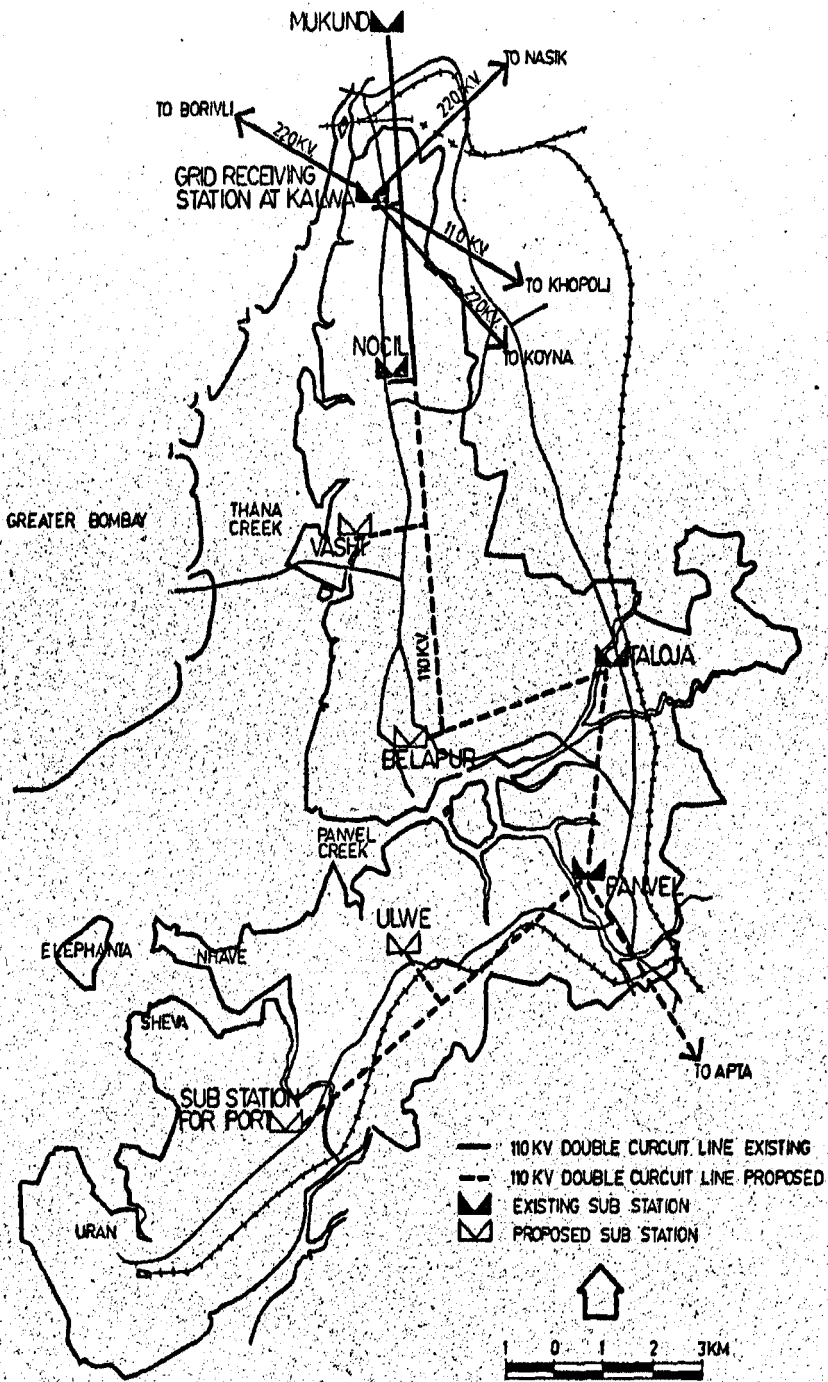
3.62 Besides the fire fighting equipment mentioned above, some of the other facilities that will be required for 100,000 population are listed below:

- a) **Communication:** The efficient operation of the fire fighting services depends on a good communication system. The fire station should have at least 4 direct telephone lines with automatic hunting facilities. A separate number, say 999, may have to be allocated for New Bombay fire services. Besides, wireless sets will also need to be installed in the fire engine and at fire stations.
- b) **Fire alarms:** A network of fire alarms will need to be installed.
- c) **Water Supply:** The fire fighting units will have to depend on the water supply in the mains for their supply of water and an adequate number of fire hydrants will have to be provided at suitable points throughout the development. These are expected to be 150 mm. diameter outlets spaced not further apart than 70 m in each direction. The water in swimming pools should also be available in an emergency.

- d) Fire Station: Each fire station will require an area of 0.8 hectare and an appropriate fire station building with residential staff quarters attached.

Power Supply

- 3.63 The Maharashtra State Electricity Board at present distributes power in New Bombay except in the Panvel Municipal limits where the Panvel Taluka Supply Company distributes power. Development programmes in New Bombay are being indicated to the MSEB so that they can make the necessary arrangements for power supply.
- 3.64 Power demand: The demand of power will be estimated on the basis of the following factors: progressive development of the city, progressive increase in power-intensive activities, and an improving economic condition of the population. An accurate assessment of future requirements is rather difficult at this stage as there is a high degree of uncertainty about some of the above factors.
- 3.65 Power Supply: In New Bombay the existing power supply schemes consist of a very large receiving station of the MSEB at Kalwa in the north. Two 220 KV lines from Nasik, one 220 KV line from Koyna, two 220 KV lines from Tarapur via Borivli and one 110 KV line from the Tata Transmission network come into the Kalwa Receiving Station. To the south of New Bombay another large receiving Station is located at Apta about 10 KM from the boundary of the New City. The 220 KV line from Koyna into Kalwa is tapped at Apta to feed this Receiving Station. Thus New Bombay has within or adjacent to its area two major receiving stations. Also four 100 KV lines of the Tata Hydro-Electric Companies cross through the centre of the area.
- 3.66 Sub-Stations: The industries on the east of Thana-Belapur Road receive power from two 100/22 KV Sub-stations at Mukund and NOCIL, which are fed at 100 KV from Kalwa and also from 22 KV feeders directly coming from Kalwa. Panvel (Municipal limit) is served by a 100/22 KV Sub-station tapped from the Tata line. Diagram 3.08 shows the receiving stations, Sub-stations and H.T. transmission lines.
- 3.67 New H.T. Transmission lines: As a long term plan, Kalwa and Apta Receiving Stations are to be linked by a double circuit 110 KV line passing through the new city. Already the double circuit 110 KV line exists between Kalwa and NOCIL. In the scheme approved, this line is being extended to Vashi as a single circuit line on double circuit towers to provide the necessary load at Vashi. This scheme is expected to be commissioned by 1974. Linking of the two Receiving Stations at Kalwa and Apta will firm up the sources of supply to the new city and in the event of interruption of supply from either of the Receiving Stations, power can be received from the other Receiving Stations.



POWER LINES FROM KOYNA & KHOPOLI PASSING THROUGH THE PROJECT AREA
 HAVE NOT BEEN SHOWN THOUGH THEY PRESENTLY SUPPLY POWER TO PANVEL
 & TALOJA.

DIAGRAM

POWER NET WORK FOR NEW BOMBAY

- 3.68 Siting of new sub-stations: As mentioned above, three 100/20 KV sub-stations are already functioning at Mukund, NOCIL and Panvel. Two sub-stations have been planned at Vashi and Taloja and will be operational by 1974-75. One sub-station is being planned for Belapur. Ultimately, there will be about 8 sub-stations of varying capacities.

Post & Telegraph

- 3.69 The programmes of development undertaken by us will be indicated to the Post Master General, Maharashtra Circle, and a close liaison will be maintained with him so that the necessary post and telegraph facilities are provided in the developments undertaken. The standard for providing a post office is based on the postal traffic it has to handle. Generally, in an urban area a post office is provided for a population of about 5000 to 10,000 persons. A Head Post Office essentially performs the same function as a Post Office but is in addition an accounting unit for 20 to 60 Post Offices in the area. Most of the Post Offices in an urban area will also provide telegraph facilities.

Telephones

- 3.70 The jurisdiction of Bombay Telephones, which provides services in Greater Bombay and Thana, has been extended to cover New Bombay for planning and development purposes. The programmes of development undertaken by us will be indicated to Bombay Telephones and the P & T Board and a close liaison will be maintained with them so that the necessary telephone facilities are provided in the developments undertaken. We have submitted a report in February 1972 to the Bombay Telephones and the P & T Board wherein a long term projection of telephones and trunk automatic exchange needs was made on the basis of a projected population of 2 million by 1991.
- 3.71 The existing tele-communication facilities in New Bombay are as follows:

(a) Telephone Exchanges: At present there are only three telephone exchanges in the new city. Two exchanges, at Panvel and Taloja, are automatic; the third exchange at Uran is a manual exchange.

The total capacity is 950 lines as indicated below:

Panvel - MAX II	-	700 lines
Taloja - MAX III	-	50 lines
Uran - CBNM	-	200 lines

In addition, the area in the north (Kalwa to Belapur) is served as a long distance connection from the Thana exchange of Bombay Telephones. The total demand of the area at present is about 500 telephones although the total working connections are only 250, due to paucity of exchange equipment and cables.

- (b) Trunk Exchange : The Panvel-Taloja telephone system has its trunk exchange at Panvel. Uran also has a trunk exchange. Calls between Uran, Panvel-Taloja and Kalwa-Belapur region are set up manually via Trunks. There is a no-delay trunk service between Panvel-Taloja and Bombay.
- (c) Telex : There is no telex exchange, but a few telex connections are working from Bombay Telex.

3.72 Construction of the first nucleus housing complex commenced at Vashi in the Kalwa-Belapur area in early 1972. The planning to meet the short and long term requirement was taken up about the same time. The short term scheme envisages installation of 400 lines MAX II at Turbhe in rented accommodation with the facility of direct dialling with Greater Bombay. The 400 lines MAX II equipment and one 60 channels UHF system have been allotted. Inter-face equipment has been ordered from Indian Telephone Industries (ITI). The installation will commence by the end of 1973 and the exchange is programmed for commissioning by June 1974. An additional 200 lines (400 to 600) on the Turbhe exchange have been allotted in 1974-75. The capacity of Turbhe by June 1975 will therefore be 600 lines.

As a long term measure, the P & T has allotted equipment of 2000 lines each for installation at Turbhe and Belapur and an additional 600 lines equipment for an exchange at Kalwa.

Utilidors

3.73 Normally, service lines like water supply pipes, sewers, telephones and power cables etc. are buried below roads and footpaths. However when some maintenance, repair or new tapping work is to be undertaken, the excavation and refilling and the keeping open of trenches for some time creates many problems for vehicular and pedestrian traffic. The provision of a common accessible duct (utilidor) to carry all these services under the footpaths would result in a reduction in the number of problems arising during normal maintenance, repairs and provision of new tapplings.

3.74 When utilidors are provided, all services are laid parallel to the road network, below the footpaths. All services, except sewerage and storm water, can be located in the accessible duct. Sewerage and storm water which use gravity as the motive power, even with intermittent pumping sometimes require laying at considerable depths and a common duct for these and other services would necessitate very deep ducts and supporting columns for the other services. This would be excessively costly and in any case, it is expected that sewerage and storm water lines require very little attention once they are laid. The duct is therefore proposed to be wide and deep enough to accommodate water, telephone and power lines. The duct will be on one side of the road. Sewerage and storm water mains can be on the other side, or under the duct. The duct will have a 10 cm. lean concrete base, 22.5 cm. R.C.C. retaining walls on either side, and

will be covered with 15 cm. precast R.C.C. slabs which can be lifted whenever major work is to be done within the duct. For routine work, access to the duct through manholes will be possible. Slabs with a suitable finish will serve as a foot-path. However, as slabs have to be lifted occasionally, they cannot be sealed and rain water penetrating the joints will collect at the bottom of the duct, from where it will be drained by providing connectors at suitable intervals to the storm drains. Diagram 3.09 shows a cross-section of the road and the proposed duct.

- 3.75 The provision of utilidors is costlier than the current practice of burying services underground, but we have yet to examine the possibility of using pipes and cables of inferior specifications, and which may be acceptable because the utility duct represents a less corrosive environment than direct contact with the soil. As an experimental measure, we propose to provide these access ducts for services in our Belapur node.

Garbage Disposal

- 3.76 Garbage collection and its disposal is a statutory obligation of civic authorities in India. We are keen to institute an efficient, sanitary and economical method to handle this work. Several factors involved in the choice of a method have been considered. The Paper Sack System of refuse collection is being adopted increasingly by towns in the developed countries but it would not be financially viable in our country for quite some time. Dust bins will continue to be in use. The nature of refuse is also changing. Various kinds of packaging material are beginning to appear in the refuse. As wood and charcoal are replaced by other forms of fuel, the amount of solid refuse will diminish. Densities of habitation economic activities and social habits of residents are other major variables in the situation. Arrangements for effective control of industrial wastes and that of offices and commercial establishments also influence the efficiency of refuse disposal system. Consequently, the method selected must be sufficiently flexible to meet changing demands and this may best be decided node by node.
- 3.77 Householders in a building will be responsible for depositing their garbage in the collection bins provided for the building from where it will be collected by the garbage disposal staff. Garbage in public places and resulting from street cleaning will be similarly deposited in bins suitably located for the purpose. Thereafter, carrier vehicles with side or rear loading arrangements will collect garbage from the bins and transport it to the collection point for disposal. In Vashi, it has been decided to use the Sanitary Land Fill Method for final disposal. This method has been found to be the most economical, at present, and large low lying areas are available for tipping of refuse. Some studies (Milton Keynes) have shown that the method of incinerating refuse becomes financially viable only when the population

in a node reaches the 100,000 level. Besides, it is three times more costly than controlled tipping. Again, in Vashi the expected cost of refuse disposal has been estimated to be Rs. 22.30 lakhs a year, and it may reclaim about 4 hectares of land every year.

- 3.78 Instead of building up an elaborate sanitary services staff of its own, CIDCO is considering the use of contracting agencies for collection and disposal of garbage and for maintaining the cleanliness of development as has been so successfully done in Hong Kong and Singapore.

Social Services

- 3.79 From the beginning of its work, CIDCO has attached considerable importance to the quality of life in New Bombay. It has taken steps to ensure that social services in the new city are so developed and managed that every household benefit from them, fully and equitably. The land reservations proposed for social services are expected to be adequate for a long time to come to accommodate the increasing demands which may develop because of the rising rate of urbanisation. The financing of social services has been so planned that making use of a service is not related to the paying capacity of a person.
- 3.80 In all its planning work, CIDCO has considered the social aspects of development to be as important as the physical. Decisions on physical planning have been taken after full consideration of the social implications involved in each situation. Realising that the emergence of community life in neighbourhoods of a new city poses special social problems due to the heterogeneous backgrounds of newcomers, and that new settlers may experience difficulties that do not fall within the purview of traditional social services, CIDCO has proposed special programmes which will help newcomers to settle down expeditiously and to develop a community life in their respective neighbourhoods.
- 3.81 Social services will develop in New Bombay through the mutual cooperation of CIDCO, various voluntary agencies and other Governmental bodies. CIDCO firmly believes in promoting self-help and voluntary effort in the community. Towards that end, CIDCO has carried out the overall planning of social services with the advice and active participation of the other specialist agencies concerned. Thereafter, its role is to establish standards of various services, institute model programmes on a selective basis, undertake innovative and experimental work and carry out programmes that need to be instituted but for which no other agency is forthcoming. For the rest, CIDCO hopes that other agencies will come forward and carry out the programmes within the overall framework of the Plan. Wherever necessary, voluntary agencies will be given required support and help.

3.82 CIDCO views social planning in comprehensive terms and its Plan attempts to integrate all social services, wherever possible. The school is seen as the hub of social planning around which all social services in a given neighbourhood revolve. School facilities, such as libraries and playgrounds, will be made available to non-school groups. Community centres will either operate from school premises or at least share facilities with schools and work in close collaboration with them. Teachers and pupils will be encouraged to undertake extension education work. Health education and school health programmes will be carried out within school premises. The advantages of integration lie in overall improvement in the quality of each service, lower costs due to shared facilities, intensive use of physical premises and a greater interaction between various service personnel as well as between service personnel and the community.

3.83 For convenience, social services have been discussed under the following headings :-

- Education
- Health
- Social Welfare
- Recreation

Education

3.84 CIDCO attaches the greatest possible importance to education. New Bombay is a city being built with an eye for the future. Pupils of the seventies will be active members of society and the economy at the turn of this century and they are to be prepared to play their full part in an age characterised by rapid scientific advancement and technological innovation. Education must prepare pupils to make adaptations and stay relevant to a continuously expanding and changing range of opportunities in employment, recreation, social services and civic and social responsibilities.

3.85 CIDCO accepts that education of children should begin at the age of 3; as such pre-primary education should form an integral part of the education system. Therefore, it recommends the system of 2 + 10 + 2 + 3 for New Bombay which is in line with the system of 10 + 2 + 3 system recommended by the Government of Maharashtra (2 years in Pre-Primary School + 10 in School + 2 Pre-University + 3 University Years).

3.86 CIDCO has conducted various studies and examined standards adopted by other Town Planning Authorities in India and abroad. Thereafter, it proposes that in New Bombay there be one pre-primary school per 1000 population, one primary school per 5000 population, one secondary school per 12,500 population and one college per 50,000 population. Likewise, a technical training institute becomes feasible at 75,000 population level and a medical college at the 1,50,000 population threshold.

- 3.87 School and College places and the number of institutions required to be set up in New Bombay at a population level of 2 million are indicated below:

Table 3.08

School and College Places

(Assuming 2 million population by 1991)

Population Level	Pre-Primary		Primary		Secondary		Colleges	
	No. of places	No. of units	No. of places	No. of units	No. of places	No. of units	No. of places	No. of units
20,00,000	16000	100	2,00,000	360	57,000	257	69,000	46

- 3.88 Private institutions will be welcome to participate in CIDCO's education programme and will be provided with appropriate facilities to enable them to meet CIDCO's proposed standards. CIDCO desires that as much as possible of the education programme be covered by private institutions.
- 3.89 As New Bombay is going to have a nodal type of development, in the actual planning and location of institutions, patterns of development in different nodes will influence space and other standards of educational institutions and variations from one node to another will be permitted.
- 3.90 The school system proposed for New Bombay is designed to provide a quality of education to all pupils comparable to that currently available only in expensive and exclusive schools in Greater Bombay. CIDCO will provide two pre-primary years of schooling in addition to the 4 years of primary education and 6 years of secondary education. Sufficiently improved teaching standards will be achieved by reducing the teachers' workload by 20 per cent, raising teachers' salaries by about 25 percent over and above the existing pay scales in Greater Bombay, restricting the class size to 30 pupils, increasing the built up area to 35 sq.ft. per pupil and providing extensive playgrounds, well-equipped science laboratories, workshops and activity rooms.
- 3.91 The standards recommended by CIDCO in this regard are given below:

Table 3.09

School Standards

General Standards

- | | |
|------------------------------------|----|
| 1. Maximum No. of pupils per class | 35 |
| 2. Number of divisions per class | 2 |

3. Shifts	1
4. Media of instruction	2

<u>Size of Units</u>	<u>No. of Pupils</u>
1. Pre-Primary	160
2. Primary	560
3. Secondary	840
4. Pre-Primary + Primary	720
5. Primary + Secondary	1400
6. Pre-Primary + Primary + Secondary	1560

Area Standards

1. Per Pupil classroom area	12.85 sft.
2. Minimum built-up area per pupil	29.00 "
3. Plot area per pupil (Bldg. + Surrounding open space)	39.00 "
4. Minimum class size	450.00 "
5. Size of corridors	8' wide
6. F.S.I.	0.75
7. Maximum No. of storeys	G + 2
8. Ground coverage	37.5%
9. Playground area per pupil (in addition to public parks)	55 sft.

3.92 Table 3.10 on page 81 shows comparative standards in different schools.

3.93 Although schools in New Bombay are required to follow the syllabus prescribed by the State Government, they will be asked to emphasize co-curricular activities, do remedial teaching of English, institute school health programmes, introduce vocational guidance and career planning, promote self-help activities and seek meaningful involvement of parents in school activities. By and large, the school education will be science based and employment oriented.

3.94 The Plan for the school system places great importance on the need for flexibility to allow for future changes in educational policy as are inevitable in a developing society. In this context, retraining of teachers has been accepted as a legitimate responsibility of CIDCO.

3.95 A large number of primary schools and 9 secondary schools already exist in the Project Area. These schools suffer from many handicaps. CIDCO is making efforts to improve the conditions of these schools, to upgrade them and to integrate them in the overall school system.

3.96 Both pre-primary and primary education in New Bombay are expected to be free. Fees charged in secondary schools will be at the usual government rate of Rs. 5 to Rs. 7.50 per month. The cost of schooling in New Bombay is likely to be

Table 3.10

Comparative standards of Schools

Variables	Standards recommended in Vashi	Existing in Greater Bombay Municipal Schools.	Udayachal High School (Godrej) Vikroli, Bombay.	St. Mary High School Bombay	DDA Delhi	Average of 152 schools in Itadan	Recommended standards in Itadan	Hong Kong Planning Standards
1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Per Pupil Class Room area (sq.ft.)	12.85	8.8	18.00	N.A. *	12 to 13	9.9	16	N.A.
2. Minimum built up area per pupil (sq.ft.)	29.00	23.40	N.A.	28.80	N.A.	N.A.	N.A.	N.A.
3. Plot area (bldg. + openspace) per pupil (sq.ft.)	39	16.00	N.A.	180.00				
4. Minimum Class Room size.	450.00	596	-	N.A.	N.A.	N.A.	N.A.	N.A.
5. Maximum No. of pupils per Class Room	35	45	-	N.A.	N.A.	N.A.	N.A.	N.A.
6. Size of Corridors (ft.)	8	6	10	N.A.	N.A.	N.A.	N.A.	N.A.
7. F.S.I.	.75	1.45	N.A.	00.16	N.A.	N.A.	N.A.	N.A.
8. No. of storeys	0 + 1	0 + 3	0 + 4	N.A.	N.A.	2	2	5
9. Ground coverage	37.5%	36.17%	N.A.	N.A.	33.3%	53%	40 to 45%	40%
10. Site in acres	-	.49 (1395 pupils)	N.A.	N.A.	1.5 to 2.5 (600 pupils)	3(750 pupils) .93 play- fields.	2.5 to 3 (350 to 450 No play field pupils) .7 to 1.8 playfields	.55
11. Playground area per pupil	35 sq.ft.	-	46.3 sq.ft.	-	-	-	-	-
12. Shifts	1	2	1	2	1	N.A.	N.A.	N.A.

N.A. : Not available.

relatively high, but parents are not required to meet these costs directly. Since government grants to schools in CIDCO area are likely to be limited, new measures have been proposed to finance education and the same are discussed in Section 3.119.

- 3.97 In view of the special importance CIDCO attaches to this schooling programme, a separate paper on this is being prepared for discussion and comment by educationists.

Post Secondary Education

- 3.98 The post secondary education comprises colleges for arts, science and liberal education, technical institutes, professional and vocational education, institutes of higher learning and research, university etc. CIDCO's planning in this respect is yet to mature.

- 3.99 CIDCO is keen to develop a post-secondary educational system which is employment-oriented and science-based, where vocational training is given a dominant position and wherein the end of education is not seen as the mere acquiring of a degree or diploma. How this is to be done is an open question. A working group comprising eminent educationists has been constituted to advise CIDCO in this regard. Various issues are under consideration. Should there be independent colleges and an open university? What should be the syllabi for various courses? Of what kind and at what levels should vocational and professional education be imparted? And so on. It seems obvious that the shape and content of post secondary education in New Bombay would be different than what is currently being offered by other educational authorities in the region. As different course work and curricula may not fit into an established university system, the need to set up a new university is quite clear. However, the shape, purpose and administrative set up of the possible university are yet to crystallize. Should the university be simply an association of colleges, or a teaching or an examining body? The working group would consider all these issues and make its recommendations. CIDCO is confident that a full fledged system will emerge well before the New Bombay pupils begin to look for college places in any significant number.

- 3.100 If a sufficient number of research institutions and other institutes of higher learning come forward to locate themselves in New Bombay, then a possibility of developing a separate node for educational and research purposes will be considered. The proposed university might also be located there. For the rest, schools will be scattered in various neighbourhoods and so located that children neither need buses for commuting to and from schools, nor have to cross any highway or major roads. Colleges will be located at convenient distances.

- 3.101 Staff of schools, colleges and community centres together will undertake extension education work and develop it in a meaningful manner. We hope that night schools for the young and adults, Shramick Vidyapiths, evening classes for technical

and vocational subjects etc. will be developed by social service personnel. There is a vast scope for getting help in this regard from the industrial complex in the Trans-Thana Region and this resources will be fully tapped. We hope that the Central Board for Workers' Education, the Maharashtra Labour Welfare Fund and similar other agencies will make full use of the opportunities offered by New Bombay.

Health

- 3.102 Our basic assumption in planning health services for New Bombay is that public health, medical care, water supply, sanitation, environment, recreation, and afforestation should be seen together if health services are to be effective. Degeneration in any one of the aspects mentioned above leads to unsatisfactory performance of the system as a whole. Provisions for a potable water supply, a modern sewerage system, afforestation, and recreation and pollution control programmes have been detailed elsewhere in the Plan. Public Health and medical care services are spelled out below:
- 3.103 Elements of the proposed public health programme in New Bombay are as follows:
- (a) Potable Water Supply - Co-ordination with water supply authorities
 - Laboratory tests of water supply.
 - (b) Sanitation - Refuse collection, its transport and disposal
 - Care and maintenance of sewerage system.
 - Provision and maintenance of public conveniences, spittons and garbage cans, on city streets, public places and parking lots.
 - Enforcement of "Keep Your City Clean" rules.
 - (c) Antenatal care - Recognition of pregnancy
 - Routine antenatal examination.
 - Detection of abnormalities in pregnancy.
 - Nutrition during pregnancy.
 - Health Education (rest, exercise)
 - Safe delivery.
 - (d) Child Health
 - (i) Children under 5 - Assessment of growth and development

- Immunisation against:

- * B.C.G.
- * Smallpox
- * Tetanus
- * Diphtheria
- * Whooping cough
- * Polio
- * TAB
- * Cholera.

- (ii) School health - Museums
 - Talks and lectures
 - Postal leaflets giving advice.

- (e) Disease eradication - Malaria
 - Tuberculosis
 - Plague
 - Venereal Disease
 - Filaria
 - Leprosy

3.104 The public health programmes suggested above may appear no different from those of other civic authorities. However, the differences lie at the fundamental levels in attitudes, in planning for comprehensive coverage, in emphasis on certain items and in the positioning of the implementing organisation. Our programme aims at comprehensive coverage. It will carry the service to the doorsteps of householders, schools, colleges, offices, community centres and other organised groups, giving special attention to child care, motherhood and family planning and making health education its integral part.

3.105 Standards of hospitalised care adopted by CIDCO for New Bombay are superior to those prevailing in most other metropolitan areas, but lower than those recommended by the Bhore Committee. The ideal seems difficult to achieve in view of the scarcity of medical and para medical staff as well as resources. The proposed standards are set out below:

Table 3.11

1. No. of beds per 1000 population	4.5
2. Built up area per bed -	
a - including staff quarters	52 M ²
b - excluding staff quarters	45 M ²
3. F.S.I.	0.75
4. Minimum economical size of hospital	100 to 200 beds
5. No. of maternity beds per 1000 population	0.86

A 3-tier organisation of the health service has been proposed, namely the Community Health Centre, the Medical Centre and Hospitals.

- 3.106 The Community Health Centre (CHC) will provide all public health services, the primary level of medical care (that is, routine Out Patient Department (O.P.D.) treatment) and will attend to emergency cases on a short term basis. The CHC will be equipped with conventional diagnostic and investigational services. It will be headed by a medical officer assisted by the required number of para-medical staff. The catchment population for a CHC will coincide with the numbers required to support a group of 2 secondary schools, 2 community centres and 5 primary schools, which is about 25000 population. Dental care, eye testing and mobile health units will also operate from the CHC.
- 3.107 The Community Health Centres (CHC) will attend to patients in their respective neighbourhoods only. This will make medical care available promptly, reduce both commuting time for patients and the rush on Medical Centres and generally facilitate greater health-consciousness amongst people. It will also make the CHC more responsive to local needs, promote better coordination with other social services and make for a greater supervision of the local community over the service.
- 3.108 The Medical Centre constitutes the second tier of the health service. It is a small hospital with 50-100 beds along with a poly-clinic wherein specialised medical care is provided to cases referred by both the CHC and General Practitioners (GPs). Medical Centres are a logical outcome of the nodal type of development. Normally, a Medical Centre will service 4 CHCs and all GPs within its jurisdiction. The staff of a Medical Centre will comprise several specialists, most of whom will be employed full time. It is quite possible for various Medical Centres to specialise in certain aspects of medical care and make cross-references of patients and also to send specialists to specified CHCs according to a time schedule. Care will be taken to ensure that there is no unnecessary duplication of facilities in any node. For instance if an ESI hospital in one node provides certain facilities efforts will be made to secure the availability of specialised services in this hospital for the population not normally served by it in that node. However, all these details have still to be worked out by the Medical and Public Health Advisory Committee set up by CIDCO.
- 3.109 One possibility that is being explored for the Medical Centres is that of catering and nursing of patients by their relatives. Simple hostel and cooking facilities can be provided, so that for the simpler cases patients are looked after by members of their own family rather than by professional nursing staff. This would not only be cheaper, but more comfortable psychologically for most patients.
- 3.110 Large hospitals for providing more intensive medical care and for teaching and research purposes will be set up. However, their detailing is yet to be done.

- 3.111 As New Bombay is a city comprising of newcomers for the most part, it is possible to maintain a complete health record of its entire population and also to achieve the desired standards of health of its residents. CHCs will maintain all such records. Mobile units for X-ray and screening, immunisation against notified diseases, health education and family planning will make regular visits to schools, community centres and office complexes. This will make it easier for people to use these these services and will also improve follow-up measures.

Social Welfare

- 3.112 The State of Maharashtra and Greater Bombay in particular are pioneers of Social Welfare in India. Some of the best Social Welfare programmes are to be found in Greater Bombay. The Fifth Five Year Plan of the Social Welfare Department, Government of Maharashtra envisages expansion of the Social Welfare scheme. It is proposed to set up some more institutions for the welfare of juvenile delinquents, socially handicapped children, socially exploited women, beggars, leprosy-affected persons and the physically handicapped in the State. Some of these institutions are essentially required for the Bombay Metropolitan Region, and not for the city alone.
- 3.113 As there is no scope for expansion of Social Welfare institutions in Greater Bombay for want of suitable land, they may conveniently be located in New Bombay. While the subject is being discussed with the State authorities the following institutions should be tentatively anticipated for New Bombay by the time its population reaches the ten million level:

Table 3.12

Sr.No.	Institution	No. of inmates
1.	Remand Home for Boys	200
2.	Remand Home for Girls	200
3.	Certified School for Boys	150
4.	Certified School for Girls	100
5.	Workshop and Shelter Home for vagrant destitute children	100
6.	Backward classes hostel for Boys	200
7.	Backward classes hostel for Girls	150
8.	State Home for Women (with production centre)	100
9.	Multipurpose Institute for physically handicapped	150
10.	School for Mentally retarded children	100
11.	Home for incurable helpless patients	160
12.	Beggar Home	700
13.	Leprosy Home	300
14.	Centre for Recreation and Training of the Blind	150

- 3.114 Community Centres will be developed in all nodes and neighbourhoods at New Bombay. Generally speaking, there will be one community centre for every 12,500 population threshold. Wherever possible, community centres will make use of school premises and share playgrounds with them. Services offered in a community centre will reflect the needs of the social community. But, in general, we are keen that income generation activities form an integral part of the programme of community centres, particularly those serving low and middle income groups. Apart from this, community centres will provide facilities for recreation and social education, reading rooms, family counselling and undertake activities to develop local leadership for all civic and social affairs concerning client groups. In view of the special role envisaged for community centres, that is, income generation and developing local leadership, they will be headed by senior and experienced persons, with necessary support personnel. To the extent possible, community centres will draw on the services and staff of educational and health authorities.

Recreation

- 3.115 The Plan for New Bombay makes adequate provision for green areas, open spaces and parks. This has been dealt with elsewhere. All schools are being given playgrounds which they will share with the local community. Land allotted to a school for a playground will be developed and controlled by it. But the school concerned will have only the first right to use it. When not used by the school, the playground will be available to other institutions, on request. Community centres will provide facilities for indoor recreation.
- 3.116 Plans for the number, size and location of other recreation facilities such as gymnasias, swimming pools, museums, zoo and other amenities are under consideration and the Social Welfare Advisory Committee is expected to spell out details of all these facilities.
- 3.117 New Bombay has a large sea front and an extensive hilly area that is being replanted. It provides ideal sites for hiking and allied activities, and the lake to be created in the central area will be well suited for locating water borne sports. There is also an excellent beach near Uran which would be an attractive recreation area.
- 3.118 New Bombay provides excellent locations for setting up holiday homes, summer camps, racing tracks and other activities generally undertaken by organizations like Scouts and Girl Guides, the Red Cross Society, the Social Welfare Department, Climbing clubs etc. CIDCO will approach these agencies for developing such programmes in the New Bombay area.

Funding the Schooling Programme

3.119 Most of the social services attract grants from various government departments. However, these grants are available only for "admissible expenses" incurred at the government approved scale. To illustrate, pre-primary education expenses are not admissible and primary education is the exclusive and total responsibility of the civic authority. Secondary schools, colleges, hospitals and social welfare institutions may get grants to cover salary and overhead costs only at the approved scale. Consequently, CIDCO will be left with a large chunk of unmet expenses for which it must find its own resources. The subsequent sections are illustrative of the way in which resources could be raised to meet the higher expenses of the improved schooling programme being proposed by CIDCO.

3.120 The only source of recurring steady income to a local body is taxation. Three tax sources which could possibly be tapped for the purpose of financing the improved schooling programme are :

- (a) Payroll tax,
- (b) Turnover tax (sales tax)
- (c) Establishment tax.

There may be other sources also, which have not occurred to us.

3.121 Of the three sources listed above the first two can be imposed by the State Government and the third (on land area occupied by factories and built-up space occupied by commercial and other establishments) can be imposed by the local body. The amount of money to be raised annually is too large to be tapped from a single source without generating serious opposition and as such all three would have to be utilised to some extent to make up the deficit. Widening the tax base would also make it easier to periodically raise the tax levels if found necessary.

3.122 Pay roll tax is imposed on employers as a fraction of the salaries earned by employees in their service and is limited to the organised sector. A population of 20 lacs corresponds to an employment of about 7 lacs, of which about 4.2 lacs should be in the organised sector. Out of this 4.2 lacs it is proposed to tax only for employees paid more than Rs. 200 a month; these constitute about 50% of all employees. An average pay roll education tax of Rs. 10 p.m. (varying from Rs.5 at the lowest to Rs. 20 at the higher income groups) would yield Rs. 21 lacs per month. (Pay roll tax is limited by the Constitution of India to a maximum of Rs. 250 per person per annum).

3.123 The State Government and the Central Government impose a sales tax and if CIDCO wants to impose a turnover tax it will have to be as a rider on the central and state taxes and cannot be a very high percentage of the turnover. The annual sales tax collected in Bombay for a population of 60 lacs is Rs. 100 crores. This corresponds to a turnover of Rs. 8000 crores. The corresponding sales tax in New Bombay

can be expected to be about Rs.33 crores per annum. Assuming a tax rate of 7.2% instead of the prevailing 6%, the additional revenue realised would be about Rs. 6.6 crores a year, or about Rs. 55 lacs per month.

3.124 There is a further possibility in the disposal of sales tax. In areas taken up for industrial development by SICON, the State Government allows industries moving into these areas a deferred payment of the sales tax they would normally pay immediately. This tax amount is given to the industry as a long-term loan to be returned after 18 years. In areas undertaken by CIDCO for urban development, the State Government could similarly allow a return of all sales tax earnings in that area to CIDCO as a long term loan. This would be an important source of finance to the development authority and appears justifiable because sales are being generated in the new area as a result of the development authority's activities.

3.125 The establishment tax could be of two types depending on the type of establishment. It would be a rate based on built up area occupied by commercial and other establishments.

(a) The total land occupied by the two industrial estates (Trans-Thana and Taloja) in the New Bombay area is about 30 lac sq. metres. Out of this, the area occupied by industrial plots is about 21 lac sq. metres. Assuming another 10 lac sq. meters for industrial plots elsewhere in the city, the total taxable land under this category would be 31 lac sq. meters. A tax of Rs.1.25 per sq. meters per month would yield Rs.38.75 lacs per month.

(b) The total built up area under commercial establishments is computed on the basis of likely employment in the commercial sector. For a total employment of 7 lacs, the commercial and service sector is expected to account for about 4 lacs. On an average, a commercial sector job occupies 7.5 sq. meters. The total built up area under the commercial sector is expected to be around 30 lac sq. metres. A tax of Rs. 1.25 per sq. metre of built up area would yield Rs. 37.50 lacs.

3.126 The preceding sections indicate that it would be possible to raise sufficient revenues by local taxation, to support the improved schooling programme that is being proposed. However, taxation is an area calling for special expertise and CIDCO will consult those with special experience in this area before drawing up proposals for approval by the State Government.

Industries in New Bombay

3.127 The process of industrialisation in New Bombay, particularly in the trans-Thana Belt, was initiated by the Maharashtra Industrial Development Corporation (MIDC) in the early 60's as part of its programme to develop well planned industrial areas on the periphery of Greater Bombay. The pace of industrialisation in this area was rapid, a capital investment of Rs.174 crores being attracted within a decade, compared to Rs. 1900 crores for the whole of Maharashtra in the same

period. The trans-Thana Industrial Belt employed nearly 16,000 workers in 1971. This represents a capital investment of Rs. 1,09,000 per person employed, as against an average of about Rs. 23,000 in Greater Bombay and Rs. 20,000 in Maharashtra. As these figures indicate, this area has a concentration of capital-intensive industries. The most important of these are chemical industries producing petrochemicals and their products, other chemicals such as drugs pharmaceuticals, caustic soda, and engineering industries making electric transformers, motors, lamps, aluminium foils, textile machineries, rolled steel products, and tin sheets, besides other products. Encouraged by its success in the trans-Thana area, the MIDC subsequently opened up a new industrial area at Taleja. These two areas together account for about 2,895 hectares of land which incidentally represents nearly 8.5% of the total usable land area in New Bombay.

- 3.128 The Industrial Location Plan (detailed in Appendix 0)0) recommends an expansion of only 2,000 in the level of employment in organised industries in New Bombay by 1980. This expansion is expected to occur in the family of petrochemicals and has been worked out after considering the degree of inbuilt excess capacity in plants and the extent of economies in capital cost if expansion is to take place at the existing sites. The small additional employment growth envisaged in industries might raise the question of the viability of the whole New Bombay project. In other words, the argument is that without a substantial growth of industries, the creation of new jobs will be considerably slowed down and this will consequently make it difficult to achieve the population growth as envisaged in New Bombay. But, in fact, this not true. The new city is sustainable without any substantial additional basic manufacturing employment growth (refer Sections 2.15 to 2.28). The existing employment in basic industries in New Bombay is around 18,000 which will supposedly increase to 20,000 by 1980, as allowed for in the Location Plan.
- 3.129 As for the period between 1980 and 2000, the Industrial Location Plan recommends the setting up of strongly market oriented industries in New Bombay to meet the likely increase in demand for certain consumer goods like bakery products, soft drinks, milk bottling, furniture, packaging, printing, etc., associated with the settlement of a resident population. Similarly, another group of industries which needs to be in New Bombay is those which are strongly port oriented. The industries which are not pollution-intensive but which need to import large tonnages of input by sea and despatch a large part of their output by the sea route could also benefit from a port-side location at Nhava Sheva, since this would avoid double handling. The ship building and ship repairing industry will also have a decided advantage at Nhava Sheva as deep draught facilities will be provided at the proposed port there, and there will be a considerable movement of ships through Bombay harbour. It would therefore be worthwhile to shift the existing ship building yard from Bombay to Nhava Sheva. All these possibilities lead us to believe that we shall have to develop a large industrial zone for port based industries and the industries to be located therein should be in operation from the beginning of the 80's onwards.

3.130

The port based industrial area will also include an Export Processing Zone (EPZ). EPZ is a special industrial area in or near ports of entry where foreign materials can be brought in without being subject to payment of customs duty and if the finished products are exported, no duties have to be paid. Thus, business firms which export a substantial amount of their product and use dutiable or quota-imported materials might find the use of such a zone advantageous, in that it saves tying up capital in the payment of duties. The firms will save also on transportation, material handling and insurance normally involved in handling merchandise to and from the port. This will make exported products more competitive for a world market. In our country, where labour is abundant and cheap, an EPZ will particularly provide an excellent opportunity to export such products as have a large labour component. The EPZ in New Bombay will have special advantages, for the following reasons:

- (a) It is in close proximity to and has easy access to the country's most important and diversified industrial, financial and commercial centre, namely Bombay.
- (b) EPZ will easily draw upon the rich and varied entrepreneurial, managerial and labour pools of Greater Bombay.
- (c) New Bombay is being planned as a major metropolis around the proposed site and it is expected that the facilities associated with a metropolis will be available right at the proposed site.
- (d) A deep water port at Nhava Sheva will be developed which will have berths to handle container traffic and a general cargo berth at a later stage with complete warehousing facilities for storage of merchandise in transit, and
- (e) Cheap and ample supply of water and power will be available. Communication facilities would also be developed as part of the New Bombay development.
- (f) Cordoning off the EPZ would also be easier because it has an open area bounded by Panvel Creek in the north railway line to the east, the sea to the west, and the almost impassable Uran mud-flats between Mora and Sheva to the south. Consequently, for the purpose of customs administration, it would only be necessary to set up a few check-posts and security towers along the land boundary. This would ensure an easy and effective check on smuggling into and out of the EPZ.

3.131

A limited survey of 50 manufacturing exporting firms reveals that nearly two-thirds of the firms reacted favourably to the proposal of having some kind of activities in an EPZ. The types of industries which would be interested are electrical equipment, plastics (including laminates), extraction of edible and non-edible oils, readymade garments, sewing machines, electric fans, printing, knitwear, processed fruits and vegetables. It is estimated that with the full

operation of the zone, a total of 8,500 persons will be directly employed which will also mean about Rs. 2.5 crores in wages and salaries. Besides, the operation of the port will lead to additional employment of customs personnel in shipping, trucking, brokerage, freight forwarding, banks, insurance, packaging, etc. The direct employment in the EPZ along with supporting services, is expected to support, initially, a population of about 45,000, many of whom will perhaps relocate in New Bombay from Greater Bombay.

3.132

In addition to the major industrial areas, there are plans to accommodate small scale service industries in special industrial zones within the urban centres in New Bombay. Some of the industries which are using light machines and equipment can be accommodated in "flatted factories". Flatted factories are buildings housing small scale industrial units separated by horizontal partitions (floors). To maintain good working conditions, it is essential that the units in these buildings pose no vibration, pollution and noise hazards. Flatted factories would be unsuitable not only for factories using heavy plants and machinery but also manufacturing heavy goods since there would be a cost of vertical handling by lifts and hoists. Industries which can be easily located are those manufacturing jewellery, repair of watches, electrical appliances (repair and assembly), dress making, catering establishments, test laboratories, optical lens grinding, pickle making and bottling, photography, icecream, agarbatti, candles, book binding, etc. CIDCO will build some of these flatted factories. In other cases cooperative societies may be formed with various factory owners as members and the management may be entrusted to the society or some other agency under the administrative control of CIDCO. It might also be possible for the management to provide various services like telephone facilities, common watch and ward, common canteen and so on at a relatively low overall cost. Sub-leasing of areas and splitting them into smaller units will not be allowed without the concurrence of CIDCO.

3.133

Due to historical reasons as well as a lack of regulation in the past, some of the areas in the old island city have become the worst congested areas, with industrial units existing side by side with residential flats, producing a harmful impact on the living environment. In accordance with the provision of the Development Plan for Greater Bombay prepared in 1966, there are about 3000 industrial units located on land that does not conform to the prescribed land use. In other words, industrial units in residential, commercial and recreational zones are said to be units in non-conforming zones and recommendations have been made for shifting them to conforming zones. Planned shifting of these industrial units will reduce congestion in some of the most densely populated areas of the island of Bombay. It is estimated that the island of Bombay accounts for 75% of the non-conforming industrial units in Greater Bombay and most of them suffer from inadequacy in space, a factor which has been seriously inhibiting their efficient working. Some of them have already expressed their desire to shift to New Bombay.

3.134 The Maharashtra Economic Development Council has estimated that nearly 800 non-conforming industrial units, those located in the worst affected areas, employing about 27,000 workers could be shifted without much difficulty. The task of shifting and rehabilitating industries is closely related with the task of providing suitable alternative locations with enough space for future expansion and for housing of workers and staff. The New Bombay project provides an answer and should be able to meet these conditions reasonably satisfactorily. In shifting industrial units, there will also be a cost associated with movement. A formula can be worked out under which the movement cost could be apportioned between public authorities and the shifting firms. Developed land parcels could be made available at subsidised rates in New Bombay, with the land vacated by the industry in Greater Bombay being redeveloped in conformity with the Greater Bombay Development Plan. A few other methods have been suggested to facilitate shifting. They are:

- (a) Some kind of price preference to shifting units in the purchase policy of government and other public bodies, to cover partly the loss of production during the shifting period.
- (b) Special allocation of materials such as steel and cement which are in short supply to shifting units.
- (c) Priority in housing for workers working in such units.
- (d) Special credit facilities at lower rates for rehabilitation of firms through the creation of some kind of rehabilitation fund.
- (e) Provision of ready-made industrial sheds on rental or ownership basis with facilities for deferred payment.
- (f) Provision of some kind of transport facilities for marketing of products and procurement of inputs.
- (g) A deferral of sales tax payments, as is permitted in the case of industries shifting to SICOM sponsored areas.

3.135 Development of new industries and expansions in New Bombay, in the future, will not be allowed without considering the effluents that many of these industries will emit in the atmosphere and into the streams and creeks. Pollution is one reason for limiting industrial growth in certain zones. However, this is not enough since pollution knows no boundary. Preliminary atmospheric monitoring by CPHERI has revealed that the level of pollution observed in certain parts of New Bombay is already high, judged by any standard. The existing pollution is caused by:

- (a) Winds carrying fumes from power and petrochemical complexes in the eastern suburbs of Greater Bombay.
- (b) Pollutants from industries located in the trans-Thana Creek area in New Bombay. This is one of the reasons why the development plan seeks to contain certain kinds of industrial growth in New Bombay so as to ensure that the base level pollution does not rise further. Industries in the chemical group,

basic metals and processes involving intensive fuel-burning and non-metallic products (such as cement) will be rigorously screened and, in appropriate cases, not permitted in New Bombay. It is expected that these industries will be appropriately located in industrial zones in other parts of Maharashtra, as suggested in the Industrial Location Plan.

- 3.136 Special mention may be made about the Taloja Industrial Estate which was developed by M.I.D.C. primarily to accommodate chemical industries. However, it is felt that the liquid effluents which will be discharged by these industries into the Panvel creek will pollute the entire water course running through the central area of New Bombay. The main business area of New Bombay is planned around Panvel creek with an inland lake located in the centre. It will, therefore, be necessary to preserve the quality of water in this area. As a precautionary step, chemical industries, particularly those discharging toxic effluents, should not be permitted at Taloja.
- 3.137 For reasons mentioned above as well as to select areas where future industries can be sited, a comprehensive micro-meteorological and air quality survey has been commissioned in New Bombay. The survey, spread over a period of 2-3 years, will collect and analyse data on wind directions, wind speed, temperature variations with respect to height and concentrations of pollutants like sulphur dioxide, oxides of nitrogen, sulphation rate and suspended particulates. The problem of inversion will be studied upto a height of 500 ft. This study is being carried out by CPHERI. CIDCO has also asked CPHERI to carry out an Emission Inventory Survey for industries located in the trans-Thana Industrial Belt to identify the principal industries which are responsible for air and water pollution in the area. This study, together with other studies as mentioned above, will help in selecting and locating manufacturing as well as other activities in New Bombay and in formulating emission standards and control strategies.

Environment

Arboriculture

- 3.138 Green belts, parks and water surfaces play a significant part in the landscape of a city. But much more than that, they are an important input for generating a certain quality of life that people value and enjoy in a city. Our land use plans show reservations for green belts and open spaces. In the New Bombay Project area, most of the hills are barren and saline sub-soil in certain areas is not particularly conducive to the growth of trees. Special studies were conducted to investigate soil conditions, to judge the suitability of a given area for particular types of trees and greenery. As a result of these studies, a plan has been evolved with a view to ensuring that there will be green groves of flowering and evergreen trees throughout the city. Ten million trees are expected to be planted in about one-third of the total project area, in a phased programme of ten years of planting. The barren hills are proposed to be

afforested to prevent soil erosion and to develop woodlands for recreation. The cost of afforestation is expected to be Rs. 3000 per hectare per year and that of maintenance Rs 1000 per hectare per year, during the first five years only. To start with, CIDCO has established two nurseries which, in two years have yielded 0.6 million seedlings of about 50 varieties and nearly 10,000 seedling of tall growing trees of 20 varieties. About two lakh trees have been planted over 200 hectares of land and further work continues.

Pollution

3.139 A comprehensive study of atmospheric conditions affecting air pollution in New Bombay and the surrounding region is being undertaken through CPHERI. The objectives of this study are:

(a) To determine the existing environmental conditions, with regard to the factors affecting climate (such as temperature, humidity, wind direction and wind velocities) as well as those important from the point of view of public health (such as present levels of air and water pollution and anticipated increases).

(b) To help define physical zones which are favourable or otherwise for various types of development from the air pollution point of view.

(c) To assist CIDCO in establishing a permanent cell for environmental pollution studies to monitor the existing levels and to exercise control.

3.140 In order to study the micro-meteorology, 16 meteorological stations will eventually be set up in the New Bombay area. Some have already been established. 24-hour wind direction and wind speed data will be collected at all these stations. In order to study the frequency of stable conditions as well as duration of inversions, it will be necessary to study the temperature pattern for the selected areas in respect of different altitudes, upto a height of 500 ft. Tentatively, it is proposed that 4 such locations will have to be studied where residential or commercial centres are envisaged. At 10 of these 16 stations, arrangements will be made to monitor the air quality as regards the most common pollutants like sulphur dioxide, oxides of nitrogen, suspended particulates, settleable dust, and the sulphation rate. A mobile unit will be used for this survey work and a small laboratory will be set up for the study.

3.141 In the micro-meteorological studies carried out so far, wind speed and wind direction data have been collected at Mahape, Vashi, Panvel, Asudgaon, Belapur, Belpada, Jawahar Industrial Estate, Uran and Rabale. The wind speed data are being collected round the clock for a period of 5 to 10 days in a month although not on the same days at all the stations. The wind direction data are being observed round the clock on all days of the month simultaneously, at the stations under observation. Diagram 3.09 shows the stations where the air-quality and meteorological observations were carried

out during the period October 1972 to February 1973 in the project area. Similar measurements have been carried out since January 1972. Table 3.12 shows the average percentage frequency of wind directions and calm conditions during October 1972 to February 1973. Diagram 3.10 indicates the wind direction roses drawn from the data in Table 3.13 given below. Wind direction is the direction from which the wind blows. The length of the arm of the rose is proportional to the percent of time a given wind direction was observed.

- 3.142 Recording of temperature profiles in respect of height has been carried out so far at Uran, Sheva, Ransai Dam, Vashi, Belapur and Jawahar Industrial Estate. The temperature pattern at different altitudes upto a height of 500 feet was recorded during nocturnal hours for three days in the winter. For purposes of illustration, vertical temperature profiles observed at Jawahar Industrial Estate and Uran High School are given in Diagram 3.11 and Diagram 3.12 respectively.
- 3.143 The air-quality data have been collected, so far, at Rabale, Mahape, Vashi, Belapur, Belpada, Panvel, Jawahar Industrial Estate, Gavhan Kopar, Uran and Ransai Dam. The concentration of SO₂, oxides of nitrogen and suspended particulate matter were, however, observed on a four hourly concentration basis for 24 hours twice in a month. However, an insufficiency of instruments has meant that observations at different stations were carried out on different days. The data on sulphation rate and settleable dust are being collected over the entire period from January 1972.

Table 3.13

Average Percentage Frequency of Wind Directions
and calm conditions in New Bombay during
October, 1972 - February, 1973*

Station	Wind direction								
	N	NE	E	SE	S	SW	W	NW	Calm
Uran School	9.0	4.0	7.7	7.0	3.8	8.3	18.0	12.9	24.3
Uran Railway Station	10.8	3.2	2.0	8.0	10.6	8.0	17.6	16.0	23.6
Panvel	3.8	1.9	7.8	2.7	2.5	5.8	23.0	8.8	43.7
Asudgaon	9.6	2.9	1.3	1.6	4.0	7.6	11.5	7.7	53.8
Vashi	8.3	1.4	1.5	2.5	10.6	9.9	20.8	9.9	35.1
Mahape	16.0	10.3	2.9	1.2	0.9	5.9	14.9	4.9	43.0
Rabale	14.3	2.3	1.4	3.5	5.4	11.4	18.0	22.5	20.7

* Air quality survey in New Bombay by CPHERI.

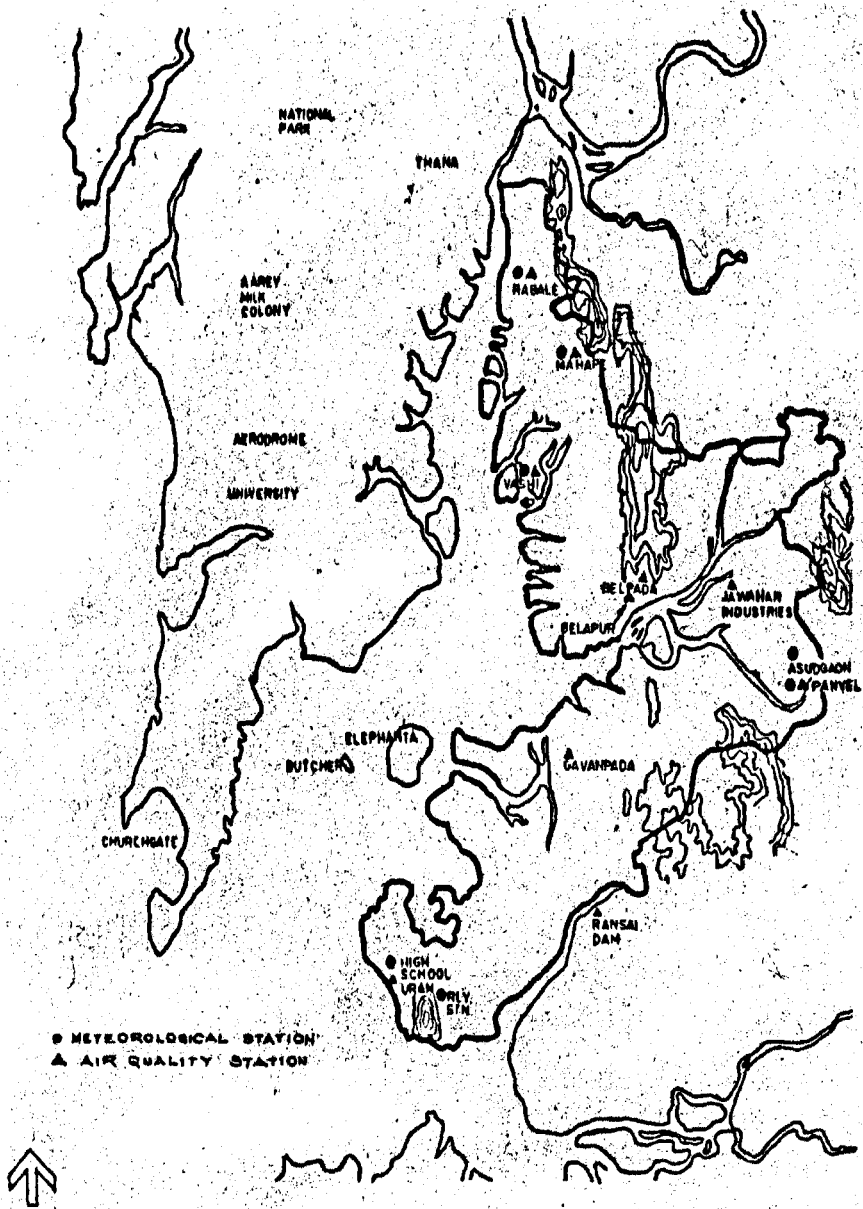
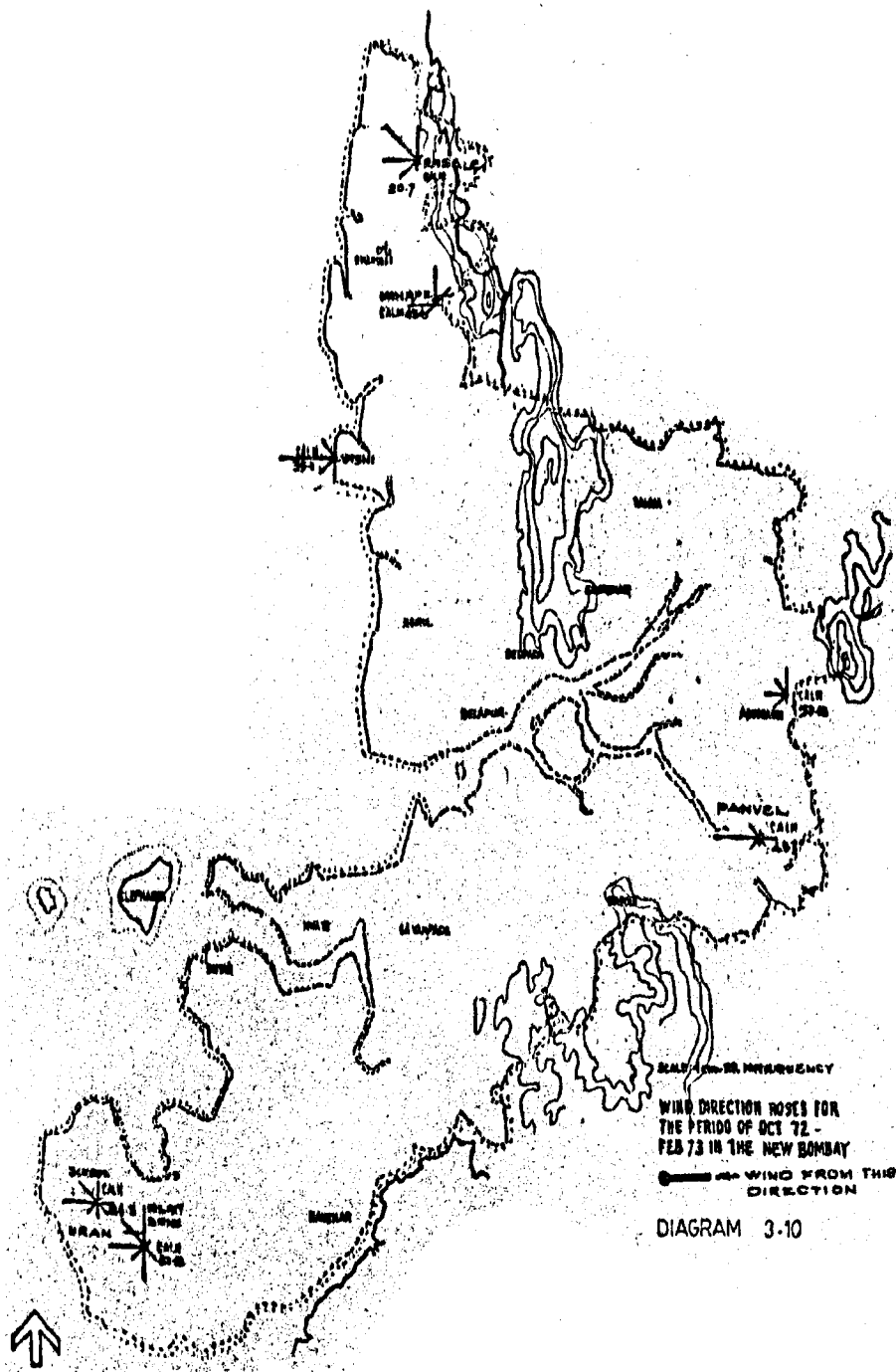


DIAGRAM 3-09

Map showing meteorological and air quality stations in New Bombay.



WIND DIRECTION ROSES FOR
 THE PERIOD OF OCT 72 -
 FEB 73 IN THE NEW BOMBAY
 ———— WIND FROM THIS
 DIRECTION

DIAGRAM 3-10

DIAGRAM 3-11
 VERTICAL TEMPERATURE PROFILE at
 JAWAHAR INDUSTRIES on 14/15 FEB. 73.

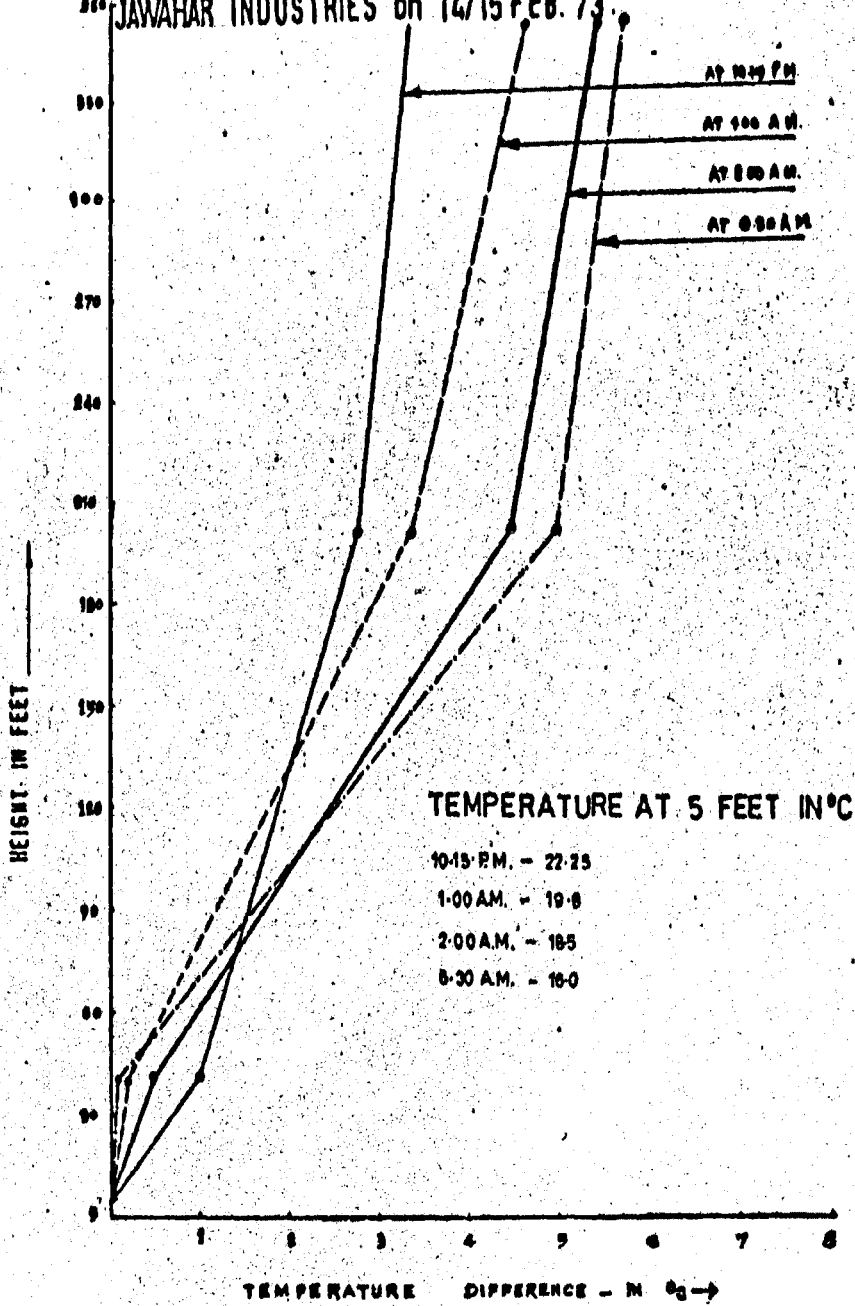
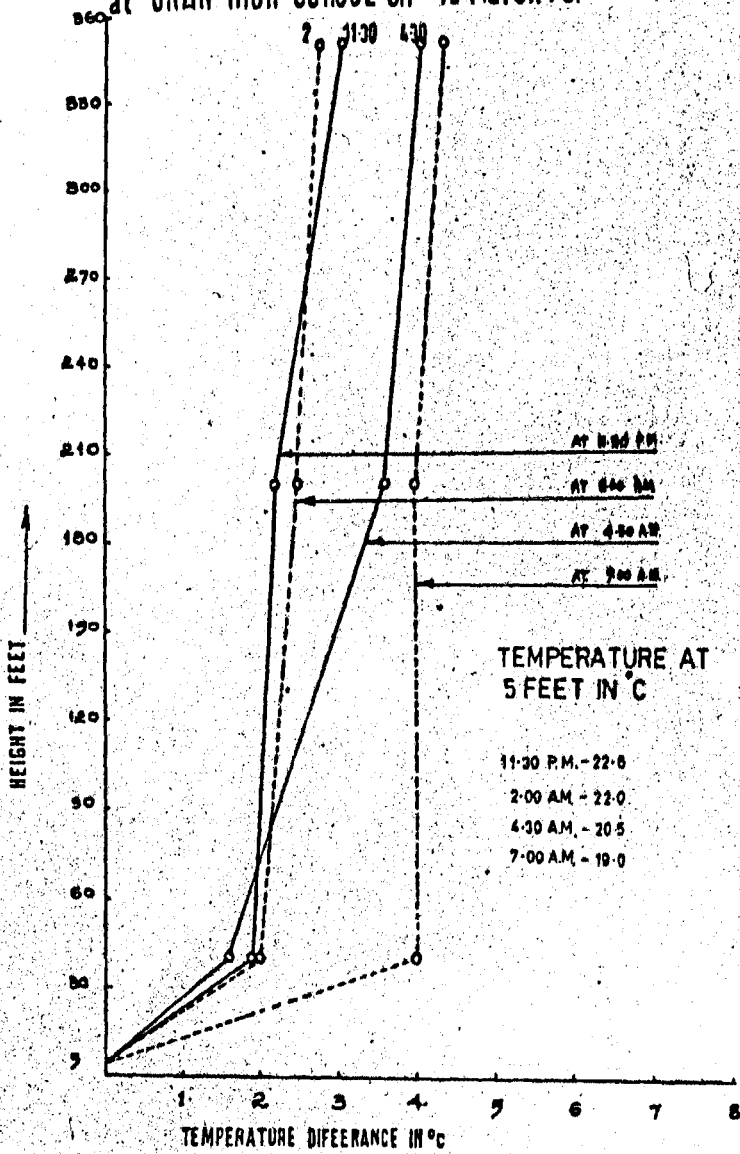


DIAGRAM 3-12
 VERTICAL TEMPERATURE PROFILE
 at URAN HIGH SCHOOL on 4/3 March 73.



Damming Panvel Creek

- 3.144 The damming of Panvel Creek, at a constriction near Shahbaji, offers the possibility of creating a lake upstream, around which the business area development can take place. The lake, with its backdrop of hills, will make a particularly attractive setting for the development on its water front. The studies listed below were undertaken to determine the feasibility of damming the creek.
- 3.145 Hydraulic studies to determine the effect of damming the Panvel Creek on siltation in the navigation channels of the existing Bombay Port and the proposed Nhava Sheva Port were conducted on the Bombay Harbour Model at the Central Water and Power Research Station (CWPRS) at Khadakvasla near Poona. This model has been built to a scale of 1:1000 horizontal and 1:100 vertical. For this investigation, the model was extended to cover a portion of the Panvel Creek 2-3 miles upstream of the proposed dam site. Velocities were measured along the alignment Trombay-Elephanta-Nhava. Out of the total flow crossing this line, only 2% flows upstream of the dam site into the Panvel Creek. The introduction of the dam caused only marginal changes in the velocity and current directions along this line. Tidal level observations recorded on the model at the Gateway of India, Trombay, Nhava and at the dam site indicate that there is practically no variation in these levels consequent on the construction of the dam, except for a rise in the high water level at Panvel Creek just downstream of the dam by 0.30 metre. Low lying areas just below the dam site may have to be protected from submergence. There would be a drop in velocity by about 70% to 80% immediately downstream of the dam site, leading to very heavy siltation of the order of 0.3 metres per year in this area. This cumulative siltation would gradually extend westwards, but would not have any major effect on the proposed Nhava Sheva Port, nor any effect on the existing shipping channels in Bombay harbour. However, the increasing siltation downstream of the dam would render it not directly reachable by water ferries from Greater Bombay.
- 3.146 Since the Panvel Creek has a fan shaped catchment with two main arms, one towards Panvel and the other towards Taloja, a study was also undertaken to determine the likely effects of construction of the dam on the flood levels upstream near Panvel Town and Taloja village. The catchment area of the creek is about 428 sq.kilometres near its mouth with an average annual yield of the order of 37,200 mcft and an estimated peak 100-year flood of about 90,000 cusecs.
- 3.147 If a fresh water lake is formed by constructing a dam, the lake level at the start of the fair weather season in October would be 3.07 m GTS, but it would go down to 1.57 m. GTS by the end of June because of heavy evaporation and the lack of fresh water flowing into the creek between November and June. Thus, a fresh water lake would be a stagnant and diminishing pool of water and this does not seem particularly

desirable. Alternatively, a salt water lake with a steady pond level is feasible by suitable regulation of the overflow gates in the dam which can let in the tide and permit the maintenance of any desired level. However, this stable lake level will not be possible throughout the year. On certain days, when heavy rainfall occurs or is expected over the catchment, it will be necessary to keep the overflow gates fully open and allow the lake level to fluctuate with the tide.

- 3.148 Bunds will be required along the periphery of the lake, to a height above that of the highest tide. This is necessary whether the dam is constructed or not. A preliminary examination of three alternative locations for the dam indicates that the cost of the dam would be between Rs. 3 and 4 crores at 1970 prices. The dam length at the three sites varies between 410 m. and 740 m., with an average rock fill height of 11 m. and a spillway length of 320 m. With a peak design flood of 1,12,500 cusecs and 20 gates (12 M x 5.5 M), there would be an afflux, or rise in the high flood level, of 0.46 m (1.5 ft) upstream. The study shows that Panvel town will not be affected by this afflux. There would be an afflux of 0.25 m at Taloja and a protective bund costing Rs. 2.5 lacs, would be necessary on the creek side of the village. Navde village would be similarly affected and would need a protective bund costing Rs. 4 lacs.
- 3.149 We propose, eventually, to dam the Panvel Creek, subject to the approval of the Bombay Port Trust. It is expected that the cost of the dam will be recovered through an increase in land prices around the lake as a result of the improved quality of the lake development. The damming of Panvel Creek is consequently not contemplated in the immediate future but at some later time, when the demand for land in the business area increases and we can expect to recover the capital amount invested on the dam through increased land prices on the perimeter of the lake.

Recycling Sewage

- 3.150 We are considering the re-use of treated sewage on vegetable and flower farms in New Bombay, because it has the advantage of easier disposal of the sewage and also because of the economic benefits it brings by providing both irrigation and nutrient to the farm. We have hesitated to carry out such a scheme because of findings which indicate that vegetables grown on sewage farms carry a number of intestinal parasitic infections damaging to human health. In order to eliminate the possibility of intestinal infections, a scheme of irradiation, either before or after the conventional forms of sewage treatment and before it is applied on the vegetable farm, is being considered. However, to establish whether irradiation would work, a fairly extended research programme is called for, beginning with laboratory tests and continuing, if these are promising, to the stage of setting up a pilot plant.

Rehabilitation Programme

Preamble

- 3.151 The New Bombay Project will affect 95 villages in Thana, Panvel and Uran Tehsils. The land to be covered will be about 17,000 hectares of private land and an equal area of Forest and Government land. According to the 1971 census, the total population is about 1,17,000, excluding the population in the Panvel and Uran Municipal areas.
- 3.152 Unlike what happens in irrigation projects, gaothans in New Bombay area will not only be kept intact but will also be actively developed by providing social amenities and otherwise encouraging the process of absorption of the rural population into the new urban setting, to enable them to participate fully and actively in its economic and social life.

Objectives

- 3.153 The State Government and CIDCO are alive to the problem of rehabilitation of the local people. CIDCO, right from its inception, has given a high priority to the problem and launched a comprehensive rehabilitation programme with the following three objectives:
- (a) To provide at least one member of every family whose land is acquired with a real opportunity of earning a non-agricultural livelihood at least as remunerative as the family's land afforded;
 - (b) To provide for those among the dispossessed who cannot work some secured income from investments out of the compensation payable; and
 - (c) To bring about the assimilation of the rural population in the new urban environment and equip them to take full advantage of the new opportunities created by the development of the new city.

Public Contacts

- 3.154 To plan the rehabilitation programme, constant touch is kept with the people in the rural area by paying regular visits to the villages and attending meetings of the people's representatives and local leaders to discuss and solve their problems.

Employment

- 3.155 CIDCO's Placement Service is in constant touch with the Employment Exchanges at Thana and Panvel, the various industries in New Bombay and the project affected families, with a view to finding placement for both skilled and unskilled persons.

The present population of New Bombay is mostly uneducated and unskilled. These people are therefore being trained in technical skills at CIDCO's Technical Training Centres and efforts are made to place them in private and public sectors employment, or to help them achieve self-employment.

Employment Guarantee Scheme

- 3.156 An Employment Guarantee Scheme, during the non-monsoon period, has been introduced in certain villages. Under this scheme, project affected persons are employed on daily wages, as manual labourers on CIDCO's various afforestation and construction works. This provides them with a source of employment and also furthers CIDCO's programmes.

Employment Exchange

- 3.157 The State Government has issued instructions to give preference to project affected persons in employment. To make the placement machinery effective, a special Employment Exchange for the whole of the project area is being planned. The staff of this Employment Exchange will pay frequent visits to public and private sector concerns to find effective placement for project affected persons.

Entrepreneurs' Scheme

- 3.158 The State Government, with the help of the Government of India, has sanctioned a scheme for providing employment to unemployed graduates, matriculates, etc. Taking advantage of this scheme, CIDCO, in collaboration with the Maharashtra Industrial Development Corporation, Konkan Development Corporation, and the Nationalised Banks, will be undertaking a scheme to provide employment to suitable project affected persons. Under this scheme, about 40 educated unemployed persons will be given the necessary technical guidance and financial assistance, along with other facilities, like training for their staff, to enable them to run their own small industries. Project affected boys, suitably trained, will be employed in such small-scale industries. These will become independent units producing products required by other industries. Such units will be established in all the three Tehsils of the project area, Thana, Panvel and Uran. These units will employ about 800 project affected persons.

Loans and stalls for petty trades

- 3.159 For those project affected persons who desire to start their own small-scale businesses such as a bakery, grocery, fruit stall, cycle shop, etc., a scheme for giving loans to individuals upto a maximum of Rs. 5,000, has been introduced.

Autorickshaws

- 3.160 Project affected persons are trained in autorickshaw driving. Thereafter, loans are secured from the nationalised banks and autorickshaws are made available from a Government quota. Under this scheme the project affected boys earn their livelihood and also provide transport facilities to the residents of the locality.

Deposit Scheme

- 3.161 Project affected persons receiving compensation for their land can deposit, with CIDCO, a part of the amount of their compensation. Interest ranging from 6% to 9% per annum is given for such deposits depending on the amount and the period of the deposit. This helps the older group of project affected persons to earn a secured income and thus to maintain themselves and their families.

Training

- 3.162 CIDCO has arranged facilities for training in various skills to enable the younger group of the population to equip themselves with the skills required for employment in industries and offices. For technical training besides taking advantage of the State Government Industrial Training Institute (I.T.I.) at Panvel, CIDCO has its own Technical Training Centres (T.T.Cs) at Mahape, Panvel, Uran, Ulve, and Gavan. More such centres are proposed to be opened when circumstances justify this. These centres train project-affected persons in a variety of trades, which makes it easier for them to find employment.

<u>Course</u>	-	<u>Trade</u>
(1) House Mechanic	-	i) Wireman ii) Plumber and Pipe Fitter iii) Mason
(2) Structural Mechanic	-	i) Welder ii) Painter iii) Furniture frames.
(3) Workshop Mechanic	-	i) Turner ii) Fitter iii) Mechanist
(4) Automobile Mechanic	-	i) Motor Mechanic ii) Spray Painter iii) Auto-electrician
(5) Electronic Mechanic	-	i) Radio Mechanic ii) TV Mechanic
(6) Wood work Mechanic	-	i) Furniture Maker ii) Wood Work Machine Operator iii) Plastic Laminites etc.

- (7) Gardening and Horticulture - -i) Gardener
- (8) Surveyor - -i) Surveyor
 ii) Craftsman
 iii) Maistry

Crash training programmes like pipe fitters, road roller drivers, pump attendants, etc., are started when necessary and courses in typing and stenography, tailoring, etc., are also conducted.

Training Guarantee Scheme

3.163 A Training Guarantee Scheme has been sanctioned under which project affected persons are trained by opening additional training centres where necessary, provided:

- (a) at least 30 educationally qualified boys are available;
- (b) after successful completion of the training, the trainees are willing to serve any where in Maharashtra.

During the training period, a stipend of Rs. 50 p.m. is paid to each trainee.

Social Amenities

3.164 Educational facilities:

(i) College: Under this scheme financial assistance is given for the construction of buildings for college education. There is only one college run by the Rayat Shikshan Sanstha at Panvel. The Government of Maharashtra has allotted necessary land to this institution and CIDCO has agreed to provide financial assistance for the construction of the college. The plans and estimates are being finalised. Financial assistance is also given to the project-affected students in this college.

(ii) Secondary Schooling: There are nine secondary schools in the project areas as shown below:-

<u>Sr. No.</u>	<u>Village</u>	<u>Tehsil</u>
1.	Belapur	Thana
2.	Turbhe	
3.	Ghansoli	
4.	Navade	Panvel
5.	Dapoli Paragaon	
6.	Gavan	
7.	Funde	Uran
8.	Jasai	
9.	Chanje (Karanja)	

The schools in Thana are run by the Village Panchayats and local institutions, while those in Uran and Panvel are run by the Rayat Shikshan Sanstha, Satara. Financial assistance is provided for the construction of the school buildings and museum-cum-science halls etc. Poor students are also given help for purchase of books.

(iii) **Primary Schooling:** There are primary schools in all the villages in the project area. Grant-in-aid for the construction of school buildings is also sanctioned in favour of the Panchayat Samitis or Village Panchayats to construct buildings according to the Government pattern.

- 3.165 **Village Development:** A special feature of the New Bombay Project is that only the agricultural land is acquired, while the house sites remain untouched. To bring them on par with the urban environment, schemes for improvement of the gaothans have been formulated. The details of such schemes are given in Section 3.172 and 3.173.
- 3.166 **Piped water supply:** Many villages in the project area suffer from a water shortage, particularly during summer. A scheme for providing piped water supply, with the capital investment being made by CIDCO, has been sanctioned. It is implemented in a phased programme, in collaboration with the MIDC from its Ransai, Barvi and Patalganga water supply schemes. Under the scheme, CIDCO pays the entire capital cost of laying the pipe lines and the Village Panchayats only pay monthly water charges.
- 3.167 **Arboriculture:** The plans undertaken to improve the environment in the development nodes and villages have provided opportunities for (a) training project-affected persons in gardening and (b) appointing project-affected persons as casual labour, on arboricultural works, which have been taken up on a large scale. Details of the arboricultural developments are given in Sections 3.138.
- 3.168 **Medical facilities:** A scheme to provide medical facilities by constructing primary health units at central places is being considered. These units will be provided with sub-centres so that the medical facilities are available within a radius of about 3-4 miles from any village. Occasionally, medico-surgical camps are held at central places, advantage of which is taken by the rural population.
- 3.169 **TV Sets:** TV sets are installed in the secondary schools in the project area with the help of the Directorate of Rural Broadcasting of the State Government.
- 3.170 **Film Shows:** Educative and commercial film shows are arranged periodically in the villages.
- 3.171 **Achievements:** Achievements in Rehabilitation are given in Appendix Q.

Village Improvement Schemes

- 3.172 We wish to pay particular attention to the existing 95 villages which will be exposed to the great impact of the proposed urban development, which will change their entire life style. We have, therefore, decided to prepare village improvement schemes which

will be based on a policy of conservation. However, this policy does not envisage a stagnant economy for the villages. Rehabilitation measures will be taken up to prevent the villages turning into slums. Villages can be categorized and studies made of their common problems like sanitation, water supply, social facilities etc. and also for their individual built forms and activity patterns. Efforts will be centred on augmenting and providing amenities and services, which are lacking, with minimal changes in the basic village structure and minimal disturbances in village life. The entire improvement scheme will be co-ordinated with the other gaathan expansion schemes.

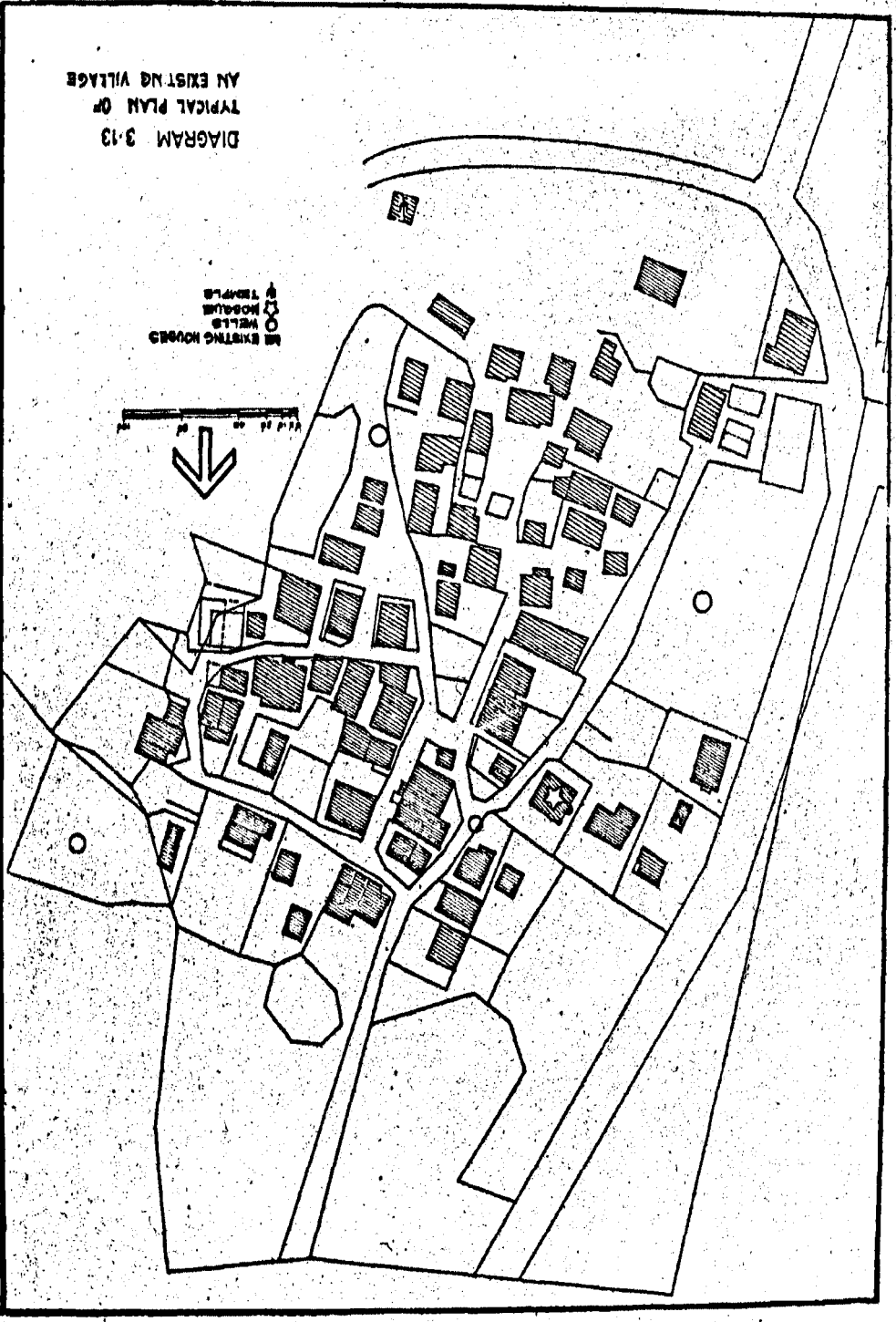
3.173

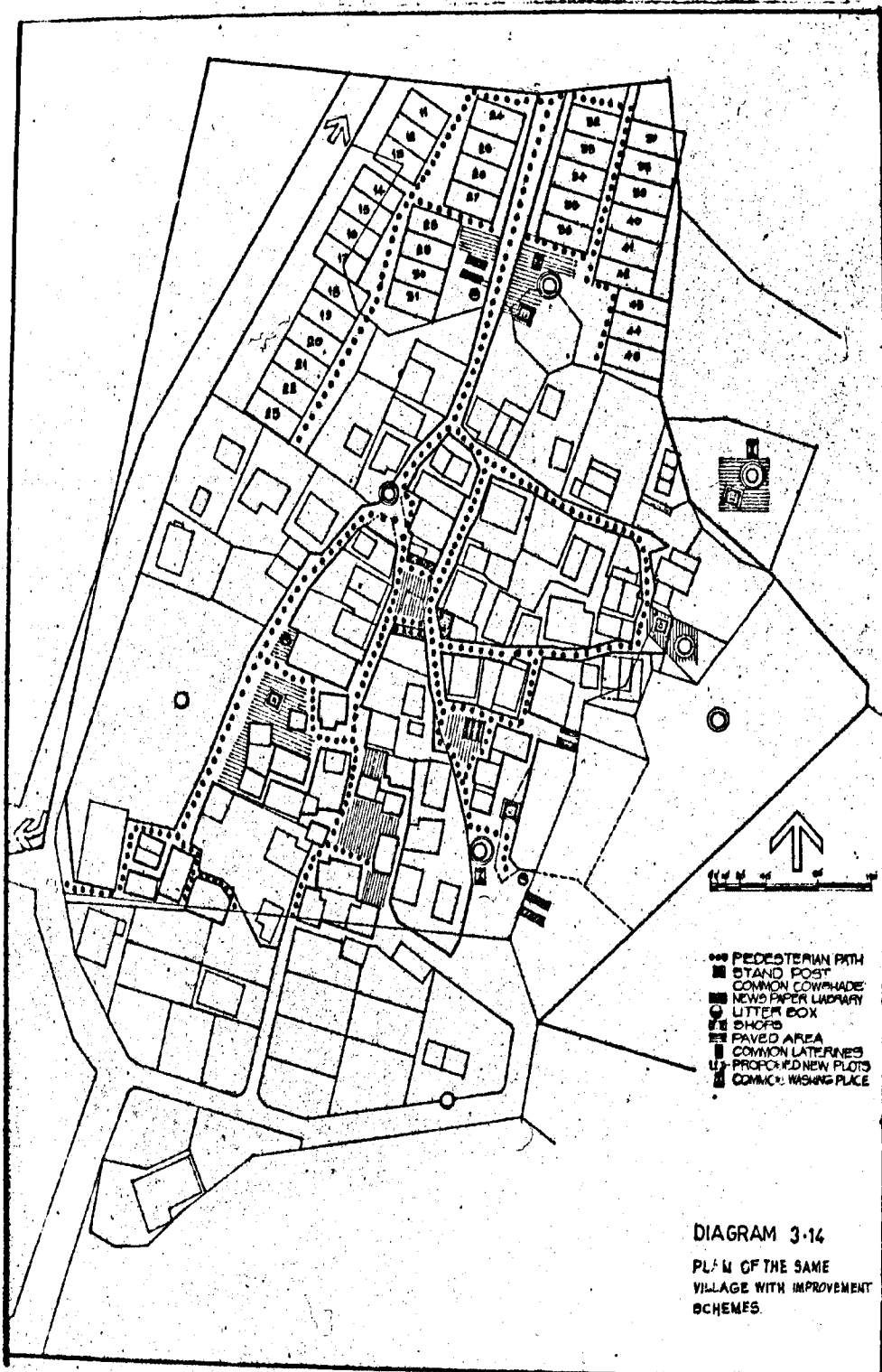
Preparation of a Scheme:

- (a) For each village, we will collect and analyse data regarding population, housing facilities, services, etc.
- (b) We will then prepare the first draft improvement scheme. It will contain maps, charts and explanatory sketches of:
 - (i) The village, its surrounding region and existing road links and our proposals in the surrounding area.
 - (ii) Existing broad land use, showing the cluster of houses (residences), cattle sheds, shops, ponds, public transport facilities, and social facilities like schools, post offices, banks etc. and religious places and any special use, for example drying areas for fishing nets.
 - (iii) Identification and possible regrouping of places of important activities such as religious places and water distribution points, places of weekly bazars and shopping, bus-stops and eating houses, and so on.
 - (iv) Existing services, their condition and adequacy like water supply, waste water, sewage and refuse disposal, internal roads and accesses, and street lighting.
 - (v) Proposals of improvement (based on the above mentioned studies and information analysis)
- (c) This first draft will be forwarded and explained to the villagers for inviting their comments and reactions and we will try, at all times, to secure the participation of the villagers and involve them in the village improvement schemes.
- (d) On the basis of the suggestions received from the villagers, a revised improvement scheme will be prepared.
- (e) A rough estimate of the cost involved will be prepared for sanction.
- (f) The scheme will also indicate, broadly, the strategies for implementation.

Diagram 3.13 shows a typical plan of an existing village and Diagram 3.14 shows the plan of the same village with improvement schemes.

DIAGRAM 3-13
TYPICAL PLAN OF
AN EXISTING VILLAGE





Town Amenities

- 3.174 Police Stations: In Greater Bombay in 1969, there was 1 police station per 1,50,000 persons, which is grossly inadequate. For New Bombay, one police chowki per 15,000 population, one police station in a new node or township and one Central Police Station have been proposed. Police chowkies will be fitted into the normal building pattern, but separate plots will be provided for police stations.
- 3.175 Banks: In Greater Bombay (April 1973) there was 1 banking office per 11,000 persons, though the Bank Authorities wish to have one bank per 8000 to 10,000 persons in urban areas. Our expectation is that there will be one bank (5000 sq.ft. built up area) per 10,000 persons resident in New Bombay and these banks will be distributed all over the city in proportion to the expected population in each area. Banks will be offered preferred sites if they wish to establish their head-quarters or regional offices in New Bombay.
- 3.176 Markets & Shopping: The Town Planning Department, Government of Maharashtra, has suggested 1 market site of 0.5 acres per 20 to 25 thousand population. This standard has been adopted for New Bombay. In so far as shopping is concerned, after examining standards in various metropolitan cities all over the world and particularly in India, the Plan proposes 1 shop per 66 persons in residence in an area. The average size of built up area is expected to be 20 m² per shop.
- 3.177 Hotels & Restaurants: It is expected that hotels, including guest houses and lodgings will develop automatically in response to demand.
- 3.178 Social Centres: Social ceremonies to celebrate weddings, births, saryjanik pujas or congregations of extended families and relatives for various events are very frequent in our society. Only a few are able to afford hotels and other commercial facilities for the purpose. As a result, spill-over on public places, such as roads, lanes and parks is a usual practice leading to traffic dislocation and public nuisance. New Bombay will provide social centres in various nodes of the city. A social centre will have a hall, a few rooms, open spaces in front and behind and other facilities needed for these ceremonies. The local community leaders will be encouraged to raise contributions and equip the Centre with furniture, crockery, utensils and such other items as are required for various ceremonies and celebrations and also be responsible for its management. Intending users can book the Social Centre and hire whatever they need by paying service charges.
- 3.179 Libraries: Libraries of all educational institutions in New Bombay will be open for the use of all residents of the city. In addition, libraries and reading rooms of all community centres will be open to the public.

- 3.180 Auditoria: Bombay is a cultural centre, not only of Marathi plays, dramas and cultural activities, which are highly developed, but also of various other language groups that reside in the metropolis. New Bombay will provide facilities of a high order for staging cultural activities of all kinds for various groups.
- 3.181 Cinema Halls: The Town Planning Department, Government of Maharashtra, has recommended 1 cinema seat per 50 persons and CIDCO has accepted this for New Bombay. However, a cinema hall becomes viable only at a 25,000 population threshold.
- Cinema halls are located at least 200 metres away from educational institutions, hospitals and public offices and are away from residential areas as well as traffic junctions.
- 3.182 Swimming Pools: At present, it is proposed to build the first two pools, at Vashi and Belapur, with CIDCO providing funds. The rest of the units will, hopefully, come up through private and voluntary effort.
- 3.183 Public Conveniences: CIDCO's Building Regulations will make it obligatory that public conveniences at prescribed scale and standards are provided at railway stations, bus stations, restaurants, hotels, cinemas, gardens, markets, jetties and all other public places. In addition, CIDCO, as the civic authority, will build public conveniences all over New Bombay at the scale of 1 unit per 2000 population - a unit being 2 urinals and 1 toilet seat for men and 3 toilet seats for women. There will be a nominal service charge for the use of toilet seats. Public conveniences will be suitably located after making a survey of patterns of traffic and other relevant data.
- 3.184 Hostels for Working Girls: Single working girls, who are now entering the employment market in large numbers, particularly in office sector jobs, find great difficulty in housing in all metropolitan cities. Keeping this need in view and considering that the magnitude of the need will grow, suitable provisions are being made for hostels for working girls.
- 3.185 Night Shelters: Nearly 1.5% of the Greater Bombay population is without any kind of shelter. The situation in New Bombay will be much better than this but the need to provide night shelters is a genuine one.
- These night shelters will be located near railway stations, bus termini, wholesale markets and ware-houses. Persons with no place to sleep in New Bombay can spend a comfortable night in these night shelters by paying a nominal service charge.
- 3.186 Jail: An appropriate site will be made available for construction of a jail.
- 3.187 Crematoria: Crematoria will generally be located nearer the sea and burial grounds and cemeteries on the periphery towards the hills. Crematoria and burial grounds already existing in the Project Area will be developed to bring them up to CIDCO standards.

- 3.088** Hawking: Hawkers are a common occurrence in all Indian towns. New Bombay will have special space reservations and hawking will be permitted in reserved places only. A study is being made of the hawking patterns in Greater Bombay and elsewhere in India. Detailing will be done after the results of the study are available. Meanwhile, spaces have been earmarked for hawkers and pan-supari shops in sectors of Vashi under construction.

Data Bank

- 3.189** It is proposed to build an Urban 'Data Bank' or Information System which will include all the necessary data useful for planning purposes and model building work to be carried out for the Bombay Metropolitan Region. It is proposed to have the system flexible enough to cover administrative needs, although this will not be an immediate requirement. The system will need to be made sensitive to the growth and other changes taking place in different parts of New Bombay, Greater Bombay and some areas of Thana and Kolaba districts which could affect working in Metropolitan Bombay.

- 3.190** Data Bank will have the following major activities:

- (a) Organisation and data collection.
- (b) Recording of data
- (c) Updating the data periodically
- (d) Retrieval of information in a suitable format
- (e) Development of models and the selection and presentation of information which can influence planning decisions.

- 3.191** The following files are proposed to be included in the Data Bank:

- (a) Land acquisition and land ownership file
- (b) Land use, capability and suitability file
- (c) Physical development and property file
- (d) Socio-Economic data file
- (e) Transportation network and traffic file containing data regarding highways, railroads, roads and waterways etc.
- (f) Air pollution data file
- (g) Service utilities file containing data regarding power and telephone lines, pipe networks - water, sewage, gas and drainage.

- 3.192** The basic unit for which data should be recorded, the coding structure and the organisation of the files are currently under study. Because Greater Bombay is an already built up area with census boundaries not matching Municipal Ward

boundaries and neither of them matching postal boundaries, physical area units have to be established which are the best compromise, so that data from these various sources can be aggregated or disaggregated to the newly defined units. The units also must not be so many that data retrieval and manipulation becomes unnecessarily cumbersome, nor so few that the fine grain of detailed information is lost. For New Bombay, where most of the development is yet to come, the basic unit can be differently chosen and care taken that other agencies' data collection is over multiples or sub-multiples of these basic units.

- 3.193 The probable sources from which data will be gathered are given in Appendix K.

Finance

- 3.194 The financial working of CIDCO commenced in March 1970, with a paid-up capital of Rs 10 lacs fully subscribed by the holding company, SICOM Ltd., and a loan of Rs 270 lacs sanctioned by SICOM Ltd. The funds were drawn in consultation with SICOM, as and when necessary. Until the end of the first financial year, on 31 March 1971, the total amount borrowed from SICOM was Rs 16,60,068/-. A large part of the paid-up capital was utilised to acquire fixed assets, such as furniture and fixtures, office equipment and vehicles. The holding company charged interest at six per cent per annum on the amount drawn.
- 3.195 During the second year, the Corporation's equity capital was raised from Rs 10 lacs in 10,000 equity shares of Rs 100 each to Rs 3 crores in 3,00,000 equity shares of Rs 100 each, by an issue of 40,000 equity shares of Rs 100 each subscribed and paid in full and 2,50,000 equity shares of Rs 100 each subscribed in full but paid up to Rs 20, by the holding company - SICOM Ltd.
- 3.196 In December 1971, the Corporation raised a loan of Rs 12,08,17,000 by public subscription through an issue of Debentures of Rs 1,000 each at a discount of 2 per cent, redeemable after 12 to 15 years and bearing interest at the rate of 7.25 per cent yearly.
- 3.197 In the same year, the State Government settled with CIDCO the terms of its agency to develop New Bombay (Government Resolution, General Administration Department, No.CID-2072-U, dated 24th January, 1972) and empowered CIDCO to dispose of land in New Bombay after its development and to appropriate the proceeds to the expenses incurred on development including administrative expenses, plus agency remuneration at Rs 3 lacs for the year ending 31st March 1971, to be increased each year by Rs 1 lac, subject to a maximum of Rs 5 lacs for any year. The Corporation has eventually to transfer any surplus beyond this to the Government. The cost incurred by the Government on the acquisition of lands will be accounted as Government's own capital outlay. Section 26 (V) of the Maharashtra Regional & Town Planning Act, 1966, requires

that the Planning Authority submit estimates of the cost of acquisition of lands required for public purposes. Since all the land is to be acquired by Government, this estimate is not presented here.

- 3.198. The Corporation may make "On Account Advance Payments" to the Government from the proceeds of land disposal to meet the Government's outlay on the payment of compensation for compulsory acquisition. Such "On Account Advance Payments" made by the Corporation will be adjusted in due course. In accordance with the above terms, during the current year a total amount of Rs 2 crores was released to the State Government by way of "On Account Advance Payments". While making this payment, an assurance has been sought from the Government that it will assist CIDCO in raising funds either through Government guaranteed bonds or through issue of debentures as was done in the year 1971. It is proposed to raise a total amount of Rs 4 crores through this source during the current year. Apart from open market borrowings, negotiations are also under way for securing funds from the Housing & Urban Development Corporation of the Central Government for financing the housing programme. Up to 30th June 1973, the funds raised and expenditures made are shown in Table 3.14.

Table 3.14

(Rs in lacs)

<u>Funds Raised</u>	
Share Capital	100.00
Debenture Issue	1,153.00
Loan from SICOM	17.00
	<u>1,270.00</u>
<u>Expenditures</u>	
New Bombay	495.00
Other areas	15.00
State Government "On Account"	100.00*
Loan to SICOM	302.00
Fixed Deposit	225.00
Advance	116.00
HCC Ltd.	15
MSEB	22
MFB	60
Others	19
Revenue Expenditure	<u>17.00</u>
	<u>1,270.00</u>

* A further sum of Rs. 100 lacs was paid after 30th June 1973.

3.199 The programme for future expenditure will greatly depend upon the success of our land disposal policy and our capacity to generate finances on a "Revolving Fund" basis. There will obviously be limits to the amount of loan finance, ~~that~~ can be raised by issue of debentures. Hence, it is imperative that we treat the amount already raised and the amount likely to be raised during the current year as seed capital for generating a "Revolving Fund" on the lines adopted by the Delhi Development Authority.

APPENDIX F
DESIRABLE STATION SPACING FOR MASS RAPID TRANSIT SYSTEM

- F.01** The performance of a rapid transit system is judged mainly by its speed. First, a high average speed is desirable from the standpoint of a passenger, for if the public is to be completely satisfied with the service, the performance of the vehicle should be at least equal to or if possible better than that of private vehicles in respect of average speed. Second, increasing the average speed decreases the number of vehicles required to service a route of given length with given demand, which results in savings in the transportation cost.
- F.02** The average speed attained depends on halt time at stops, acceleration, deceleration, maximum speed and station separation. Diagram F.01 illustrates this in a graphical form for values of acceleration and deceleration 4.8 KPH/Sec, which are the highest practical values for ground track systems. It shows that although the top speed of the vehicle is 80 KPH, it can attain an average speed of 50 KPH only if stations are spaced not closer than 1.5 km. With 1 km. station spacing, the average speed attained is only about 40 KPH. With lower values of acceleration and deceleration which are frequently encountered in practice, the relative advantage of increased station spacing will be even greater.
- F.03** We may consider the influence zone of a rapid transit system to be one km. on both the sides because then commuters are within a reasonable walking distance from the station. It is assumed that the population and jobs in any development are concentrated as far as possible within this area, land extensive uses such as playgrounds, banks, etc. being located beyond the periphery. Diagram F.02 shows the influence zones of stations for station spacings of 2, 1.5, 1 and 0.5 kms. It indicates that with 1.5 kms station spacing, 94% of the area in the influence zone is covered (i.e. with 1 km. radius) and 12.5% of the area is served by two stations i.e. there is an overlap. When the station spacing is reduced to 1 km., the overlapping area increases to 70% and the area covered increases to 99%. With a further reduction in station spacing to 0.5 km., almost 100% of the area is served but most of the area comes under the influence zone of three to four stations, which is quite unnecessary.
- F.04** This analysis shows that for efficient performance, station spacing should be as high as possible; and for good coverage, that is, best utilisation of land within walking distance of the transit system the station spacing should be 1.5 km., but definitely not less than 1 km.

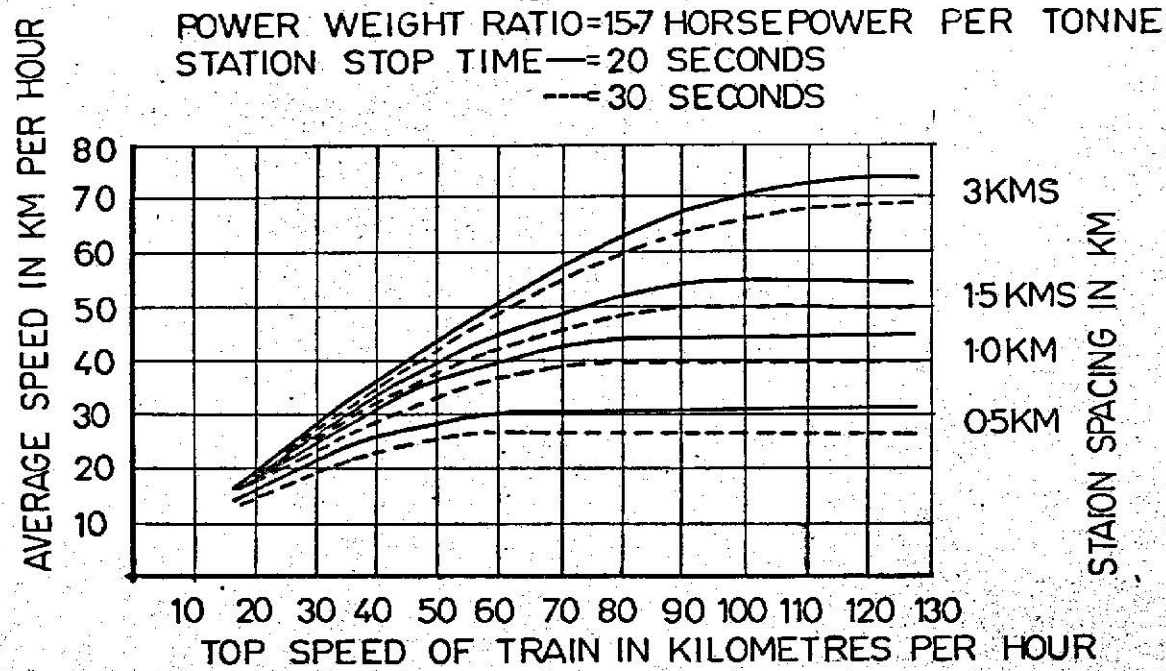
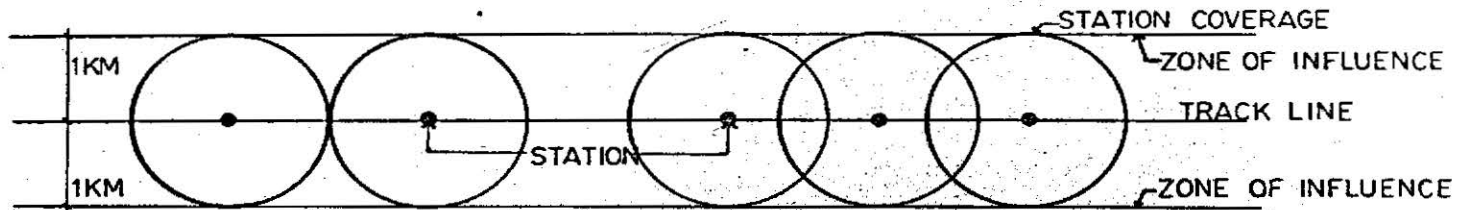


DIAGRAM F. 01.

RELATIONSHIP BETWEEN TOP SPEED, STATION SPACING,
 AND AVERAGE SPEED.

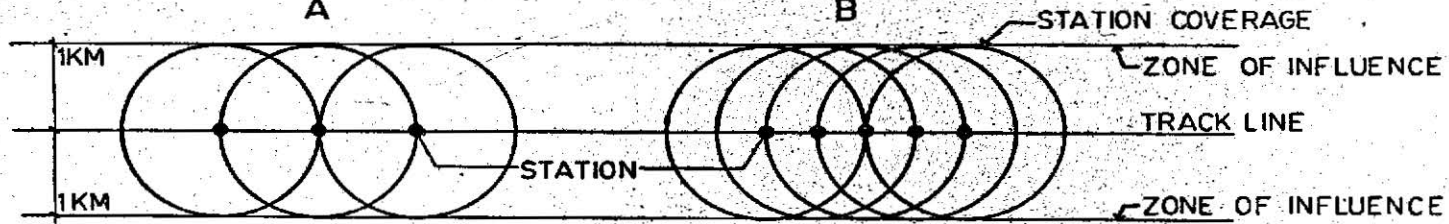


SPACING 2 KM
 COVERAGE 78 %
 OVERLAP 0.0 %

SPACING 1.5 KM
 COVERAGE 94 %
 OVERLAP 12.5 %

A

B



SPACING 1 KM
 COVERAGE 99 %
 OVERLAP 70 %

SPACING 0.5 KM
 COVERAGE 100 %
 OVERLAP 98.5 %

C

D

DIAGRAM F.0/2

STATION SPACING AND ITS COVERAGE

APPENDIX G

- G.01 As an individual mode of transport, especially for the low and middle income groups, bicycles are quite popular in many cities of India. In New Bombay, where roads would not be as hazardous as in Greater Bombay it is anticipated that people would use bicycles for work and other trips.
- G.02 It would be desirable if persons were to spend not more than 20-30 minutes for their work journeys each way. Taking 30 minutes as the maximum time for their work journey and the bicycle riding speed at 16 km/hour, the maximum acceptable distance is approximately 8 kms. Hence, for purposes of this analysis, the catchment area for cycle traffic will be taken as 8 kms.
- G.03 A separate cycle track is generally recommended where :
- i) significant cycle-traffic exists, or
 - ii) significant future cycle-traffic is forecasted, or
 - iii) significant motor-vehicle traffic is present on the road, or a combination of these conditions.
- G.04 According to the Indian Roads Congress, separate cycle tracks of minimum 2 m. width may be provided when the peak hour cycle-traffic is 400 or more on routes with traffic of 100-200 motor vehicles, two way on a two-lane road. When the number of motor vehicles using the route is more than 200 per hour, both ways, separate cycle tracks may be justified even if the two way cycle-traffic is only 100 per hour.
- G.05 Where movement is in both directions, a cycle track of minimum 3 m. width should be provided to make it less hazardous and efficient. These tracks would be horizontally segregated from vehicular traffic by a green verge of at least 1 m. width.
- G.06 Although the capacity of a cycle track is highly sensitive to climatic conditions, grades, proximity of barriers, bottlenecks at intersections, a 3 meter wide cycle track for two-way movement should be capable of handling 2000 cycles per hour.
- G.07 Construction of a cycle track costs only Rs.21/- per sq.m. which is less than half the unit cost of a vehicular road.
- G.08 In New Bombay it is proposed to construct a cycle track of 16 km. length on an experimental basis from Vashi to the Thana-Belapur industrial belt. Should this become popular, a network of cycle tracks will be constructed connecting residential nodes to the employment and shopping centres.

APPENDIX H

ECONOMICS OF DIFFERENT TRANSIT SYSTEMS

- H.01 In every urban area the transport system plays a very important role. The mode of transport which a commuter would like to choose is the one which can take him to his destination within a desired time, at a cost which is within his economic capability. A fast mass transportation system is the only answer for the people of our country and for all the people in developing countries, where only a few can afford to have fast vehicles of their own. In Greater Bombay about 80% of the passenger trips made by mechanical modes are by mass transportation i.e. by bus and train. These two modes of transport share approximately equally the number of passenger trips in Greater Bombay.
- H.02 A train system is faster than buses in mixed traffic mainly because of higher cruising speeds, no interference from other vehicles and more widely spaced stops. The train system also has a larger capacity. But it can be made more economical only if there is a high flow of traffic on the concerned route. It is also possible to improve the efficiency of the bus system to a large extent by providing an exclusive busway for the system, but this increases the road cost debitable to the bus system, as this road is reserved for buses only. However above a certain level of demand, the greater efficiency using busways more than pays for the extra cost of roads and this system becomes more economical than buses in mixed traffic, besides providing a faster service.
- H.03 A study was carried out to determine the mode of mass transportation levels of traffic flow, on the basis of economic considerations. The flow of passenger traffic from one point to another on a given route may vary randomly or have a particular pattern depending on the distribution of population and various kinds of activities along the length of the route. In general, it is the peak of the traffic flow over the route which is the most important factor in determining the total system installation and operating cost.
- H.04 It was found from the study that upto a certain average speed of buses in mixed traffic, this system is more economical than an exclusive busway system (diagram H.01). On a particular route for example, if the average speed of buses in mixed traffic is 16 km/hr. with 1.0 km stop intervals, the graph (diagram H.01) indicates that an exclusive busway is more economical if the present flow of traffic at the point of maximum demand on the route is 11,500 passengers one-way per day or more. If the average speed of buses for a given stop interval falls below the plotted figure at a given flow of traffic, an exclusive busway has preference over the mixed traffic system on cost considerations.
- H.05 A comparison was also made between the train system and the exclusive busway system. It was found that with a 1 km. station spacing, the train system is economical only if the passenger traffic flow one-way per day through the point of maximum demand exceeds 41000 (diagram H.02) and with 2 km. station spacing the limit is 36000 per day (diagram H.03). This was based on a headway constraint that the time interval between two successive services will not exceed 15 minutes.

H.06 This analysis suggests to the transportation planner the most economical system for any given level of traffic flow. It also suggests that on some routes it would be economical to operate an exclusive busway system on certain sections of the route with buses operating in mixed traffic in the remaining sections.

DIAGRAM H.01
**AVERAGE SPEED OF BUSES IN MIXED TRAFFIC SYSTEM
 BELOW WHICH AN EXCLUSIVE BUSWAY IS MORE ECONOMICAL**

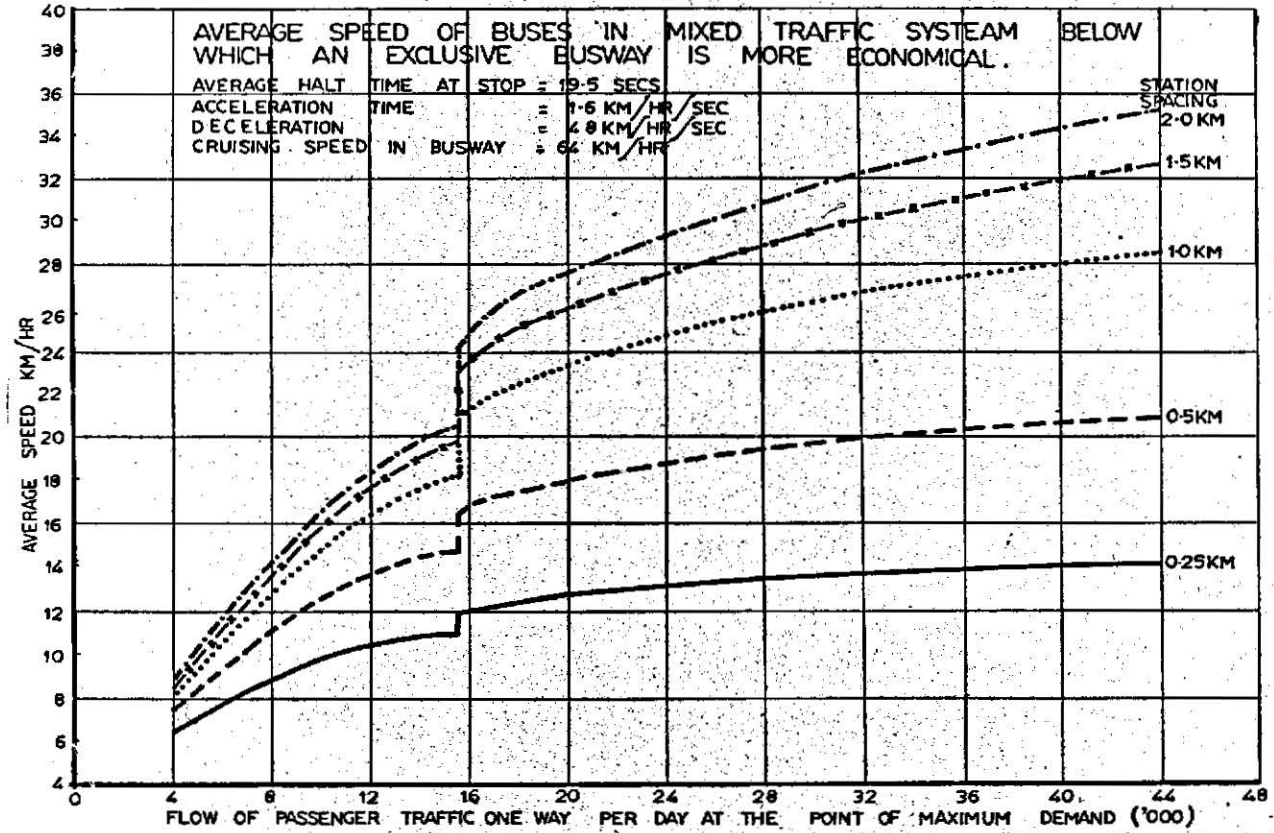


DIAGRAM H.02

SYSTEM COST (RS) ROUTE / KM / DAY / PASSENGER THROUGH THE POINT OF MAXIMUM DEMAND

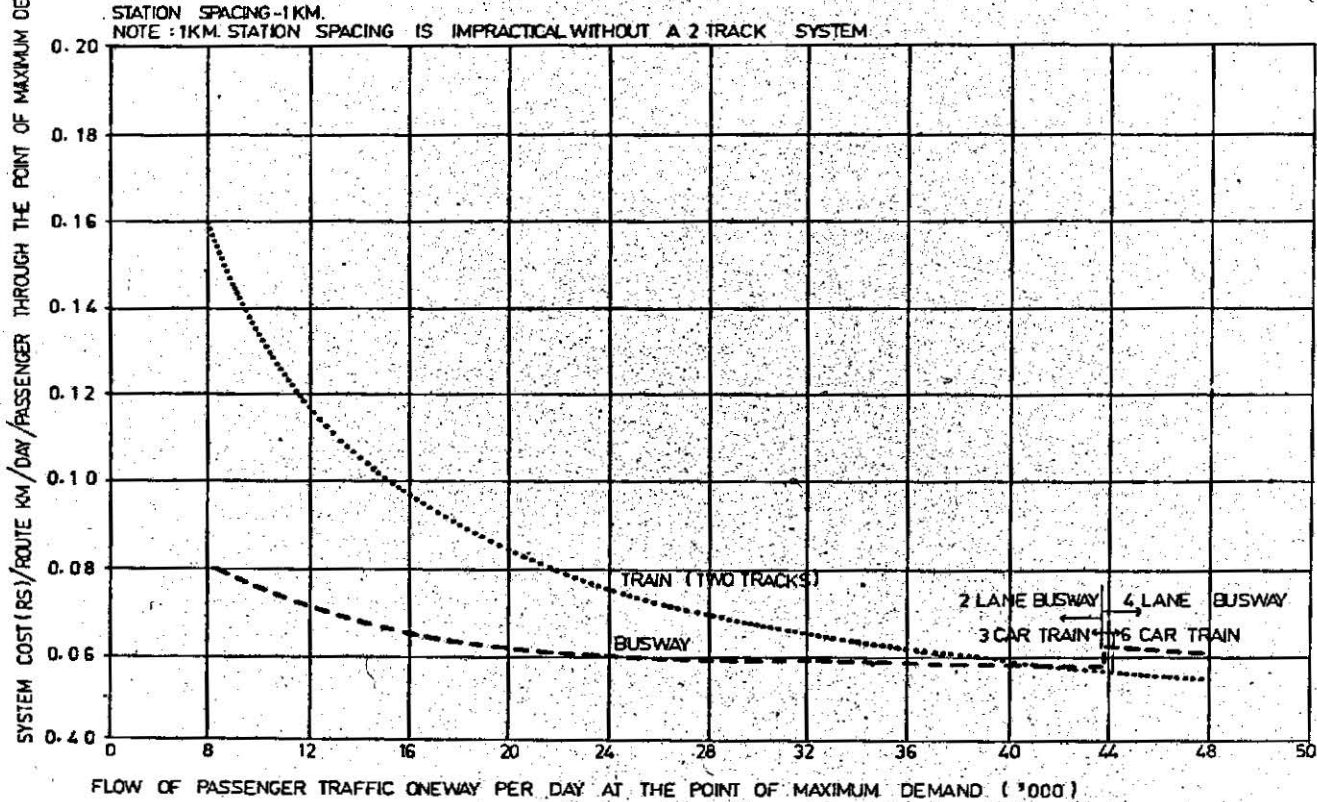
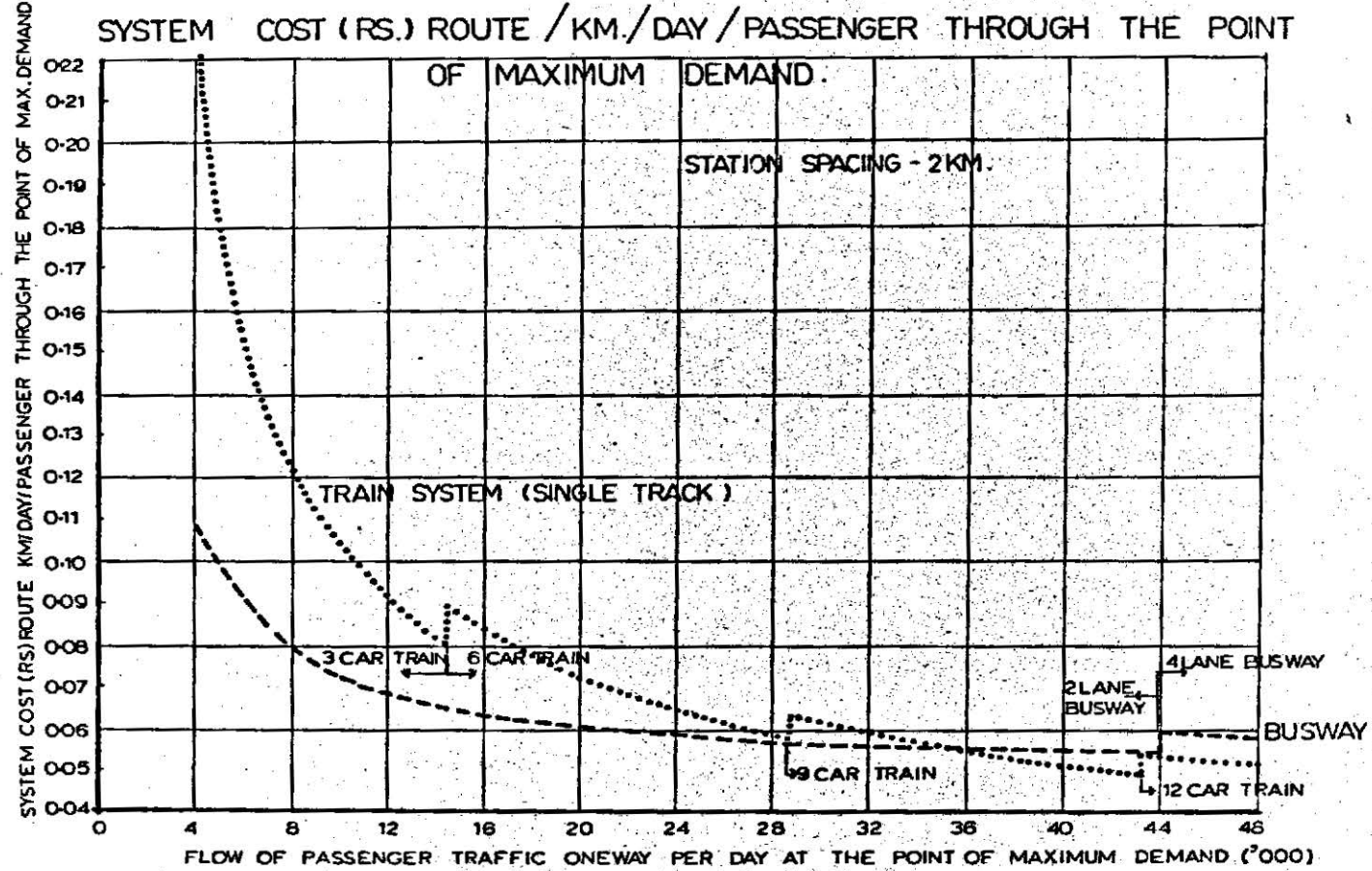


DIAGRAM H.03

SYSTEM COST (RS.) ROUTE / KM./DAY /PASSENGER THROUGH THE POINT OF MAXIMUM DEMAND.



APPENDIX I

PARKING

I.01 Parking in 'New Bombay' deals with the following aspects :

- (a) Fixing standards of parking space requirements for different land uses, and
- (b) Organisation of parking areas.

Parking Standards

I.02 To assess the total parking demand in a zone or block or plot, the parking standards indicated in Table I.01 have been evolved for different land uses in New Bombay. These standards are based on the prevailing requirements in Greater Bombay and on studies undertaken by various agencies in Delhi, Madras and Hyderabad.

Table I.01

PARKING SPACES TO BE ASSOCIATED WITH DIFFERENT LAND USES IN NEW BOMBAY

Type of Use	Unit	Required parking space in Sq.m.
1. Offices	100 Sq.m. of Floor area	24
2. Warehouses*	" "	10
3. Small Scale* Industries	" "	10
4. Theatres	100 Seats	80
5. Hospitals	100 Beds	300
6. Primary Schools	100 Students and staff	80
7. Restaurants	1 Seat in dining hall	4
8. Hotels	1 Seat in dining hall	4
9. Retail	100 Bed in guest room	4
9. Retail and Wholesale shopping	100 sq.m. of Floor area	60
10. Residential, High income group	1 Dwelling	24
Middle Income Group	1 Dwelling	8

* Warehouses and small scale industries will be required to provide at least two truck spaces on their individual plots.

I.03 For the Belapur CBD node, the first CBD node in New Bombay, it is assumed that the land use mix would be more or less similar to the Fort area in Greater Bombay. Based on the Wilbur Smith study it is anticipated that in Fort area, the parking space requirement in 1991 would be at the rate of one car space per 14 employees. The same scale is proposed to be adopted in the Belapur CBD area.

I.04 The actual parking demand of different land uses will be monitored as development takes place in New Bombay and when the need arises the above standards will be suitably modified.

I.05 The areas required for parking cars, motor cycle/scooter and bicycles will be as follows :

Car	-	24 sq.m.
Motor cycle/Scooter	-	2.8 sq.m.
Bicycle	-	1.4 sq.m.

Organisation of Parking Space

I.06 The units for reckoning the parking will be considered as one block i.e. the total parking area demanded by the activities in a particular block will be provided in the block itself (a block being defined as an area bounded by streets, or by a natural or other barrier on one or more sides & streets, on the remaining sides). Where vehicles and pedestrians are horizontally segregated, the total parking area generated by a block would be provided as shown in Diagram I.01,

- i) depending on the regulation for ground coverage, an area will be automatically available within each plot for on-plot parking and deductable from the total parking-area requirement of the entire block;
- ii) on any unimportant road, kerb-side parking will be permitted and the space thus available would also be deducted from the total parking area requirement;
- iii) where kerb side parking cannot be permitted on account of traffic load on the street, a service road parking along with the main street, horizontally segregated, will be provided;
- iv) the remaining parking area will be provided in the form of a parking lot in a centrally located plot within the block.

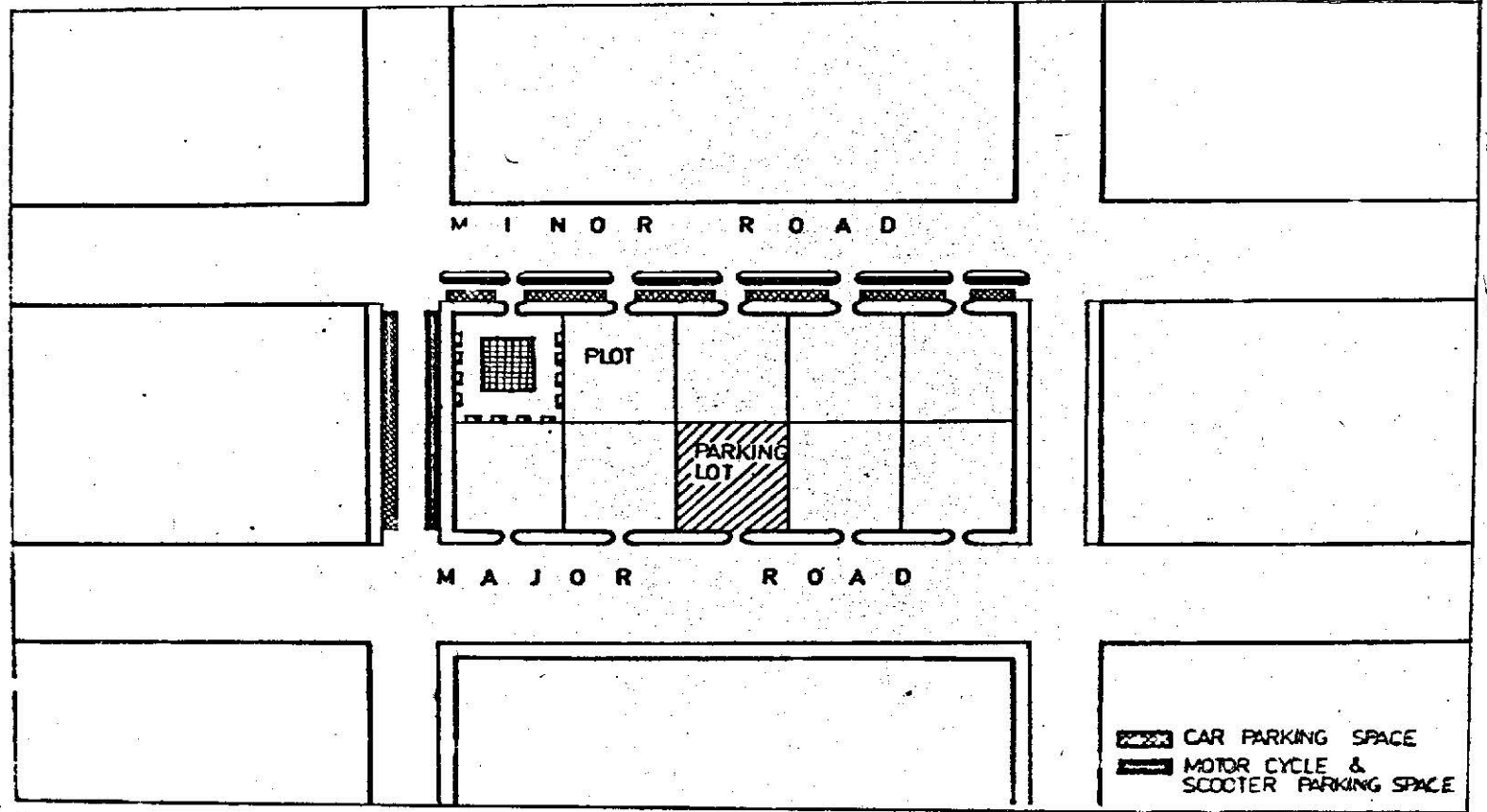
I.07 In the zones where heavy pedestrian movements need vertical segregation of pedestrians and vehicles, the required parking space will be organised in the following way:

- i) the provision of a large part of pedestrian activities at the first floor level and above, will release a considerable portion of the ground area for parking vehicles,
- ii) since the headrooms required for fire-fighting vehicles and buses will be 17 ft. or more, pedestrian circulation area will be located at this level above the ground. Under any building, therefore, it will be possible to add at a later date, if it is needed, a further mezzanine area for car parking,
- iii) in case any further area is needed for parking, the remaining parking area will be provided in the form of a centralised parking lot within the block. This requirement is considered unlikely in the foreseeable future.

- I.08 This assumes that the entire ground area, except that required for building lifts and service cores, will be owned by CIDCO. Private owners and builders will be rented or sold only the air volume above the first floor. In this case, the ground area can be organised to best advantage between vehicular circulation and parking spaces as set out above.
- I.09 Current parking policy in Central London is to provide very little new parking space, to discourage motor traffic into the city centre. While we expect to cater to the 1991 level of parking demand, we will be careful not to over-provide parking spaces in central areas.

ARRANGEMENT OF PARKING IN A BLOCK

DIAGRAM I.01.

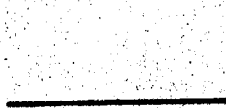


▨ CAR PARKING SPACE
— MOTOR CYCLE & SCOOTER PARKING SPACE

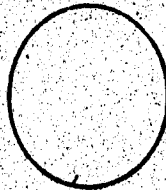
APPENDIX J

ROUTE PATTERN A. D NODAL DENSITY

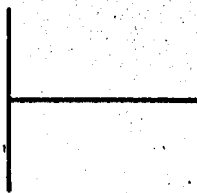
J.01 The main factor in determining the transport system cost on a route of any specific length is the maximum flow of traffic at any point on the route. For a given total volume of traffic, the maximum flow at any point on the route varies with the route pattern. The following four very simple route patterns were studied under the assumption that the traffic generation is uniform over the total length of the route.



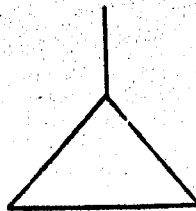
ROUTE PATTERN A



ROUTE PATTERN B



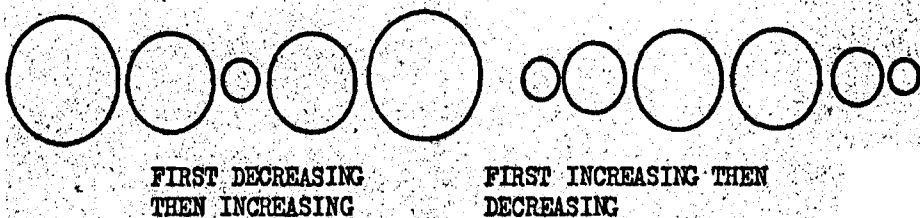
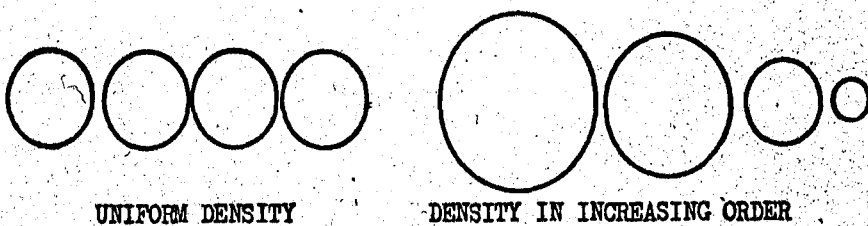
ROUTE PATTERN C



ROUTE PATTERN D

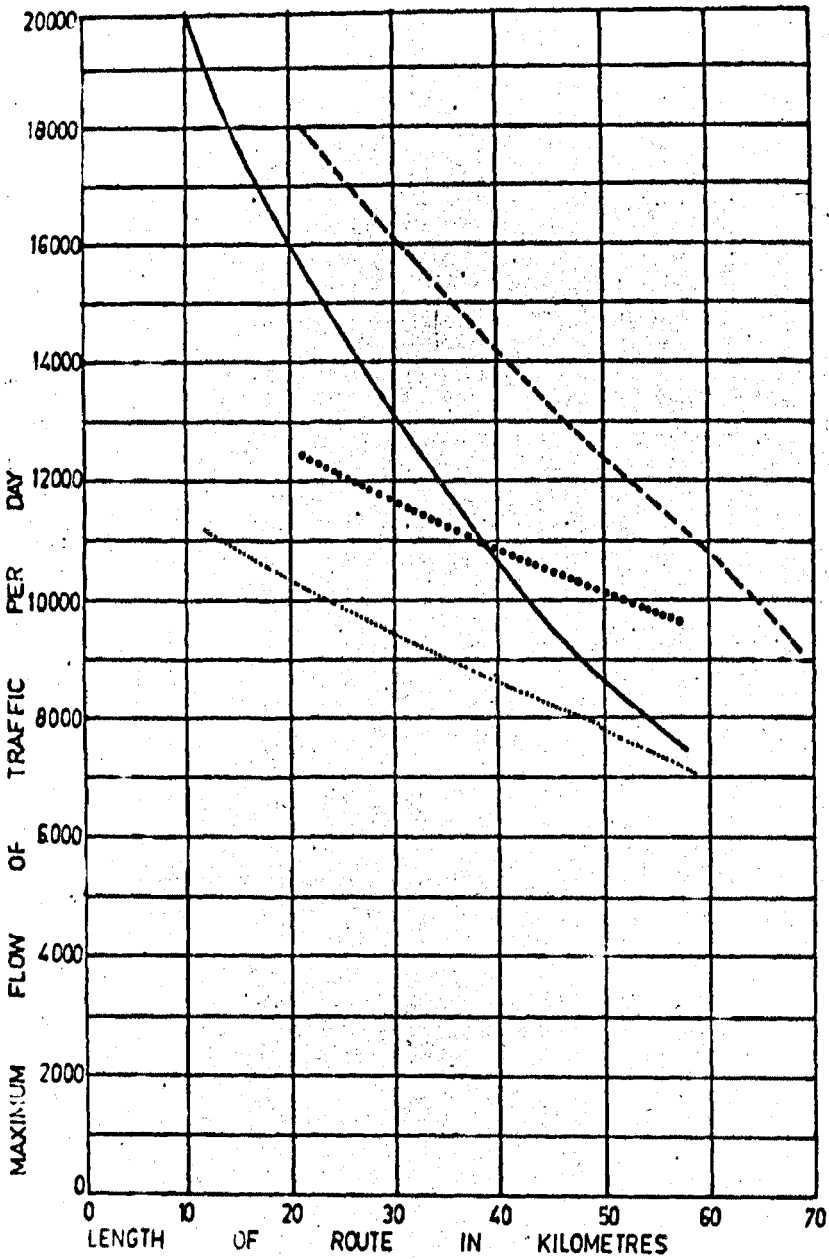
J.02 The maximum flow of traffic was determined in each case using the Gravity Model with different friction factors. Diagram J.01 shows the relationship between the different route patterns for total commuter trips of one lakh, with friction factor 0.1. The relative position of the route patterns were found to be the same for other friction factors. This shows that a circular transit route pattern has the minimum peak flow of traffic and in consequence the minimum transport system cost.

J.03 In many cases the geography of the area under development and other considerations may dictate variations in intensity of development along the route. With this in view, the linear route pattern was further studied for nodal density over the route varying in the following patterns.



J.04 It was found from the study that the pattern with high density at the two ends of the route and gradually decreasing towards the mid point has the minimum peak flow of traffic and the transport system cost is the least in this case. Diagram J.02 shows the relationship between different density patterns for a total commuter traffic of one lakh trips per day one-way over the route.

DIAGRAM J.01.

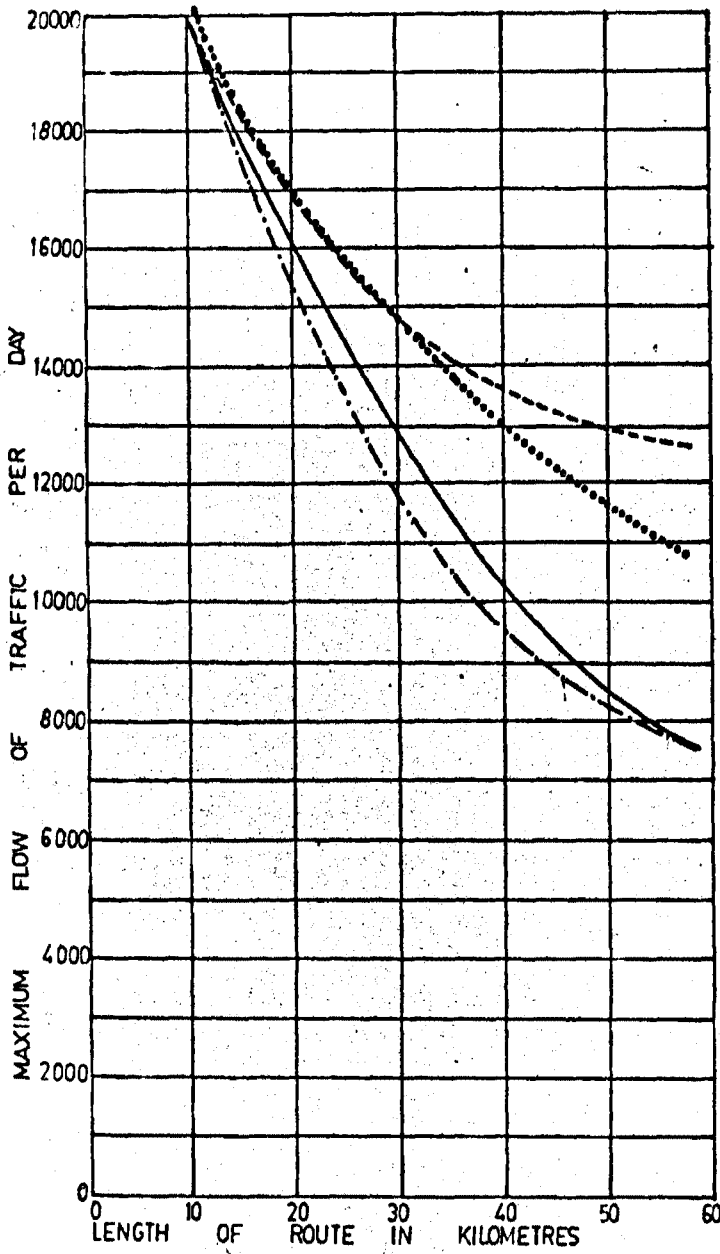


TOTAL TRAFFIC = 100000
 FRICTION FACTOR = 0.1

- ROUTE PATTERN A —
- ROUTE PATTERN B
- ⊥ ROUTE PATTERN C ----
- △ ROUTE PATTERN D

COMPARISON OF FOUR ROUTE PATTERNS

DIAGRAM J.02.



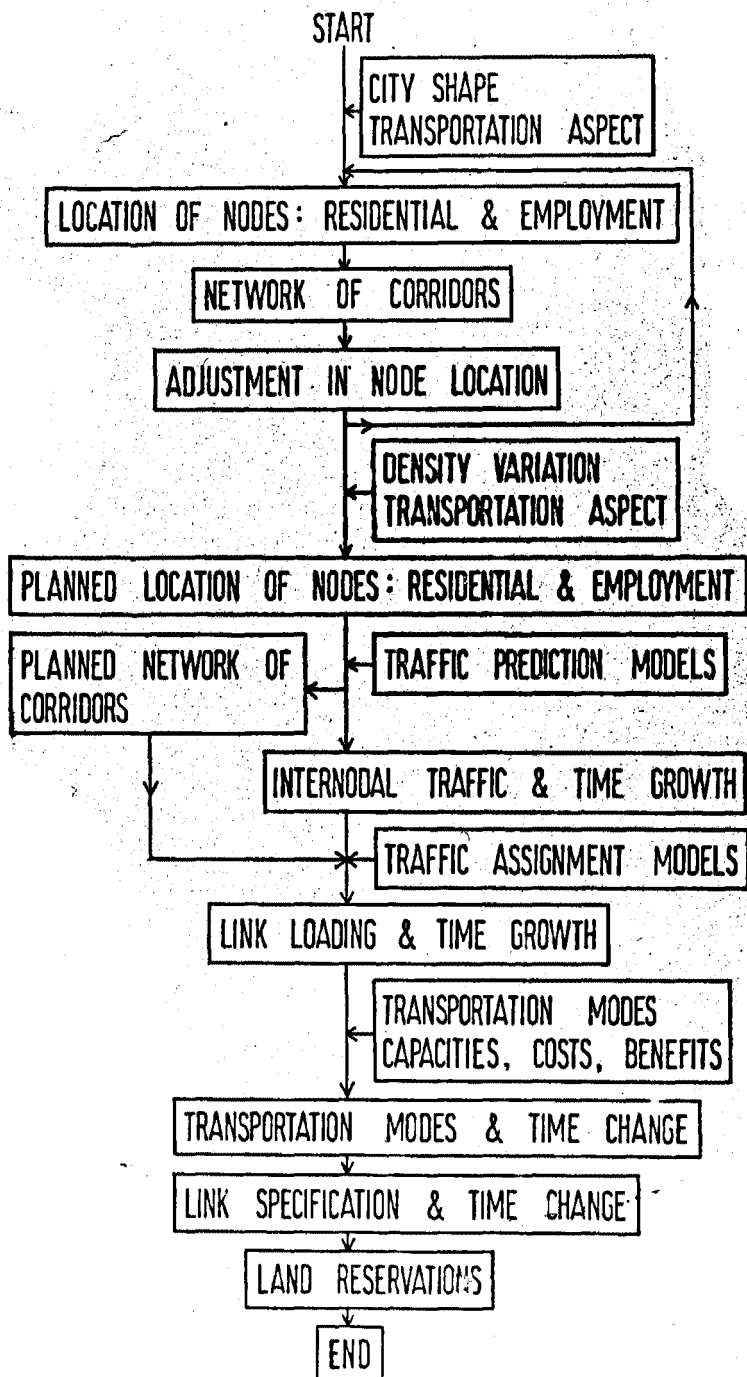
TOTAL TRAFFIC • 100000
 FRICTION FACTOR • 0.1

- UNIFORM DENSITY ———
- DENSITY IN DESCENDING ORDER - - -
- DENSITY FIRST DECREASING THEN INCREASING - · - · -
- DENSITY FIRST INCREASING THEN DECREASING · · · · ·

COMPARISON OF FOUR DENSITY PATTERNS IN LINEAR ROUTE

APPENDIX K

TRANSPORTATION PLANNING FOR NEW BOMBAY
PLANNING PROCESS FLOW DIAGRAM



APPENDIX L
TRIP DISTRIBUTION MODEL

L.01 An important aspect of the transportation planning process is an estimation of the number of trips likely to be made per unit time between pairs of zones of the area under consideration. The 'Gravity Model' is the most commonly used tool for the estimation of trip distribution among the zones based on the following information:

- (a) Trips produced in each zone,
- (b) Trips attracted in each zone,
- (c) Distance between each pair of zones.

Gravity Model

L.02 The general expression of the Gravity Model is given by

$$T_{ij} = K_{ij} G_i A_j e^{-\lambda d_{ij}}$$

Where

T_{ij} = Number of trips from zone i to zone j

K_{ij} = Normalising factor

G_i = Number of trips produced in zone i

A_j = Number of trips attracted to zone j

λ = Friction factor

d_{ij} = Distance from zone i to zone j.

The normalising factor K_{ij} is usually determined by the Fratar's method of iteration.

The Gravity Model was calibrated to find the value of λ on the basis of trip distributions in Greater Bombay (1968) as found in 'Bombay Mass Transportation Study' by the Traffic Cell, Maharashtra. The calibrated value of λ for different purposes and modes of transportation is given in Table L.01 for distances measured in Km.

TABLE L.01
CALIBRATED VALUE OF FRICTION FACTOR (λ)

Purpose	Modes			
	Bus	Train	Car or Taxi	All modes.
Work	.0863	.0315	.0521	.0212
All purpose	.0950	.0219	.0533	.0241

Notes: Work trips = 62%
Non-Work trips = 38%

The calibrated value of λ for Bus trips was confirmed with one screen-line-crossing data in Greater Bombay, observed in January, 1973.

The value of λ is negative in the case of train trips which indicates that as the distance increases from origin to destination the willingness to travel by train increases, while it is just the reverse in case of other modes. The main reason is that because of a heavily subsidised fare structure on the railway system, people prefer to travel by train for long distances and by bus and other modes for short distances. Another reason is that in the case of Greater Bombay due to scarcity of accommodation near the city centre and its high cost, people are forced to reside further and further away to the north, while the city centre at the south remains the major location of work and other activities.

APPENDIX 'M'

Criteria for Mass Rapid Transit (MRT) Layout for
New Bombay

- M.01 In transportation planning for passenger traffic it is the policy of CIDCO to lay maximum emphasis on the public transport system. From the experience of cities in India and other countries, it is seen that unless the public transport system is strengthened and made efficient, the city transport problem cannot be satisfactorily solved. The public transport system is far superior to motorized private transport modes in respect of :
- (i) the passenger carrying capacity for a given outlay on the infra-structure such as roads,
 - (ii) energy consumption per unit of transport (per passenger km),
 - (iii) pollution potential per unit of transport.
- M.02 Keeping in view therefore the limited resources available for building infrastructure, the need to conserve fast depleting energy resources (India is almost totally dependent on external source for oil) and the need to keep the environment in the city as clean as possible, the maximum emphasis has to be laid on the public transport system.
- M.03 The average economic level of a city commuter are also such that a private mode of transport is not within his reach. A study in Greater Bombay has indicated that almost 80% of the daily trips by mechanical mode are undertaken by public mass transport. Transport system planning for the new city, therefore, is built around a convenient and efficient Mass Rapid Transport System.
- M.04 The MRT system could be operated either with trains or with buses. A separate study has indicated that on economic considerations a train system is cheaper than a bus system on any route when the daily traffic load through the point of maximum demand on that route exceeds 20,000 to 24,000 one-way trips. The train system also implies less energy consumption and pollution per unit of transport. (The possibility of using electrically powered buses has not been considered, as these are not made in India).
- M.05 An analysis based on a rough land use plan for the city has indicated that the number of trips passing along a travel desire corridor through the point of maximum demand would be in many instances in excess of the above mentioned critical traffic level. It has therefore been decided to plan the primary MRT system as eventually a train system.
- M.06 A study of the travel habits in Greater Bombay has indicated that on an average the work trip by train mode involves a walk of 18 to 20 minutes. Keeping this in view, it is considered that the catchment of a train system could effectively extend upto 1 Km on either side. The resident population

within this strip of 2 Kms can therefore be expected to walk to the MRT station without any inconvenience or need for a secondary transport system.

M.07 Subject to the above yardstick for the coverage, the MRT layout for the city has been delineated on a map of 1:30,000 scale so as to satisfy the following design criteria:

- (i) The train alignments are chosen in such a way that the entire land mass planned to be developed under the project is covered within the catchment area (2 Kms wide strip).
- (ii) In the stretches where more than 1 corridor is required, interchanges are provided at about 5 Kms intervals to permit a transfer of commuters between parallel corridors.
- (iii) The alignments are delineated keeping in view the general topography of the region to minimise the construction cost.
- (iv) The alignments are adjusted so as to have an interchange with the central station (for inter-city rail traffic). This will give the facility for the resident population staying far away from the central station to have a direct access by the public transport system to the Central Station.
- (v) The alignments in the Central Region which has been planned for development as the business area are so adjusted as to give maximum access and efficient disposal within the area.
- (vi) For the longest north-south corridor (Kalwa-Nhava), it is proposed to provide 4 tracks, 2 for all-station stopping trains and 2 for galloping trains, stopping at the main interchange points located at an interval of about 5 Kms. It is considered that for a satisfactory level of services, for travel distance exceeding 15 to 20 Kms a faster corridor is required. The arrangement of the tracks on this corridor is proposed in the manner of up-up and down-down, which would permit an easy cross-platform transfer.

M.08 As explained, the primary MRT system would be a train system, and for best accessibility the route location for this would be through the heart of the residential and employment nodes. The city motorway system (for inter-nodal car traffic) is then to be located in relation to the MRT. This could be located either along the outer boundaries of the developments or along the train system itself.

M.09 It is considered that locating the motorway on the outskirts would have the following advantages :

- (i) It would not compete with the rail mode of transport being along the outer boundaries.

- (ii) Connections between the parallel motorways would all be three arm junctions which can be very easily organised, require less land and cost less.
- (iii) Such a location can be conveniently fitted into the stage plans for development. In the initial stage when the traffic demand is low and can be handled by buses, the motorway and busway will be combined and located along the train route. In fact, the sub-structure of this corridor can be constructed to railway standard, which would make it possible to convert it readily into a railway system. When the need arises for introducing a train system for handling the traffic the first step of the scheme would be to construct the motorway in its final location on the outskirts and transfer of the motor traffic to this. The old motor-way corridor can then be taken over for the railway construction with a busway operating in parallel. Ultimately, when the level of mass transit demand is high, the busway can be discontinued and replaced by a train system.
- (iv) The motorway on the periphery will direct all the through car and truck traffic away from busy MRT areas.
- (v) The citizens who own cars will tend to locate near the motorway and thus the area near the M.R.T. station will be available for middle and low income groups because the higher income groups will not compete for this area.
- (vi) The accessibility points will be also distributed evenly for different modes; therefore, the development along the M.R.T. node will have considerable depth and land prices will be more evenly distributed.

M.10 The second method of having the city motorway along the train system would imply problems of arranging grade-separated crossings and connections between the motorway and the primary roads of the nodal development. In such a scheme for the initial stage the land reservation has to be made from the total ultimate requirement consisting of the railway corridor as well as the motorway corridor which makes for much larger pedestrian crossings from one side to the other.

M.11 It has been proposed therefore to keep land reservations for motorways and mass transit systems on the basis of the first method set out above.

APPENDIX N

TRANSPORTATION NETWORK FOR NEW BOMBAY

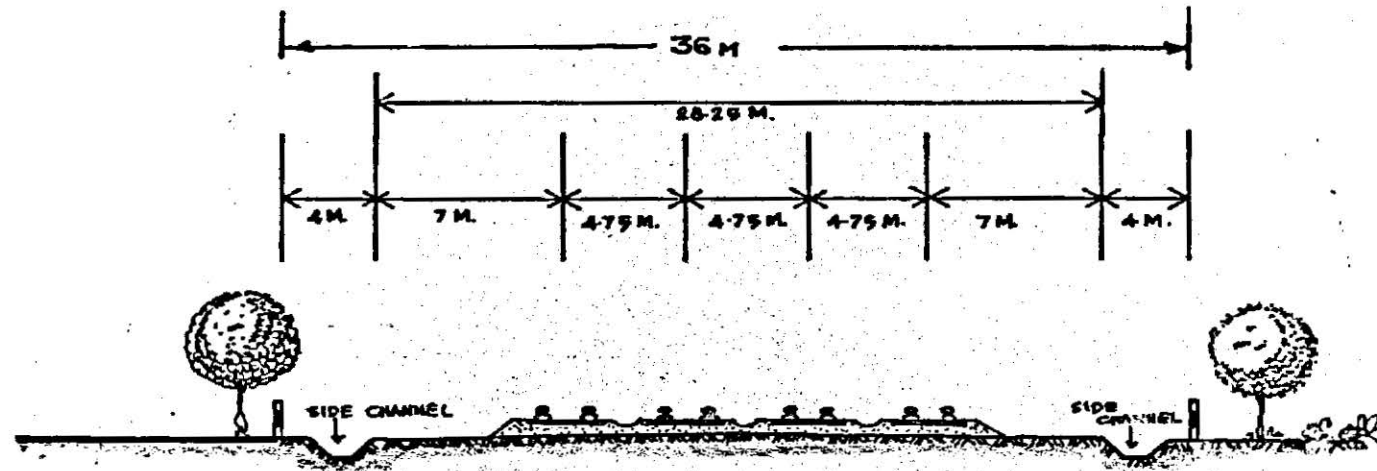
N.01 New Bombay will be served by a primary network of both MRT system and motorways as shown in Diagram No.1. The MRT system, mainly trains and in some cases buses on busways, will run through the heart of the residential and business nodes to give maximum access in the area. The motorways will run at the periphery of the habitations to minimise interference with activity and residential areas as well as to maintain a desirable speed of traffic on the roads.

Mass Rapid Transit System

- N.02** The primary MRT system is proposed with three long corridors of a train system and one circular corridor of buses on reserved tracks (busways).
- N.03** Corridor 1 is proposed as connecting Kalwa and Nhava-Sheva and is the longest corridor having a length of 52 km. It passes through the industrial belt of Thana-Belapur, takes a loop to serve Vashi township, goes through the main residential nodes north of the business area, envelop the whole of this area, touches the Central Station and passing through the residential areas goes to the area north of Nhava-Sheva port. It will finally be extended across the creek and anchored to the train system of Greater Bombay at Grant Road. This corridor will be serviced by a four track train system.
- N.04** Corridor 2, proposed as a 42 km. long two track train system, also originates at Kalwa but goes to the Taloja industrial area. It abuts the Thana-Belapur industrial belt, serves the residential area north of the business area, distributes commuters at the Belapur node, touches residential nodes on the north-east of the business area and goes to the Taloja industrial belt. To reach a greater land coverage this alignment forms a loop at Taloja.
- N.05** Corridor 3 is proposed as a two track south-east corridor of the train system connecting all the nodes on the southern arm, the southern portion of the business area, the central Railway Station and the Panvel industrial area. It has a total length of 33 km. from Uran to Panvel.
- N.06** Corridor 4 is proposed as a two lane exclusive busway of circular form with a circumferential length of 12 kms. It will primarily cater to the intra business area trips around the central lake.
- N.07** It is proposed to have stations all along the corridors at an interval of about 2 kms. with a provision of increasing the frequency of stations at every 1 km. in case this eventually becomes necessary.
- N.08** A typical cross-section of a four track M.R.T. system (Train) is shown in Diagram N.02.

Motorways

- N.09 Apart from the State highways shown in thick lines in Diagram N.01, the city will have three motorways namely Western motorway, Eastern motorway and North-South motorway.
- N.10 The Western motorway having a length of 45 Km. originates north of Vashi, swings to Vashi, runs along the Western periphery of the city and terminates at Uran.
- N.11 The Eastern motorway starts at Thana, serves the Thana-Belapur industrial belt, runs at the boundary of the business area nodes, gives access to the Central Railway Station and traversing along the eastern periphery of the city goes to Uran. The total length of the motorway is 60 kms.
- N.12 The North-South motorway, with a length of 15 kms. connects the two industrial estates, Taloja and Panvel. This motorway forms the main access link to National highways and State highways.
- N.13 For the efficient transfer of long distance traffic to the Motorway system, cross connectors will be provided at regular intervals.
- N.14 A typical cross-section of the motorway is shown in Diagram N.03.



TYPICAL CROSS SECTION OF M. R. T. SYSTEM

DIAGRAM N. 0 2.

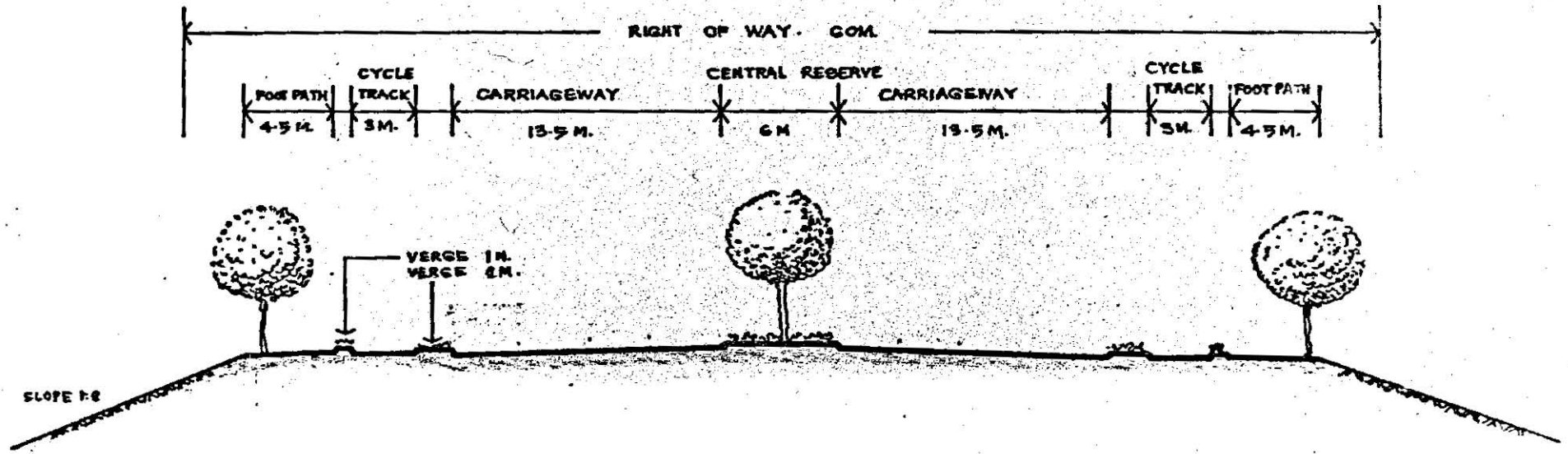


DIAGRAM N. 03
 TYPICAL CROSS SECTION OF MOTORWAY

APPENDIX O

SUMMARY OF THE REPORT ON INDUSTRIAL LOCATION IN MAHARASHTRA

Background

- 0.01 Maharashtra is one of the most industrially advanced States in India. The State, with 9% of the country's population, accounts for 20% of the total factory employment in the country and 25% of the value added by industry. The State is also one of the largest in India, covering 9% of the area of the country. However, industrial location in Maharashtra shows a very high concentration in the 120-mile corridor between Greater Bombay and Poona. The rest of the State by comparison is industrially backward and neglected. Within the municipal limits of Greater Bombay itself is an industrial concentration which accounts for 59% of the total factory employment in the State, and 73% of the value added. The Bombay-Poona belt contains approximately four-fifths of the total factory employment in the State. It also accounts for half the total urban population in the State and three-fourths of the total population in towns of more than 100,000 population in 1971. Obviously, a considerable development gap exists between the Bombay-Poona belt and the rest of the State. Considerations of equity clearly require that this gap be reduced as far as possible. This would imply the location of further industrial growth as far as possible in what are today the industrially undeveloped regions of the State. However, it would seem equally important that the industrial location policy be so determined as to minimise the overall costs of establishing an industry in the coming years.

Objective

- 0.02 The study on Industrial Location in Maharashtra was jointly sponsored by CIDCO and the State Government. It was carried out by Tata Economic Consultancy Services under the supervision of a Steering Committee consisting of:
1. Dr. Yoginder K. Alagh : Director, Sardar Patel Institute of Economic and Social Research, Ahmedabad.
 2. Prof. V.M. Dandekar : Director, Gokhale Institute of Politics & Economics, Poona.
 3. Dr. P.B. Medhara : General Manager, ICIPI & Member Planning Team, CIDCO.
 4. Dr. K.S. Parikh : Indian Statistical Institute, Delhi & Member Planning Team, CIDCO.

5. Dr. T.N.Srinivasan : Indian Statistical Institute, Delhi.
6. Dr. S.D.Tendulkar : Indian Statistical Institute, Delhi.

0.03 The objective was to determine an industrial location pattern for future industries in Maharashtra which could be considered "optimal" in the sense of reconciling the social objective which called for an equitable distribution of industrial development over the State with an economic objective of minimising overall costs. It was required that the study take into account the kinds of industry that are likely to develop in Maharashtra over the next 10 and 30 years. Inter-relationships between industries were also to be examined to determine how industries should be clustered together for their effective functioning. Various regions in Maharashtra were also to be examined with respect to relative costs of infrastructure in order to determine what kinds of industries would be best suited to each region. Finally, an optimal location plan was to be evolved considering the social and economic objectives that had been set.

Methodology

0.04 Since a careful study reveals that a formal programming model which can be solved with existing computational facilities is inadequate when it comes to location planning, the present study has been based on a less formal approach which tries to take into account all the factors that should be considered albeit in a piecemeal way. This informal approach also enables one to use qualitative information which might have had to be ignored in a more formal framework. The central objective, as already indicated, is to minimise the costs of industrial development subject to the condition that certain social goals of industrial dispersal be attained. The basic end-product of the study is a set of industry-wise targets for industrial development in different parts of Maharashtra.

0.05 The first step in the procedure is to establish what will be available for distribution. The central element in this is a projection of industrial development in the State, as a whole, over the forth-coming period. The next step in the exercise is an analysis of infrastructural costs of alternative patterns of industrial location. This involves (a) an analysis of the relative advantages and disadvantages of different areas with respect to different items of infrastructure (b) an analysis of the characteristics of industry with respect to infrastructural use. The third step in the exercise specifies quantitative targets for industrial development in the different regions on the basis of an analysis of the need for industrial employment and examines how it is possible to distribute different industries so as to achieve these targets given the recommendations derived from the second step. It also discusses the type of location policy required if the targets are to be achieved. Apart from infrastructure costs, the three-part procedure outlined above

takes into account inter-industry linkages, economies of scale and economies of agglomeration at least in a limited way. Important inter-industry linkages have been identified and taken into account in framing the recommendations. Economies of scale have been taken into account in the sense that some consideration has been given to the size of the market which market-oriented industries would serve. The sources of economies of agglomeration have been identified and taken into account in specifying an overall strategy for location policy.

Projection of Industrial Development

0.06 A 30-sector inter-regional input-output model has been used to project industrial development in the State as a whole. The exogenous variables considered are forecasts of final private consumption expenditures, Government expenditures, forecasts of investment expenditure and the likely trade flows between Maharashtra and India. These four elements provided the basis for the projections. Two sets of projections were made: first, the "low growth" projections based on a per capita real income growth of 4% per annum and a low share of investment (20%) in overall final demand; second the "high growth" projections based on an annual growth rate of 6% and a high share of investment (25%). The following assumptions were made regarding internal trade coefficients (which, in fact, are the charges assumed over what prevailed in 1963) :

- * A substantial decline in Maharashtra's propensity to import from the rest of India in the 'beverages', 'apparel and footwear', 'fertiliser' and 'iron and steel' sectors.
- * A moderate decline in Maharashtra's propensity to import from the rest of India in the 'agriculture', 'paper' and 'non-electrical machinery' sectors.
- * An increase in Maharashtra's propensity to import from the rest of India in the 'coal', 'basic iron and steel' and 'non-ferrous metals' sectors.
- * A decline in the rest of India's propensity to import from Maharashtra in the 'furniture and fixtures', 'printing', 'rubber products', 'chemicals', 'petroleum products' and 'electrical machinery' sectors.

0.07 Given the growth in output, the growth rates in employment were determined by deducting estimates of the growth rate of productivity from these output growth rates. The resultant growth rate of employment was applied to the factory employment figures for 1963. The absolute level of factory employment in the State will increase from 8.53 lakhs in 1963 to 15.11 lakhs or 18.13 lakhs in 1980 depending on the growth rate achieved.

0.08 Forecasts of industrial development upto the year 2000 have also been made to provide a longer term perspective. For employment projections in the year 2000, certain underlying All-India growth rates have been used. In using these growth

rates for making employment projections, historical growth rates of productivity in U.S. have been used. As in 1980, two sets of projections were prepared for the year 2000. The "low growth" employment forecast is based on the assumption of a 4% growth rate of income and a 1.5% growth rate of population. The "high growth" forecast is based on the assumption of 6% growth rate of income and 1.5% growth rate of employment in the State would be 28.66 lakhs or 58.70 lakhs in the year 2000. Both forecasts are subject to a large margin of errors and should be taken to represent orders of magnitude only.

Inter-regional differences in costs of infrastructure

0.09 The report concerns itself with the relative advantages and disadvantages of different parts of Maharashtra in respect of those items of infrastructure where the unit costs of providing the facilities is likely to vary substantially between different parts of the State e.g. electricity, water, effluent discharge and transport.

- (a) The marginal costs of supplying electricity have to be defined in terms of the highest cost plant in the system even though supplies may in fact come from one of the lower cost plants. Thus if 'cheap' Koyna power is supplied to local electricity-intensive industries other users elsewhere will be denied Koyna power and will have to be supplied with power from some other high-cost source, unless of course Koyna power can take care of the entire system demand, which is not the case.

The assumption about the difference in electricity costs is based on the argument that since hydel resources in the Western Ghats are limited, thermal power would have to be supplied to Nasik, Poona, Konkan and Greater Bombay regions either from thermal stations in the Vidarbha region or from new thermal stations in the Western parts of the State. On both counts, costs of power in Western Maharashtra will be higher. If the power is supplied from Vidarbha Region and if the transmission losses on the power supplied are 10-15%, the cost of delivered power in the Western region will be higher by about 10-15%. The cost difference would probably be even larger if thermal stations are situated in the Western region. This is the basis for the argument that electricity intensive industries should be sited in and near the Vidarbha Region.

- (b) Transport-intensive industries which involve the movement of goods across the ghats should not be encouraged in the Greater Bombay - Thana - New Bombay area in view of the near saturation of line capacities. Such industries should not be set up in the Konkan and Marathwada unless improvements in rail communication in these areas are simultaneously possible.
- (c) Water-intensive industries should be sited in the Konkan and other river valley areas in the State, since it is found to be cheaper to provide water in Konkan rather

than in the eastern part of the State, Greater Bombay and New Bombay. The estimate of the cost difference in water supply is based on differences in water charges in MIDC estates.

- (d) Industries generating large toxic effluents should be sited along the coast in the Konkan where effluent can be disposed of reasonably safely without much treatment. In areas where there is some danger to fish, the effluent could be pumped out some distance into the sea. This danger to fish is clearly less significant in areas where fishing is not very important and fish catches are not very large. Industries which need to dispose of an effluent which is not very toxic in character and which can be treated easily could be sited at river side locations in areas where river water is easily available. As regards air pollution, most locations other than Greater Bombay and New Bombay will be able, for the present, to accommodate pollution generating industries.

Characteristics of Industries

- 0.10 An examination of the characteristics of different industries in respect of infrastructural uses would help to identify where each industry may be located.

As far as electricity, water and effluent disposal facilities are concerned, the demands generated by an industry depend solely on its technology and would be the same wherever the industry is located. The overall costs of these infrastructural services would vary with alternative patterns of location, solely because of variations in the unit costs of providing these facilities at different locations and not because of variations in the level of demand generated by alternative patterns of location. The situation is different with respect to transport facilities. In this case, alternative patterns of location will generate alternative levels of demand for transport facilities and if the costs of transport services are to be minimised efforts should be made to locate transport-intensive industries in areas well provided with transportation facilities as well as to minimise the demand for transportation services by selection of suitable locations.

- 0.11 Minimising the demand for transportation services involves an analysis of the relative cost of transporting inputs and outputs. Broadly speaking, if the cost of transporting inputs is greater than the cost of transporting outputs, then the industry can be considered to be resource-oriented. Likewise, an industry can be considered to be market oriented when it is costlier to transport the outputs it produces than the inputs it uses. This suggests that the location of input supplies and markets have to be taken as given in determining the optimum location of industries. This, however, is not always the case. Many industries buy a large part of their inputs from other industries and many sell the bulk of their output to other industries. In these cases, the location of such linked industries must be

considered together. In doing so, one has to consider the magnitude of the linkage between the two or more industrial establishments. It would not make sense to put two industries together if the buyer's requirement is too small in relation to the economical scale of production. The ancillary supplier can realise these economies by providing the requirements not merely of one buyer but of several others.

0.12 An analysis is made of the characteristics of industries in respect of the costs of electricity, water supply, effluent disposal and transportation. Industries are characterised as electricity-intensive, water-intensive or pollution-intensive. The extent to which they should be resource-oriented is established and inter-industry linkages which need to be realised locally are identified. Taking into consideration the relative advantages of different regions in respect of electricity supply, water supply and effluent disposal and the location of natural resources, and markets a cost minimising pattern of location for each industry is specified (Table O.01, at end of appendix).

0.13 In many cases a trade-off between transport costs, electricity costs and water supply costs was necessary. For this purpose, it has been assumed that transport costs would amount to 10 paise per tonne/kilometre, that the delivered cost of electricity in the eastern part of the State (Vidarbha and other eastern parts of Maharashtra) would be one paise per kwh less than the delivered cost in the Western part of the State and that the costs of water supply would be higher in the eastern part by 25 paise per 1000 litres. The intensity of use of each infrastructure facility has been measured in terms of the demands generated per worker. Thus, in the case of electricity, industries which use more than 4000 kwh per worker per year are characterised as electricity - intensive. Industries which use more than 100 thousand litres of water per worker per annum can be characterised as water-intensive. As regards pollution, costs of pollution control in different industries in United States have been considered. Inter-industry linkages have been identified on the basis of an analysis of input-output linkages.

Overall Regionwise Targets:

0.14 The targets of industrial employment proposed are based on the need for industrial development in different regions which would fulfill, among other things, the overall objective of reducing the disparities in the per capita consumption levels between developed centres and lagging regions. Judged by some commonly used indicators of development such as the level of per capita consumption, agricultural output per worker and the availability of employment opportunities outside the traditional sector, all the underdeveloped regions in the State (i.e. outside the developed areas around Greater Bombay and Poona city) are found to be more or less equally underdeveloped and hence in need of equal attention. From the standpoint of regional development, the most important single indicator is the amount of industrial employment available in a region. To quantify the need for industry in each region, the likely

growth in labour force in different regions is considered. The overall labour-force projections show that between 1974 and 1980 the labour-force in Maharashtra will grow by 44,70,000.

- 0.15 The employment projections show that employment in organized manufacturing (factory sector) will grow by 4,06,600 on the 'low growth' assumption and 6,19,000 on the 'high growth' assumption, between 1974-80. This growth will represent 9.1% of the overall labour-force projections on the low growth assumption and 13.8% on the high growth assumption. As a need-based target, the report proposes that the growth in employment in organised manufacturing be distributed almost the various regions, excluding Greater Bombay, Konkan, Nasik, Poona, Marathwada and Vidarbha, in proportion to the growth in the labour-force in each region relative to the total growth in the labour force. By this process, all the backward regions would show an identical increase in the proportion of the labour force employed in organized manufacturing. Table 0.02 shows the region-wise distribution of the growth in the labour force in organised industry.

Table - 0.02

Need - Based Targets, 1980.

<u>Regions</u>	<u>(in '000 Nos.)</u>	
	<u>Low Growth</u>	<u>High Growth</u>
Konkan	48	73
Nasik	54	83
Poona	115	175
Marathwada	79	121
Vidarbha	110	167
TOTAL :	406	619

- 0.16 In making these recommendations, the report suggests the following :

- for all industry groups, employment in Greater Bombay should be 'frozen' at its 1969 level.
- employment in the chemical complex in New Bombay be allowed to increase by at most 2000 between 1974 and 1980, to realise possible economies of scale.
- employment in engineering industries in Poona be allowed to increase by 35,000 at the most so that the Poona engineering complex would be roughly twice as large as it was in 1969.

These ceiling levels have been derived after carefully con-

considering the degree of in-built excess capacity, both in plants and in infrastructure, as also the extent of economies in capital costs if expansion is to take place at existing sites. It is implied that, apart from a growth in employment of about 2000 (maximum) in the chemical industry in the Thana-Belapur area in New Bombay, the employment allocated to the Konkan should be allocated at centres other than the Thana-Belapur area and that apart from a maximum of 35,000 engineering jobs around Poona city, the jobs allocated to the Poona region should be located at other centres.

Industry-wise targets

- 0.17 In the procedure followed, employment in industries which are natural resource oriented was allocated in proportion to the availability of the appropriate natural resources in each region. Employment in industries which are oriented towards the consumer market were allocated in proportion to the likely growth in urban population. Employment in the remaining industries was allocated so as to ensure that employment generation in each region equals the need-based targets. In all cases, the locational compulsions identified were obeyed. It was possible to do this and meet the need-based targets because a substantial proportion of the predicted growth in industrial employment is in industries where cost considerations do not impose strong restrictions on locational choice.
- 0.18 Industrywise, engineering industries are expected to be the largest providers of the additional employment expected between 1974-1980. Of the total projected growth of 4,06,000 jobs in organized manufacturing, metal-based engineering will account for nearly 42%. This industry, because of its 'footloose' nature, will be fairly well distributed in all the regions. Textiles will account for a fourth of the additional jobs and the bulk of this can be located in Marathwada and Vidarbha, the two important cotton growing areas in the State. The chemical and fertilizer sector is usually capital - intensive and will contribute little in terms of its share in the overall employment estimate. Of the total estimated employment the increase, the chemical sector will account for less than 5 percent. The bulk of this development will occur in Konkan which will have a decided advantage in terms of port facilities, water costs and effluent discharge facilities.
- 0.19 The regionwise growth pattern will be as follows : in Konkan, the major industrial growth will occur in engineering, chemicals and agro-based food sectors; in Nasik, the bulk of the additional employment is expected to occur in industries such as tobacco, textiles, chemicals and engineering; in Poona, the sectors which will play a major role will be tobacco, metal-based engineering, food-beverage, textiles and the non-metallic industry. Future industrial development in Marathwada will be dominated by textiles, engineering and food-beverage. The same pattern more or less, will hold good for Vidarbha.
- 0.20 The plan takes into account all the linkages between industries which need to be realised locally. Whether or not a linkage needs to be realised locally has been determined essentially by finding out if any substantial cost advantages would accrue as a result of this.

0.21 The optimum scale of operations of supplying industries has been taken into account so that only those linkages are allowed for in which the demands generated by the appropriate using industries are large enough to sustain a unit of economic size. In defining linkages, the following industries have been specially taken care of (1) metal containers (2) wooden containers (3) glass containers (4) industrial gases (5) miscellaneous rubber products (6) general jobbing engineering (7) basic metals. All these are ancillary industries and their locations have been determined on the basis of the location of appropriate related industries and the direct linkage obtained in each location.

Table - 0.03

Projected Employment Growth in organized manufacturing in different areas in terms of low and high growth rates 1974-80.
(Figures in bracket indicate growth in terms of high growth rate)
(Employment in 1000 workers)

Industries	Regions					
	Konkan	Nagik	Poona	Marathwada	Vidarbha	Total
Food- Beverages	2.3 (3.4)	2.3 (3.5)	6.7 (9.5)	2.8 (4.4)	1.8 (2.7)	15.9 (23.5)
Tobacco	-	5.8 (6.7)	13.9 (16.1)	-	3.4 (4.0)	23.1 (26.8)
Textiles	-	12.1 (17.3)	6.7 (9.6)	37.9 (54.2)	52.8 (75.7)	109.5 (156.8)
Wood Products	0.9 (1.2)	0.8 (1.1)	2.1 (3.0)	0.8 (1.1)	2.6 (4.1)	7.2 (10.5)
Paper	0.1 (0.2)	0.5 (0.8)	1.0 (1.8)	0.4 (0.6)	1.2 (2.1)	3.2 (5.5)
Printing	2.1 (3.2)	2.7 (4.3)	5.7 (8.8)	2.1 (3.2)	5.1 (7.9)	17.7 (27.8)
Leather	-	0.5 (0.6)	0.4 (0.5)	-	-	0.9 (1.1)
Rubber	0.7 (0.8)	0.3 (0.5)	1.3 (1.9)	0.6 (0.9)	1.2 (1.5)	4.1 (5.6)
Fertilisers & Chemicals	8.4 ^② (17.8) ^③	4.2 (4.8)	2.2 (4.4)	0.6 (5.0)	2.8 (4.4)	18.2 (36.4)
Non-met- allic Mine- ral Produ- cts.	1.8 (4.3)	6.0 (8.7)	6.2 (13.6)	1.7 (5.4)	4.2 (10.2)	19.9 (42.2)
Basic Metals	1.3 (2.6)	-	3.5 (8.5)	-	2.4 (5.5)	7.2 (16.6)
Engineering	29.5 (36.0)	16.8 (30.8)	61.5* (89.7)*	30.3 (42.9)	26.1 (38.2)	164.2 (237.6)
Miscella- neous	1.7 (3.5)	2.0 (3.9)	3.7 (7.6)	1.7 (3.3)	6.4 (10.7)	15.5 (29.0)

	1	2	3	4	5	6	7
TOTAL		48.8 (73.0)	54.0 (83.0)	114.9 (175.0)	78.9 (121.0)	110.0 (167.0)	406.6 (619.0)
Percentages		12.0 (11.8)	13.3 (13.4)	28.2 (28.3)	19.4 (19.5)	27.1 (27.0)	100.0 (100.0)

② Includes growth of 2000 in trans-Thana area.

* Includes growth of 35000 in the developed area around Poona city.

0.23 The location plan is suggested in terms of broad types of industries such as engineering, chemicals etc. The idea is to keep together the related industries within each group. If this is not done, many of the cost advantages (such as avoidable transport cost) claimed for this plan would disappear.

The proposed plan as suggested above is, in all probability, substantially cheaper than a plan which permits a substantial amount of growth in the developed areas. Thus, promoting industrial development in backward areas of Maharashtra at the expense of development in the developed areas will promote both equity and efficiency.

Guidelines for Selecting New Growth Areas

0.24 As already seen, employment targets have been presented for five broad regions. However, the exact locations within the regions at which industries should be sited has not been specified. The Industrial Location Plan does not favour a haphazard dispersal of industries at too many locations. In planning the number of new locations, the guiding factor should be the minimum size of an industrial centre. In other words, if a location is to survive and take-off as an industrial centre, it must reach some minimum level of development or what may be called 'threshold size'. The minimum level is necessary because certain types of facilities essential to industry can only be provided beyond such a threshold level. One source of such agglomeration economies is the existence of an efficient trading network. If such a network exists, industries can economise on inventory costs. This is particularly relevant for industries such as drugs, pharmaceuticals and engineering since such industries require a variety of inputs. Such a trading network can only develop when the volume of business is large enough to enable traders to carry a reasonably comprehensive stock of the items involved. In order to make the volume of business large, one has to put the required number of industries in a particular location. Another type of agglomeration economy would be repair and maintenance services such as job-working repair shops, providing a range of services like machining, welding, motor winding, etc. Like the trading function, this also will be

Table - 0.04

Projected Employment Growth in Organized manufacturing in different
areas in terms of low and high growth rates 1980 - 2000
(Figures in bracket indicate growth in terms of high growth rate)
(Employment in '000 workers)

Industries	Regions					Total
	Konkan	Nasik	Poona	Marathwada	Vidarbha	
Food- Beverages	10.8 (23.9)	10.8 (24.6)	31.6 (66.7)	13.2 (30.8)	8.5 (19.0)	75.0 (165.0)
Tobacco	-	11.0 (23.0)	26.5 (55.3)	-	6.5 (13.7)	44.0 (92.0)
Textiles	48.4 (138.6)	72.7 (207.9)	72.7 (207.7)	121.3 (346.5)	169.9 (485.1)	485.0 (1386.0)
Wood Products	1.5 (3.5)	1.3 (3.3)	3.5 (8.9)	1.3 (3.3)	4.4 (12.0)	12.0 (31.0)
Paper & Printing	9.1 (25.7)	13.2 (37.8)	27.6 (78.6)	10.3 (28.2)	25.8 (74.2)	86.0 (244.0)
Leather	-	2.2 (4.4)	1.8 (3.6)	-	-	4.0 (8.0)
Rubber	3.2 (6.3)	1.4 (3.9)	6.0 (14.9)	2.8 (7.1)	5.9 (11.8)	19.0 (44.0)
Fertilizers & Chemicals	23.0 [⊙] (103.7) [⊙]	17.8 (36.1)	9.3 (33.1)	2.5 (37.6)	3.4 (10.5)	56.0 (221.0)
Non-metallic Mineral Prod- ucts	3.3 (13.9)	11.2 (28.0)	11.5 (43.8)	3.2 (17.4)	7.8 (32.9)	37.0 (136.0)
Basic Metals and Engineer- ing	68.0 (170.2)	45.4 (169.2)	172.9* (529.5)*	96.7 (263.9)	99.0 (290.2)	482.0 (1423.0)
Miscellaneous	6.7 (35.7)	8.0 (45.8)	17.6 (98.7)	6.7 (37.2)	16.0 (88.6)	55.0 (306.0)
TOTAL	174.0 (521.0)	195.0 (584.0)	381.0 (1141.0)	258.0 (772.0)	347.0 (1038.0)	1355.0 (4056.0)
Percentages	12.8	14.4	28.1	19.1	25.6	100.0

⊙ Includes growth of 2000 in trans-Thana area

* Includes growth of 35000 in the developed area around Poona city.

- 31 One industry which will have a decided advantage in New Bombay is ship-building. The deep draught facilities to be provided in the Nhava-Sheva port would be very useful for a ship-building yard. The development of this industry could also be combined with the shifting of existing shipyard facilities from Greater Bombay to Nhava-Sheva in New Bombay.
- 32 One can surmise that the long term plan (i.e. development after 1980) allows a certain degree of flexibility so far as industrial development in New Bombay is concerned. It suggests that the overall targets proposed for the Konkan should be suitably apportioned between New Bombay and other areas. The only point made by the report is that less-developed areas in the Konkan should receive a major share in the increased employment.

The Suggested Location Policy

- 33 The proposed plan would mean lower costs on infrastructure than would be the case if existing trends continue. In other words, on a social cost criterion, the plan is optimal. This cost advantage of the plan may not necessarily be very significant for private individuals in deciding on location in any area. So far as the costs of water and power are concerned, these costs may be either insignificant in the total cost, or the present pricing arrangements average out the inter-regional differences. The major location factor for many industries is the transport cost. The central question is the amount of industrial employment whose location would be determined largely on the basis of transport costs. The only industries where transport costs will have a marked influence on location are industries which are either strongly resource-oriented or market-oriented. The location plan shows that not more than 25% of the growth in employment in Maharashtra will be in such industries. Region-wise, this proportion is lowest in Marathwada and highest in the Poona region. The remaining part of employment is in industries that are essentially 'footloose', either singly or in some cases as a complex. In these industries, the transport cost is not very significant and considerable flexibility exists in the matter of locating these industries. It is in these cases that variations in private costs cannot be relied upon and other measures are necessary. However, to attract an industry, in any region, an assured supply of infrastructural facilities is a must. In fact, these facilities should precede industrial development, even if it implies some underutilization of facilities initially. This is necessary to tempt footloose industries away from developed areas.
- 34 Availability of infrastructure is not the only difficulty in tempting footloose industries away from developed centres. Economies of agglomeration must also rapidly come into play. Till such time as the new centres reach the proposed minimum size, these economies will not obtain and units which go to these areas initially will suffer from some temporary cost disadvantages. To overcome this, an appropriate subsidy programme may be devised. The subsidy plan suggested in the report includes :
- a) privileged access to scarce raw materials through some kind of raw material banks at the locations concerned.

- b) officially subsidised labour training facilities,
- c) officially sponsored and subsidised repair, maintenance and general service facilities,
- d) a payroll subsidy, if lower labour productivity appears to be the problem; likewise, a capital subsidy, if higher capital or costs of repair and maintenance appear to be the problem,
- e) a new system of administering these temporary subsidy schemes, so that the subsidy should be reduced as the cost differences are reduced. If the cost differences arise mainly because of the time taken for economies of agglomeration to manifest themselves, the subsidy at any location could be geared to the existing level of employment at that location. Similarly, the first unit to go to a backward location should get a higher subsidy than the second, and the second more than the third and so on. Incidentally, this might also help to expedite decision making amongst prospective entrepreneurs.
- f) pricing of infrastructure like power and water in the existing developed centres so as to reflect the true social costs. This would lead to substantially higher charges in the developed centres than what it is now and this may help to shift the focus of development as suggested in the plan.
- g) a ban on the growth of new industrial units or even expansion of existing establishments unless economies of expansion at an existing site are very substantial. The argument that such a negative policy would lead to diversion of industrial development to developed centres in other states is not tenable. The experience of the past few years when such a policy was implicitly in force does not suggest that this would be a critical problem. Anyway, some kind of national consensus regarding further development of developed centres is already overdue. Such a policy adopted at the national level would help the public authorities in States to adopt bold regional development policies.
- h) measures to make new locations attractive. One of the major factors explaining concentrations in Bombay-Poona is that it is the preferred habitat of the entrepreneurs and managers who control private industry. In developing alternatives there are two major factors to be considered. First, good and reliable passenger transport and telecommunication facilities which would enable private capital to control industry in backward areas from metropolitan centres. Secondly, in the long run these new locations must be made attractive places to live in so as to avoid cost of 'remote control'. The proposed city size of 2,00,000 - 3,00,000 population should make it possible to provide the required social facilities. In addition, a location plan should also include measures to stimulate local entrepreneurship.

Conclusion

The industrial location plan for Maharashtra suggests an opti-

imum location pattern for industries in the State, considering the industrial growth that is likely to take place in Maharashtra in the next 30 years. A bold and imaginative plan to shift the focus of industrialization to the backward areas of the State can work. What this study has revealed is that if the industry-mix in each of the future locations is chosen properly such a plan can be achieved and that the plan would not merely promote equity but also efficiency in terms of low cost.

- 0.36 It is possible that if the industrial location plan proposed in this study is implemented a certain area of land earmarked for industrial use in the existing developed centres including New Bombay would remain unutilised. Such land can always be de-reserved and put to appropriate non-industrial use.
- 0.37 The location plan has suggested approximately 15 centres of development outside the developed centres like Bombay, Poona etc. in the State and these may be developed in a phased manner. Each of these industrial centres will form a nucleus of urban development. It would, therefore, be necessary to invest rapidly in the provision of infrastructure in these centres and devise incentives to encourage industries to move to such centres. The plan, however, does not specify exact locations at which these new developments should be sited. The choice of the specific centres for development, based on the findings of the report calls for further investigation.

TABLE - 0.01

Industry	Orientation (Resource, Market, footloose)	Particular use of infrastru- cture.	Areas reco- mmended for future loca- tion.
1	2	3	4
1. Oil Crushing	Resource-based	Power-intensive water-intensive	Nasik, Poona, Marathwada,
2. Sugar	- do -	Water intensive, Effluent inten- sive.	Marathwada, Poona.
3. Food Preservation	- do -	NP (Nothing parti- cular)	Depending on the distribu- tion of pri- mary material.
4. Salt	- do -	NP	- do -
5. Dairy (primary plant)	- do -	Power intensive	Location of milk supply
6. Dairy (bottling plant)	Market based	- do -	Future urban centres.
7. Bakery	- do -	- do -	- do -
8. Soft drinks	- do -	Water intensive	- do -
9. Vanaspati	Footloose	Power intensive, somewhat water intensive too.	Eastern part of Maharashtra.
<hr/> Refer Note 1. <hr/>			
10. Tobacco	Footloose	NP	Future urban centres.
<hr/> Refer Note 2. <hr/>			
11. Cotton ginning and pressing	Resource orie- nted.	NP	Cotton growing areas of Vidar- bha & Marath- wada.
12. Cotton ginning, weaving & Processing	Footloose	Power-and water intensive.	- do - (to avoid double haulage)
<hr/> Refer Note 3. <hr/>			
13. Art silk	Footloose	Power-intensive	Vidarbha and other eastern parts.

TABLE - 0.01 (Contd.)

1	2	3	4
14. Woolen Textiles	Footloose	Power-intensive	Vidarbha and other eastern parts.
15. Saw Milling and Timber processing	Resource-based	NP	Thana and Ratnagiri in Konkan and Chanda in Vidarbha.
16. Paper and Paperboard	Resource-based	Power-intensive water-intensive Pollution-intensive.	Vidarbha (river-side location)
17. Paper Products	Market-based	NP	Future distribution of urban population.
18. Printing	- do -	NP	- do -
19. Tanneries/Processing hides & skins	Footloose	Water-intensive Effluent-intensive	Should be distributed according to livestock population.
20. Leather-products	Footloose	NP	Should be distributed according to livestock population (to integrate with Primary processing).
21. Rubber Tyres & Tubes	- do -	Highly power-intensive, water-intensive	Eastern Maharashtra.
22. Misc. rubber products.	- do -	NP	Future distribution of urban population.
23. Coal-based fertilizer	Resource-based	Power-intensive	Vidarbha
24. Fuel Oil or Naptha-based Fertilizer Plant	Non-resource-based		Near refineries or port town.

TABLE - 0.01 (Contd.)

1	2	3	4
25. Phosphatic fertilizer	Resource based (Import based)	Power intensive Population-intensive Water intensive	Coastal location other than Bombay and New Bombay.
Refer Note 4			

Basic Organic Chemicals

26. Complex based on petroleum fractions : DMT, Caprolactum, dye-intermediate, polyethylene, Polystyrene, butadiene, acetone, acetyldehyde, BHC etc. Units Downstream to Petro-chemical complex.	Resource-based	Power-intensive Water intensive Pollution intensive	Should be linked to refineries; coastal location is preferred.
27. - Dyestuffs	Footloose	Highly water-intensive, Power intensive Effluent-intensive	Coastal location in near proximity to input source.
28. - Synthetic fibre	- do -	Highly power-intensive	Eastern Maharashtra.
29. - Plastic Processing	- do -	NP	Future distribution of urban population.

Inorganic Chemicals

30. - Sulphuric Acid	Linked to fertiliser and rayon plants	Power, water and effluent-intensive	Captive plants of fertilizer and rayon industries.
31. Caustic Soda	Resource based	Power and water intensive	Konkan coast where salt is produced.

Other Chemicals:

32. Paints & Varnish	Footloose	Water-intensive Effluent-intensive	Coastal location suggested.
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TABIE - 0.01 (Contd.)

1	2	3	4
33. Soap	Footloose	Mildly water-intensive	Future distribution of urban population
34. Drugs & Pharmaceuticals	Footloose	Moderately power and water-intensive	Any area where there is a developed chemical market
Refer Note 5.			
35. Oxy-Acetylene-Gas	Market based	NP	Near Engineering industries.
36. Cement Industry	Resource based	Power-intensive	Vidarbha
37. Glass Container	Market-based	NP	Near future location of soft drinks industries, dairy industries and Pharmaceutical industry.
38. Hume Pipe	- do -	NP	Future distribution of urban population.
39. Scrap-based steel Manufacturing	Resource-based (availability of scrap)	Power-intensive	Eastern Maharashtra.
40. Steel Re-rolling Mills	- do -	- do -	- do -
41. Ferro-Alloys	- do -	- do -	Vidarbha
42. Primary non-ferrous (aluminium)	- do -	- do -	Ratnagiri
43. Non-ferrous metals Processing unit	Footloose	NP	Engineering industry centres (particularly electrical engg.)
Engineering Industries :			
44. - Consumer goods like - hurricane, lamps, razor blades, electrical appliances, radio sets, etc.	Footloose	NP	Future distribution of urban population.

TABLE - 0.01 (Contd.)

1	2	3	4
45. - Textile machinery	Market-based (location of textile industry)	Somewhat power-intensive	Vidarbha
46. - Sugar Machinery	Market-oriented (location of sugar industry)	- do -	Poona & Marathwada
47. - Chemical Machinery	Market-oriented (Chemical industry)	- do -	Near Greater Bombay.
48. - Power generation and distribution equipment.	Market-oriented (Power system)	- do -	Vidarbha.

Refer Note 6.

49. Tractors	National-market oriented	NP	Nasik, Vidarbha
50. Agricultural implements, Pump sets.	Market-oriented	NP	Any centre where market facility will be available.
51. Machine tools, conveying equipment, boilers and steam generating plants	Footloose	NP	No particular location suggested (These need not be market-oriented).
52. Motor-cars, Scooters, Bicycles	Footloose	NP	All regions would be equally good.
53. Ships and Boats	Port-oriented	NP	Coastal location
54. Fastners, Ball bearings, Electric motors, Cables & wires etc. Castings and forgings, General purpose machine shops.	Footloose	NP	Depending on the pattern of location of engineering industries. The local market must be large enough.
55. Metal containers	Market-oriented	NP	Depending on future location of oil and vanaspati industry; food processing industries drug industries etc.

TABLE - 0.01 (Contd.)

1	2	3	4
56, Sanitary Fixtures	Footloose	NP	Future distribution of urban population.

Refer Note 7

NOTES

1. The rest of the Food-Beverage industries should be located in regions producing the appropriate raw-materials. Generally, food industries are bulk buyers of materials like oilseeds, oil, sugar-cane, flour, etc. Hence, they need to be located at a centre where trade in these materials exists. This requires that several factories of the same sort should be at the same place. This will also enable one to realise the strong backward linkage that this industry has with the packaging industry such as tin cans, glass bottles, etc. Likewise, in terms of forward linkages, the industries are mainly related to one another and this gives a possibility of strong clusters and trading activities in carefully selected centres. The kind of linkage may be : The dairy industry and sugar industry linked to the confectionary industry, the oil-crushing industry with the Vanaspati industry, flour milling with bakeries, etc. The sugar industry also has important links with the paper industry (use of bagasse) and alcohol beverage industry (use of molasses) which should be realised locally.
2. Linkage with paper-packaging industry should be realised locally.
3. Cotton mills need to be located near major trading centres in Cotton. To make a trading centre work well it may be necessary to have more than one mill at any one centre. The cluster will also help the development of ancillaries such as textile stores, bobbins, shuttles etc.
4. This principal by-product of the phosphate fertiliser industry is gypsum which should be utilized to make cement.
5. The drugs and pharmaceutical industry is dependent on the chemical market. This suggests that there should be a large number of buyers so that the chemical market will be economically viable. Therefore, the objective should be to locate as many plants as possible in one place. This will also ensure the growth of ancillary industries, particularly packaging (glass containers, paper containers, barrels, etc.).
6. Industries producing specialized capital goods should generally be sited with reference to locations where investment in the using industries is taking place. If some of these machinery industries serve national market location between Vidarbha and Nasik would be suitable.
7. Generally, engineering industries are footloose and their pattern of location can be determined irrespective of the advantages and disadvantages of different regions as regards the cost of infra-structural services. Efforts should be made to locate engineering industry complex in different parts of the state to ensure inter-feeding among units.

APPENDIX P
INVENTORY OF DATA SOURCES

P.01 An inventory of data sources is being undertaken as a part of 'Data Bank' activity. The principal objective is to locate sources of data relevant for planning purpose and to determine the reliability and usefulness of this data.

Each data source is studied for:-

- (i) information content,
- (ii) geographic and subject coverage,
- (iii) definitions of the concepts used,
- (iv) the form in which the raw and processed or semi-processed data is available,
- (v) the form in which raw or processed or semi-processed information is preserved.

P.02 The subjects for which such an inventory has already been made includes:

- (a) population
- (b) vital statistics (births and deaths)
- (c) consumption and income
- (d) employment
- (e) occupational pattern of workers
- (f) industrial activity
- (g) transportation
- (h) housing
- (i) education
- (j) social amenities.

P.03 The major sources of data covered so far includes:

- (1) Census of India
- (2) National Sample Survey (NSS)
- (3) Annual Survey of Industries (ASI)
- (4) Director General of Employment and Training (DGET)
- (5) Sample Registration Scheme, Registrar General of India
- (6) Bureau of Economics and Statistics- Maharashtra State
- (7) Inspectorate of Factories
- (8) Shops and Establishments and Public Health Department - Bombay Municipal Corporation
- (9) Sales Tax Department
- (10) Directorate of Education, Maharashtra State
- (11) Directorate of Agriculture, Maharashtra State
- (12) Directorate of Health Services, Maharashtra State
- (13) Bombay Port Trust.

P.04 Apart from some kinds of information which are regularly collected and published, the agencies indicated above also carry out special studies and surveys from time to time.

P.05 Some of these surveys are carried out using the Census houselisting as a frame for selecting samples. However, interpretations are made usually at the city level, and it is often not possible to abstract the information collected to coincide with geographic subdivisions as made by the Census. Apart from the Census and Bombay Municipal Corporation, information is collected by postal districts whose boundaries

do not coincide with Census blocks or Municipal Wards in the city. Some of the more important sources of information are discussed below:

Census of India

P.06 This is a basic source of information on demographic characteristics of population, migration, housing and economic status of the population. The Census of population is taken every ten years and it started in 1872. Prior to the 1951 Census, there was no permanent Census organisation. A Registrar General and Census Commissioner was appointed, as the permanent single authority in 1949 with the objective of conducting all future censuses and carry out the work of improvement of vital statistics in the country. Directors of Census operations are responsible for conducting the census in each state and union territory. States are further divided into districts, charges and circles; under district census officers, charge superintendents and circle supervisors respectively. Circles are then divided into villages and blocks for rural and urban areas respectively. In rural areas normally patwaris and elementary school teachers are appointed as the Census enumerators and in urban areas school teachers, government clerks, etc. conduct the actual enumeration. A Census supervisor is appointed over every five enumerators to supervise and guide their work.

P.07 During the 1971 Census the following schedule were canvassed: (For each schedule 100% coverage was attempted)

- (1) **Houselist;** which collected data on different aspects of housing such as number of rooms, tenancy status, material of roof and walls, purpose for which it is used and number of persons residing in the house if it is used for residential purposes. The unit of enquiry was the Census house.
- (2) **Individual Slip:** Information on demographic characteristics, economic activity status, migration etc., was collected through this schedule. The unit of enquiry was the 'individual'.
- (3) **Establishment Schedule:** Information on the number of workers employed, type of power used and goods or services produced by an establishment. The unit of enquiry was an establishment (as defined in the Census 1971).
- (4) **Degree holder and Technical personnel card:** Information on educational qualifications, age, sex, marital status and employment and unemployment particulars of each degree holder and technically qualified person in the country.

P.08 Census information is organised at the enumerator's block level. An enumerator's block usually consists of either 120 households or approximately 600 persons. For the first time in 1971 the Census information has been put on punched cards and magnetic tape. 100 percent data from the Establishment Schedule and Degree holder and Technical Personnel Cards is available on tape. For houselisting data, a 20 percent sample is on tape and for Individual slip data

there are two samples on tape

- (i) 20 percent sample for urban areas and
- (ii) 1 percent sample for the entire population.

National Sample Survey

- P.09 **Introduction:** The National Sample Survey (NSS) was set up in 1950 by the Ministry of Finance, was brought under control of Department of Statistics, Cabinet Secretariat, in 1957 and is under NSSO - National Sample Survey Organisation in the Department of Statistics, Cabinet Secretariat, since 1970. The activities of the NSS are governed by a Governing Council since March 1970.
- P.10 **Information Collected:** Enquiry on consumer expenditure is a regular feature in most of the rounds. The subject coverage for each round is fixed by taking into account the nature of data required and the resources available. But in the last few rounds the subjects covered include household income, employment and unemployment particulars, labour force statistics, demographic characteristics, crop surveys, small scale industries, capital formation, building construction, migration, family planning, livestock products etc. From time to time ad-hoc surveys of NSS gather information on income-expenditure of middle class and working class, post-census changes in population and livestock etc. The information is collected either through one schedule or more than one schedule depending upon the scope of NSS for a particular round.
- P.11 **Sampling Design:** The sampling design is mainly a two stage one, with villages and urban blocks (not the same as Census enumerator's blocks) as the first stage units in rural and urban areas respectively. The second stage units are the households for the socio-economic enquiries and plots for the crop-surveys. However, a three-stage sampling design was used for some rounds. The first, second and third stage units were tehsils, villages and households in rural areas and towns, blocks and households in urban areas. The NSS sample is drawn in the form of two or more independent interpenetrating sub-samples, usually of the same size and using the same sampling technique. The surveying for different sub-samples is done by different sets of investigators and this provides more than one estimate for the characteristic under study. The comparison of these estimates help us to evaluate the accuracy of the survey as well as of the investigation. The States participate in NSS on a matching sample basis (a sample of the same size as that of the Central sample drawn by the NSS). The participation of the state is through their statistical Bureaus, The matching sample is usually drawn in the form of two interpenetrating sub-samples of the same size.

Annual Survey of Industries (ASI):

- P.12 The ASI has been undertaken since 1959 and covers factories registered under the Factories Act 1948. Under this act the registered factories are:

- (i) those employing 10 or more persons and using power,
- (ii) those employing 20 or more persons and not using power and
- (iii) those registered under section 85 of the Act, under which the State Government makes applicable the provisions of the Act even though the above mentioned conditions are not fulfilled.

P.13 The Defence factories are excluded from the scheme. The ASI collects information on productive capital, employment, value of output, value added, man-hours worked, investment in transport equipment and physical assets, materials consumed, products and by-products manufactured, fuel consumed etc. The registered factories are divided into (i) Census sector for which a Census is taken and (ii) Sample sector for which a sample is selected on two criteria (a) to provide usable estimates for each industry at an All-India level and (b) to provide usable estimates for all industries taken together at the State level and for two major industry groups in each State, taken separately. The sample is divided into two equal interpenetrating sub-samples using circular systematic sampling without replacement in such a way that there are no common units between the two sub-samples. The location code available with ASI schedules is the postal address of the establishment.

Director General of Employment and Training (DGET)

P.14 The DGET started an Employment Market Information (EMI) programme under the Employment Exchange (compulsory notification of vacancies) Act 1959. Under this programme about 350 Regional Employment Exchange Offices (REEO) located mainly in urban areas of the country collect information on employment in public sector establishments and employment in private sector establishments employing 10 or more persons. The occupational patterns of workers in the establishments covered by the EMI programme is also studied for the public and private sector in alternate years. The REEO also maintains records of unemployed persons registered with them. This programme uses the postal address as the location code.

Shops and Commercial Establishments Employment:

P.15 Information on the number of shops and establishments is collected under the Shops and Establishment Act (1948). Shops and establishments are classified into five groups as (i) Shops (ii) Cinema theatres (iii) hotels and restaurants (iv) residential hotels and (v) commercial establishments which also include the un-registered manufacturing sector. For each of these groups separate registers are maintained which record for each establishment:

- (a) year of establishment
- (b) year of closure of the establishment
- (c) postal address of the establishment
- (d) number of employees and family workers classified by sex and
- (e) description of main activity of the establishment.

APPENDIX Q

ACHIEVEMENTS IN REHABILITATION

Q.01 Employment:

- (a) Long and short term employment: Long term employment has been provided for 1102 persons (Thana 359; Panvel 475; Uran 268).

Besides, 500 local unskilled persons were provided jobs as casual labourers on CIDCO's works like afforestation, construction, etc. in 1972-73.

- (b) Loans for petty trades: Loans amounting to Rs.58,100 have been sanctioned to 43 persons to enable them to start their own small-scale business like groceries, selling stationery, etc.

- (c) Wooden stalls: 7 persons have been allotted wooden stalls on rent of Rs. 15 per month for running tea shops, panpatti shops, etc. 3 of them have also been given loans of Rs. 500 each for this purpose.

- (d) Auto-rickshaws: 12 boys trained in auto-rickshaw driving were helped in securing auto-rickshaws from the Government's quota and loans from the Bank of India. CIDCO has given loans of Rs. 2,000 each to 2 out of these 12 boys. They are now running auto-rickshaws in the Thana-Belapur area and earning about Rs. 40 per day.

Q.02 CIDCO's deposit scheme:

87 persons had deposited Rs. 2,04 lakhs with CIDCO out of which 73 persons have since withdrawn their deposits. The number of depositors at present is 14 and the total deposits are Rs. 45,100.

Q.03 Training:

643 project affected boys have been trained in different skills. Another 621 boys are undergoing training in CIDCO's Training Centres. CIDCO has now Training Centres at the following places:

Sr. No.	Place of Training Centre	Courses Taught
<u>1</u>	<u>2</u>	<u>3</u>
1.	Mahape	1. Workshop Mechanic 2. Automobile Mechanic 3. Carpentry
2.	Belapur	1. House Mechanic 2. Surveyor and Draftsman 3. Gardening and Horticulture
3.	Panvel	1. Workshop Mechanic 2. Typing and Shorthand
4.	Ulwe	1. Workshop Mechanic 2. House Mechanic (proposed)

1	2	3
5.	Gavhan	Woodwork Mechanic
6.	Kalanboli- Asudgaon	Gardening and Horticulture
7.	Jaskhar (temp- orarily at Uran)	House Mechanic
8.	Kegaon (tempo- rarily at Uran)	Woodwork Mechanic.
9.	Uran	1. Turner 2. Fitter 3. Machinist 4. Radio Servicing 5. Typing and Shorthand 6. Tailoring
10.	Nagaon	Tailoring
11.	Jasai	1. Workshop Mechanic (proposed) 2. Surveyor & Draftsman (proposed)
12.	Dapoli-Pargaon	Structural Mechanic (proposed)
13.	Owale	Gardening & Horticulture (proposed)
14.	Weshvi	Surveyor and Draftsman (proposed)

Q.04 Crash Training Programme for Trained but Unemployed Persons:

- (i) **Pipe-fitters:** A programme for training 8 trained fitters in pipe-fitting for one month was undertaken with the assistance of the MIDC. These boys completed training and have been employed by the MIDC on daily wages of Rs. 4 per day. After three months they are reported to be taken up on the MIDC's regular establishment payroll.
- (ii) **Road Roller Drivers:** A training course in road roller driving for trained motor drivers will be started shortly. These drivers will be employed by Government in the Buildings & Communication Department (B.&C.D.) after training.
- (iii) **Apprentice Trainees:** 19 project affected unemployed persons who have passed S.S.C and I.T.I./T.T.C. courses have been taken up so far as apprentice trainees in the various CIDCO's Technical Training Centres for advanced training.

Q.05 Social Amenities:

- (1) **Educational Facilities:**
 - (a) **College at Panvel:** A scheme for giving financial assistance for construction of a new college building has been approved.
 - (b) **Secondary Schools:**

- (i) Rs. 50,000 have been sanctioned as financial assistance for construction of new school rooms for two Secondary Schools.
 - (ii) Science equipment and student's benches worth Rs. 3,600 have been donated to two Secondary Schools.
 - (iii) A model plan for the Secondary School at Funde is being prepared.
- (c) Primary Schools: Rs. 2.65 lakhs have been sanctioned as financial assistance for construction of new school rooms and repairs to old school rooms of the Primary Schools in the project area.
- (d) Stipend: i) The rate of stipend paid to the trainees in CIDCO's T.T.Cs and I.T.Is. has been increased from Rs. 25 to Rs. 50 per month.
- ii) About 200 project affected students studying up to the first degree course at the college at Panvel are being paid a stipend of Rs. 80 per month each.
 - iii) The trainees in Gardeners' Course are being paid a stipend of Rs. 75 per month.
- (e) Scholarship Scheme: A scholarship of Rs. 50 per month has been awarded from the year 1971-72 for 4 years to a project affected student, who is now studying at the Panvel College. A similar scholarship has been given from the year 1972-73 for 4 years to another project affected student studying at the same college.
- (2) Piped Water Supply - Washing Platforms
- (a) Piped water supply has been provided to 15 villages in the project area (6 in Thana, 3 in Panvel and 6 in Uran area).
The question of giving piped water supply to other villages is under consideration
 - (b) Financial assistance of Rs. 12,900 has been sanctioned to the village Panchayats of six villages in Uran Tehsil for construction of washing platforms.
- (3) Village Development Schemes
- (i) Village Development works, such as an approach road to Turbhe, construction of a building for the Mahila Mandal and a bus stand at Belapur, renovation of tanks, etc., have been sanctioned. The works of the approach road and the bus stand have been completed.
 - (ii) The work of preparing development plans (a) for the Funde Dongri villages and (b) Jaskhar-Karal-Sonari-Savarkhar villages has been taken in hand.
 - (iii) The proposal for expansion of the gaothans by allotment of plots to needy villagers is under consideration.

(4) Medical facilities:

- (i)** CIDCO's mobile medical dispensary, with the assistance of the Health Promotion Society, used to visit in the past, 7-8 villages in the project area on every Sunday and treat about 400 patients on each visit. This facility had to be discontinued following the expiry of the contract with the aforesaid society.
 - (ii)** The question of giving financial assistance for construction of primary health units with sub-centres in the project area to cater to the medical needs of the local people is under consideration.
 - (iii)** A medico-surgical camp was arranged at Belapur with the active assistance of the Lion's Club of Worli, the Thana Zilla Parishad and the Belapur Village Panchayat, in which 700 local persons were treated and 19 eye operations and 12 gynaecological operations were performed.
- (5) T.V. Sets:** T.V. Sets has been installed at 5 secondary schools in the project area with the assistance of the State Government's Directorate of Rural Broadcasting.
 - (6) Film Shows:** Educative and commercial films are exhibited periodically in the project area.
 - (7) Contacts with the Local People:** The villages are regularly visited and the local leaders also hold meetings of the project affected prominent persons which are attended to by the Managing Director and other CIDCO officers, and at these visits and meetings the various problems of Rehabilitation are discussed and solved.

APPENDIX 'R'

OTHER AGENCIES : PROGRAMMES AND POLICIES

1. Maharashtra Industrial Development Corporation.
2. Buildings & Communications Department, Government of Maharashtra.
3. Central Railway.
4. Bombay Port Trust.
5. Maharashtra State Electricity Board.
6. Bombay Telephones.
7. Maharashtra Agricultural Development and Fertiliser Promotion Corporation Limited.
8. Maharashtra Housing Board.
9. Dairy Development Department, Government of Maharashtra.
0. Life Insurance Corporation of India.
1. Metropolitan Transport Organisation (Railways).
2. International Airports Authority of India.

1. MAHARASHTRA INDUSTRIAL DEVELOPMENT CORPORATION.

Organisation

R.01 The MIDC is an autonomous Corporation established on 1st August 1962 by the Government of Maharashtra under the M.I.D.C. Act 1961 with a view to promote and assist rapid and orderly establishment, growth and development of industries in Maharashtra. The Corporation chooses sites for and develops industrial areas and estates in different parts of the State. The Corporation has so far undertaken development of 34 industrial areas in the State and two of these, Trans-Thana and Talaja, are in New Bombay.

R.02 The total area proposed for development in the 34 estates is estimated at 15,222 hectares for industrial use and 585 hectares for residential use. Out of this the Corporation has already taken possession of 10,409 hectares (2602 hectares in New Bombay).

Industrial estates

R.03 The industrial estates are divided into two categories : (a) for engineering and non-engineering industries and (b) for chemical and other high pollution industries. Table R.01 gives the list of industrial estates and the area, number of plots and type of industries allowed in each estate.

R.04 The industrial plots are allotted on a long term premium lease basis in the developed regions of Bombay-Poona complex and Nasik and on a rental lease basis in other parts of the State. The lessee is allowed to mortgage his interest in the plot for raising finance from authorised financing agencies. There is no escalation clause in the lease agreement but the rates are revised from time to time for fresh allotments. The current rates are given below :

<u>Area and type of lease</u>	<u>Lease Rates</u>
1. Marol (Bombay Suburban District). Premium lease for 99 years,	Rs. 66 per square metre Rs. 60 per square metre for the units shifting their industries from nonconforming zones of the Bombay Municipal Corporation (the amount of premium is to be paid in five annual equated instalments).
2. Thana (Wagle Estate). Premium lease for 99 years.	Rs. 30 per square metre.
3. Trans-Thana Creek (including Kalwa) Premium lease for 99 years,	Rs. 30 per square metre.
4. Mira. Premium lease for 99 years.	Rs. 20 per square metre.

- | | |
|---|--|
| 5. Dombivli
Premium lease for
99 years. | Rs. 17 per square metre. |
| 6. Ambarnath.
Premium lease for 99 years. | Rs. 8 per square metre. |
| 7. Badlapur.
Premium lease for 99 years. | Rs. 5 per square metre. |
| 8. Nasik.
Premium lease for 99 years. | Rs. 6 per square metre. |
| 9. Pimpri (Bhosari).
Premium lease for 99 years. | Rs. 12 per square metre. |
| 10. Taloja.
Premium lease for 99 years. | Rs. 12 per square metre. |
| 11. Tarapur.
Premium lease for 99 years. | Rs. 6 per square metre. |
| 12. Bhiwandi-Kalyan.
Rental lease for 95 years. | Security deposit Rs.500/-, rent is charged at $8\frac{1}{2}$ per cent of the total occupancy amount calculated at Rs.2 per square metre of plot area. The concessional rates are offered as the area is being developed for the resettlement of persons affected by different projects in the State. This area has been taken up for development at the instance of the Director of Resettlement. |
| 13. All other places.
Rental lease for 95 years. | Security deposit Rs.500/-, annual rental is as follows :

No rent for the first two years;
Half rent for the next three years;
and Full rent from the sixth year.

Rent is calculated at $8\frac{1}{2}$ per cent of the price calculated at Rs.125 per square metre for the first 10 acres and Re.1 per square metre above the first 10 acres on slab system, irrespective of the cost of development expenditure. |

The lands for industrial development are acquired by the Government and entrusted to the Corporation. The Corporation develops these and leases out plots to entrepreneurs. The development cost and administrative expenses of the Corporation are recovered from sale proceeds and rents of plots and sheds and the balance is handed over to the Government or held in deposit for the Government. In order to attract the industries to its estates the Corporation provides a basic road network, storm water drainage and water supply. It also

arranges with the Maharashtra State Electricity Board to provide power and the relevant private, State and Central Government bodies to provide public utilities such as Police Station, Post and Telegraph Office, Telephone exchange, Banks, Fire protection etc. The Corporation also arranges to get the necessary clearances from the Directorate of Industries.

Table R.02 gives a picture of development of the industrial areas as on 31.3.1973, showing the number of industries, the capital investment attracted, the annual turnover and the number of workers employed in these industries.

Water supply schemes

R.05 The Corporation also executes its own water supply schemes to serve the industrial estates and adjoining rural and urban areas. The Corporation has 12 water supply schemes in hand. The five major schemes are :-

Table R.03

Scheme	Capacity 1972	Ultimate	Industrial supply	Domestic supply
*1. Trans- Thana WSS	53.6	53.6	Thana Belapur	21 villages belt
2. Shahad WSS	57.0	57.0	Dombivli, Bhivandi, Kalyan.	Kalyan, Dombivli Ulhasnagar 9 villages.
*3. Barvi WSS	227.0	85.0	Dombivli	New Bombay.
*4. Ransai WSS	20.3	20.3	Defence Establishment, Uran.	Uran and 50 villages.
5. Pimpri, Chinchwad WSS	27.0	34.0	Pimpri, Chinchwad- Bhonsari	Pimpri, Colony.

* To serve areas in New Bombay.

R,06 The MIDC have recently concluded an agreement with CIDCO under which they will provide the entire water required by New Bombay upto a population level of 2 million. In the initial stages the entire supply will be from the Barvi Scheme of MIDC, to which CIDCO will make an annual capital

contribution of Rs. 1 crore, for 10 years and also pay a direct consumption charge which will be reviewed every 10 years depending on the recurring costs incurred by MIDC.

- R.07 The water supply schemes are financed by open market loans and income from sale of water is used to meet the administrative expenses and to create a sinking fund to meet the open market loan liabilities as they mature.

Other activities

- R.08 The Corporation also undertakes works on an agency basis for the Government and public sector bodies. The volume of such works is however small compared to its own operations. Among such works currently in hand are :

- a) Development of a film city in Goregaon, Bombay for the Government of Maharashtra.
- b) Construction of flatted factories and shops in Thana-Belapur, Poona, Nasik and Aurangabad under the Central Government's Industrial and Commercial Estates scheme for unemployed engineers and technicians and unemployed graduates respectively.
- c) Development and provision of physical infrastructure and construction works in New Aurangabad on behalf of CIDCO.

Scale of operations

- R.09 The Corporation has been expanding its activities ever since its inception in 1962. An idea of its scale of operation can be had from its expenditure on development of industrial estates and water supply schemes which has increased from Rs.00.45 crores, in 1962-63 to Rs.22.82 crores in 1971-72. The breakup over the industrial estates and water supply schemes is given in the table below :-

Table R.04

Year	Development Expenditure (Rs. in crores)		
	Industrial Estates	Water supply schemes	Total
1962-63	0.45	-	0.45
1963-64	0.92	0.57	1.49
1964-65	1.47	2.63	4.10
1965-66	2.48	3.76	6.24
1966-67	3.65	4.33	7.98
1967-68	4.23	5.83	10.06
1968-69	4.45	7.37	11.82
1969-70	5.99	18.17	14.16
1970-71	7.04	10.86	17.90
1971-72	9.01	13.81	22.82

Table R-01

Statement showing the information regarding the Industrial Areas as on 31st March, 1973.

Sr. No.	Name of the Industrial Area.	Total area planned for		Land already in possession till 31st March, 72 Hectares	Total No. of plots in the area.	No. of plots allotted up to 31st March, 72.	No. of plots allotted during 72-73.	No. of plots surrendered.	Nature of Industries.
		Industrial use. Hectares.	Residential Use. Hectares						
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
<u>Greater Bombay</u>									
1.	Marol.	136.53	-	111.47	187	87	28	4	Engineering.
<u>Thana District.</u>									
2.	Thana (Wagle Estate)	277.61	83.36	239.74	641	530	48	13	Egg.
3.	Trans-Thana Creek	2035.00	-	1900.88	182	112	28	3	Chemical and Petrochemical.
4.	Kalwa.	511.00	-	398.12	49	29	2	-	Egg.
5.	Mira	7.82	-	7.82	64	25	-	-	Egg.
6.	Dombivli	211.62	151.78	349.27	298	172	16	5	Engineering
7.(a)	Ambarnath.	211.24	18.21	229.45	128	105	16	4.	Engineering and Chemical
7.(b)	Ambarnath Addl.	522.73	-	-	-	-	-	-	

Table R.01 (Contd.)

1.	2.	2.	3.	34.	5.	4	6.	7.	8.	9.	10.
8.	Badlapur.		104.41	-	104.41		115	89	6	43	Engg.
9.	Kalyan-Bhiwandi.		48.16	-	48.16			21	2	5	Engg. and Chemical.
10.	Wangani.		365.84	-	-		-	-	-	-	
11.	Tarapur		664.47	-	470.21		13	5	6	-	Engg. and Chemical
12(a)	Tarapur Addl.		514.37	-	514.37		-	-	-	-	
	<u>Kolaba District.</u>										
12.	Taloja		757.05	91.51	701.59		156	9	16	1	Chemical and Engg.
13.	Roha.		161.00	-	161.00		77	53	17	8	Chemical and Engg.
	<u>Ratnagiri District :</u>										
14.	Pophali-Chiplun.		81.00	-	80.00		64	34	18	4	Engg.
15.	Ratnagiri.		338.00	-	259.60		-	-	-	7	
	<u>Nasik District.</u>										
16.	Nasik		615.00	27.00	639.00		442	296	33	24	Engg.
16(a)	Nasik Addl.		541.71	-	-		-	-	-	-	-
	<u>Jalgaon District :</u>										
17.	Jalgaon		19.03	-	19.03		134	128	9	8	Engg.
17(a)	Jalgaon Addl.		193.49	-	-		-	-	-	-	
	<u>Dhulia District :</u>										
18.	Dhulia.		5.25	-	5.25		26	20	4	3	Engg.

Table R.01 (Contd.)

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
<u>Sholapur District :</u>									
19.	Sholapur (Akkaikot Road)	216.48	-	216.48	331	31	219	-	Engg.
19(a)	Sholapur Hotgi Road.	209.48	-	-	-	-	-	-	-
<u>Poona District :</u>									
20.	Pimpri-Bhoseri	1131.85	92.27	1179.71	838	305	51	9	Engg.
<u>Satara District :</u>									
21.	Satara	152.46	-	152.46	123	63	11	1	Engg.
<u>Sangli District :</u>									
22.	Sangli-Miraj	426.12	-	380.34	22	2	-	-	Engg.
23.	Islampur	488.08	-	179.38	22	3	-	-	Engg.
<u>Kolhapur District :</u>									
24.	Kolhapur	319.00	-	157.32	141	5	43	-	Engg.
<u>Ahmednagar District :</u>									
25.	Ahmednagar	788.53	-	34.16	-	-	-	-	-
<u>Aurangabad District :</u>									
26.	Aurangabad (Near Rly. Station).	34.97	-	34.97	87	60	6	6	Engg.

Table R.01 (Contd.)

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
27.	Aurangabad (Chikhalthana)	408.54	-	405.81	241	142	32	14	Engg.
27(b)	-do- (Addl.)	330.42	-	-	-	-	-	-	-
28.	Jalna.	50.58	-	50.58	53	41	14	6	Engg.
<u>Bhir District :</u>									
29.	Bhir	75.59	-	42.80	45	9	2	-	Engg.
<u>Manded District :</u>									
30.	Manded.	310.43	-	310.43	77	16	1	1	Engg. and Chemical.
<u>Osmanabad District :</u>									
31.	Latur.	285.72	-	-	-	-	-	-	Engg.
<u>Nagpur District :</u>									
32.	Nagpur	403.35	-	396.84	187	121	40	11	Engg.
32(a)	Nagpur Addl.	220.89	121.41	-	-	-	-	-	Engg.
32(b)	Kamptee Kanhan.	129.50	-	39.57	-	-	-	-	Chemical.
<u>Akola District :</u>									
33.	Akola.	305.53	-	114.93	87	26	13	3	Engg.

Table R.01 (Contd.)

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
<u>Chandrapur District :</u>									
34.	Ghugus.	409.00	-	409.00	-	-	1	-	Engg. and Chemical.
<u>Yeotmal District :</u>									
35.	Yeotmal.	203.21	-	65.12	-	-	-	-	Engg.
TOTAL...		15222.06	585.54	10409.29	4854	2539	682	176	

Table R.02

Statement showing the progress of Industrial
Development in Industrial Areas
as on 31st March 1973.

Sr. No.	Name of the Indl. Area	No. of factories in production.	No. of factories under construction.	Fixed capital investment of factories in Rs. in lakhs.	Turnover of factories in Rs. in lakhs	No. of workers employed in factories in Col.No.3
1	2	3	4	5	6	7
1.	Marol * 340 + 51	85	16	150.10	300.00	1,000
2.	Thana.	344	134	3142.20	7201.60	18,765
3.	Trans-Thana Creek Including Kalwa	56	30	13516.37	16015.42	12,000
4.	Dombivli. 1240 @ + 520	176	15	822.81	1986.38	5,500
5.	Ambernath 650 @ + 240	89	9	1024.12	2021.23	5,000
6.	Badlapur 190 @ + 270	46	11	148.80	253.89	714
7.	Kalyan Bhiwandi	10	5	178.54	421.40	500
8.	Tarapur	-	1	-	-	-
9.	Taloja	3	3	1491.41	418.00	600
10.	Roha	12	7	197.63	110.00	636
11.	Pophali-Chiplum.	11	2	5.00	10.00	50
12.	Nasik	104	34	1545.56	1600.00	5,434
13.	Jalgaon	26	10	36.67	122.91	350
14.	Dhulia	8	-	60.85	452.45	250
15.	Pimpri-Bhosari. 1840 @ + 440	228	40	3217.08	3250.00	6,404
16.	Satara	2	4	10.00	0.50	10
17.	Sangli-Miraj.	1	-	0.25	0.51	28
18.	Islampur	1	-	236.36	251.85	500
19.	Kolhapur	2	1	23.25	1.00	200
20.	Aurangabad (Near Railway Station) @+	24 2	5	18.00	43.00	300
21.	Chikalthana (Aurangabad.)	35	23	515.00	1000.00	1,300
22.	Jalna	22	3	24.00	148.00	500
23.	Bhir	-	4	-	-	-

Table 2.02 (Contd.)

1	2	3	4	5	6	7	
24. Nanded		5	1	48.00	-	79	
25. Nagpur		17 0	29	73	494.71	325.95	1,161
	@ +	12 0					
26. Akola		4 0	7	5	3.10	4.50	10
	@ +	3 0					
27. Ghugus		1	-	-	-	-	430
		1329	436	26,909.81	35,938.59	60,721	

* Indicates the number of units from Flatted Factory Buildings Udyog Sadan Nos. I and II.

@ Indicates the number of sheds - Technicians and Functional.

2. BUILDINGS AND COMMUNICATIONS DEPARTMENT

Organisation and activities

R.10 The Buildings and Communications Department of the Government of Maharashtra deals inter alia with the following principal subjects:

- (i) Buildings for use of State Government - Construction and maintenance,
- (ii) Roads, Bridges, Ferries, etc. in the State - Construction and maintenance,
- (iii) Housing for staff,
- (iv) Electrical installations in Government buildings - installation and maintenance,
- (v) Shipping and Navigation in inland water ways,
- (vi) Parks and Gardens.

R.11 The Department also undertakes construction and maintenance of National Highways on behalf of the Central Government on an agency basis.

Plans

R.12 The major roads and reclamation projects under execution and under contemplation in the Bombay Metropolitan Region are:

- (i) Diversions on National Highway No.3 near Thana and Bhiwandi,
- (ii) West Island and East Island Freeways in Greater Bombay,
- (iii) Link roads at 4 points connecting Western Highway and Eastern Highway in Greater Bombay,
- (iv) Reclamation of land at Backbay in southern end of the island city, at Mahim (700 acres) on western coast and Wadala (1628 acres) on eastern coast.

R.13 The Department has not indicated any buildings construction plans in Greater Bombay. Because of a recent policy decision all proposed construction in Greater Bombay has been stopped and the fate of plans already prepared or those in proposal stage remains uncertain.

R.14 Three major buildings projects are planned for New Bombay, namely:

- (i) Administrative building in Belapur, Central Business District,
- (ii) Staff quarters in Belapur township,
- (iii) ESIS hospital with 600 beds in Vashi township.

A total of 821 quarters will be constructed in the 1st stage, the breakup over different pay scales being as follows:-

Table R.05

Pay scale	No. of quarters
1. Rs. 1300 and above	6
2. Rs. 600 - 1299	40
3. Rs. 300 - 599	110
4. Rs. 150 - 299	385
5. Rs. 149 and below	290

R.15

The cost of work on National Highway is to be borne by the Central Government and that for work on road over-bridges at Shahad and Bassein is to be borne by the Railways. The expenditure on roads in Greater Bombay is shared by State Government (66.7%) and Bombay Municipal Corporation (33.3%). The reclamation and building projects are financed in their entirety by the State Government.

3. CENTRAL RAILWAY

Organisation

R.16 The Central Railway is a division of the Railway Ministry of the Government of India and along with Western Railway connects the island city to the mainland and also provide a suburban railway service in the Bombay Metropolitan Region.

The suburban services in Bombay, Calcutta and Madras account for a major portion (about 50%) of the total passenger trips made on Indian Railways; Bombay contributes about a majority (more than 60%) of the total suburban commuters. Within Bombay about 40% of the total commuters are carried by the two railways (about 20% each), about 40% by the municipal bus service (BEST) and the rest by private vehicles and taxis.

R.17 The suburban service of Central Railway is run on two independent sets of double lines. The first set is the main line which runs parallel to the trunk line for long distance and goods trains, for 53 km. from Bombay V.T. at southern end of the island city to Kalyan in the north east. From Kalyan it bifurcates, one line going to Kasara, 67 km. further north-east, and the other to Karjat, 47 km. south east. The second set is the Harbour branch which also originates at Bombay V.T. but separates from the main line after a few kilometers and serves the dock area in the eastern part of the city. The harbour branch rejoins the main line at Kurla, 15 km. due north from Bombay V.T. and a branch line connects Western and Central railways at Bandra.

R.18 The system uses Electrical Multiple Unit Rakes (EMU Rakes) run on 1500 volts DC current. The rakes have 8 or 9 cars and carry upto 3000 passengers during the morning peak hours - 8.30 a.m. to 11.30 a.m. - and a similar number in the evening peak hours. The suburban service carries about 11 lakh passengers daily.

The suburban services have a very complicated fare structure. Apart from the single journey and return first class and third class fares, the commuter can avail of a monthly season ticket and a quarterly season ticket. The cost of a first class monthly ticket, enabling one to make an unlimited number of journeys for a month, varies between 13 times (for short distances) to 6 times (for long distances) of the cost of a single journey ticket, and the quarterly ticket costs two and a half times the monthly ticket. The cost of a third class monthly ticket varies between 20 times to 8 times the cost of a single journey ticket and the quarterly season ticket is two and a half times the monthly season ticket. This type of fare structure which has a substantial built in subsidy for the long distance regular commuter had led to a situation where all commuters who have to commute fairly regularly buy season tickets and, the cost of commuting being very low, prefer living in the distant suburbs where rents are low, and accommodation is comparatively easily and cheaply available.

Current plans

- R.19 The major projects planned to be undertaken by the Central Railway are:
- (i) Extension of loop lines to facilitate quicker handling of traffic in the region.
 - (ii) provision for repair sheds for Diesel locomotives, carriages and goods wagons.
 - (iii) improvement of power distribution system and extension of electrification, and
 - (iv) provision of residential quarters for staff in Bombay and Kalyan

R.20 The Western and Central Railways are independent and the only interconnections within Greater Bombay are near the southern end of the city. The interchange of goods traffic therefore has to be done within the city. In order to relieve congestion and reduce detentions at the southern end it is proposed to construct a 42 km. long connection between Bassein on the Western Railway and Diva on the Central Railway. This will enable interchange at a point not affecting the suburban traffic at the present interchange and marshalling points at Bandra and Dadar.

R.21 The projects listed in paras 5 and 6, are to be financed by the Central Government, and form a part of Railway Ministry's budgets.

Future plans

R.22 As the new city develops and population grows it will be necessary to have a trunk railway route with a suitable terminal station for intercity traffic originating and terminating the city. In order to run trunk services it will be necessary to make alternations and additions to the existing Diva Panvel line which passes along the eastern boundary of the new city. This line which is a branch line at present will have to be doubled and ultimately quadrupled to handle the commuter traffic demand. Ultimately it will have to be electrified and interconnected with the DC traction system used on the Central Railway's existing main lines.

BOMBAY PORT TRUST

Organisation

- R.23 The Bombay Port Trust (BPT) is a statutory autonomous body set up in 1873 to administer the port of Bombay. The BPT functions under the control of the Government of India.
- R.24 The port of Bombay is the largest in India in terms of tonnage handled—approximately 16 million dead weight tonnes (D.W.T.) of cargo annually out of about 65 DWT in the whole country. It is the leading oil port (8 million tonnes per annum), general cargo port (8 million tonnes per annum), and passenger port (5.5 lakhs passengers per annum). There are three wet docks (i) Prince's Dock (capacity 1 m.t. per annum) with 11 berths, a 20.12 m. wide entrance and a maximum draft of 6.4 m, (ii) Alexandra Dock (capacity 5 m.t. per annum) with 27 berths, a 30.48 m. wide entrance and a maximum draft of 9.14 m, (iii) Victoria Dock (capacity 1.2 m.t. per annum) with 13 berths, a 24.38 m. wide entrance and a minimum draft of 7.01m. The three wet docks have a total water area of 115 acres and a quayage of about 2600 sq.m. There are two deep water open berths for passenger vessels at Ballard Pier with a draft of 9.14 m. and one bulk oil pier at Pir Pau with a draft of 8.84 m. In addition there are two dry docks to handle ship repairs and maintenance works.
- R.25 There is a special oil terminal near Butcher Island which has three berths capable of handling oil tankers upto 53,000 d.w.t. The oil is piped to refineries in Trombay by underwater pipe lines. The port handles about 8 million tonnes of petroleum, oil and lubricants annually.
- R.26 In addition there are a number of bunders, wharves and basins to handle sailing craft. These bunders have mechanised loading and unloading facilities and together have a quayage of 3810 sq.m.
- R.27 The port has large warehouse and transit sheds covering about 3 lakhs sq.metres. Most of these are served directly by railway and have requisite materials handling facilities like electric hoists, conveyor belts, mobile crawler cranes, fork lift, etc.
- R.28 To handle some of the cargo loaded and unloaded at the port, the Port Trust maintains its own broad gauge railway. The railway also serves industries and other installations in the port area and is linked to the Central Railway trunk lines at Wadala. The railway which is 11 km. long and has a network of 215 km. handles about 5 million tonnes of traffic annually. This accounts for about 60% of the total inward and outward railborne goods traffic of Bombay.
- R.29 The port operations are for the present entirely financed by port revenues and the Trust has built up sizable General Reserves (Rs. 34.26 crores in 1972) and a General Sinking Fund (Rs. 4.19 crores in 1972).

Current plans

- R.30 The Port Trust has two types of major development schemes in hand -
- i) Provision of extra facilities in the existing docks,
 - ii) Development of a new port at Nhava Sheva in New Bombay.

Details of the Nhava Sheva Project

- R.31 The need: The present optimum capacity of the three existing docks in Bombay port for general cargo is about 7.2 million tonnes at 75% utilisation of berths. The traffic in the port has about reached that limit. The traffic forecasts prepared by Directorate of Transport Research, Government of India indicate that the traffic will reach about 11.7 m.t. by 1975, 16.00 m.t. by 1980 and 20.34 m.t. by 1985.
- R.32 The plan: To cater to the expected excess over the capacity, the Port Trust plans to develop a satellite port in the tidal basin in Nhava Sheva creek. The project is divided into two phases. Under the first phase it is planned to construct three deep water berths with a depth of 14 metres below Chart Datum. One of the berths will cater to container traffic which the other two will be used for handling bulk cargo. On completion of the three berths in phase-I, depending upon the development of traffic demand, phase-II involving three additional berths will be taken up.
- R.33 The cost: The estimated cost of the proposed works in phase-I is as follows:

	<u>Rs. in lakhs</u>
1. Dredging	816
2. Main civil engineering works	2047
3. Terminal equipment	1004
4. Ancillary works	241
5. Communication and services	332
6. Amenities	114
7. Reclamation works	82
8. Flotilla	346
9. Miscellaneous - Acquisition of land and site investigation, etc.	192
Total	<u>5174</u>

This includes a foreign exchange component of Rs. 13.45 crores. These were calculated at 1967 prices and have been inflated by 5% per annum to obtain an estimate at 1971 prices.

- R.34 The facilities: The Diva-Panvel-Uran railway line and Panvel-Uran road are within 8 km. of the site making it easy to effect rail and road communications. The power lines from

Koyna which pass nearby will be used for supplying power to the port. Fresh water would be available from Ransai Water Supply Scheme, of MIDC. Housing for staff and connected persons will be provided in a suitable township to be developed near the site.

R.35

The benefits: The project while absorbing the additional port traffic will create large employment opportunities for the local people during execution and after completion. Vast undeveloped areas near the site will be available for long term development of the port and port based industries.

5. MAHARASHTRA STATE ELECTRICITY BOARD

Organisation

- R.36 The Maharashtra State Electricity Board (MSEB) is an autonomous body set up by the Government of Maharashtra for generation, transmission and distribution of power in the State.
- R.37 The Board's activities range over an area of 3 lakh sq.km. and serve a population of more than 3.5 crores in about 10,000 out of about 36,000 towns and villages with a total population of 5 crores in the State. The Board's generating plants have a total installed capacity of 1148 MW comprising of Hydraulic - 568 MW, Steam - 578 MW, and Internal Combustion - 2 MW. In the year ending March, 1971 a total of 4716 million KWH were generated and 1607 million KWH purchased from other agencies. After using 148 million KWH for generating station auxiliaries, 5361 million KWH were sold to consumers. The difference between power generated and power sold is accounted for by losses. The Bombay Metropolitan Region consumes about 75% of all power in the State.
- R.38 The Board's major power projects in operation are the Bombay-Koyna system, and Vidarbha-Khandesh-Marathwada grid system. The Bombay Metropolitan Region is served by the Bombay-Koyna system. The Bombay-Koyna system intended mainly for Western Maharashtra region, has three hydro power stations viz. Koyna, Radhanagri and Dhatgar. These are inter-connected with the Tata's stations of Bhira, Khopoli, Bhivpuri and Trombay; the Central Railway's Chola Power Station and the Nuclear Power Station at Tarapur. From its Radhanagri system the Board also supplies power to Goa.
- R.39 The Board's generating stations consumed 1136 million kg. of coal, 7.6 million litres of oil and 1,72,443 kilo litres of lubricating oils in 1970-71.

Current Plans

- R.40 The Board plans to set up a distribution network in the New Bombay and nearby areas to meet the demand expected to grow with the new city. The Board has made its plans assuming (i) a 100 MW demand (including industrial demand) in 1975-76 and a 220 MW demand by 1980-81 in the New Bombay region and (ii) about 90 MW demand in 1975-76 and 140 MW in 1980-81 in the Bhiwandi-Kalyan-Ulhasnagar-Ambernath-Badlapur industrial areas.
- R.41 For New Bombay region, the MSEB plans to put up 100 KV Double Circuit lines from Apte to five 100 KV sub-stations each 2 x 20 MVA, 100/22 KV. These sub-stations will also be connected to the existing sub-station at Kalva.
- R.42 For the Bhiwandi-Ulhasnagar-Ambernath area it is proposed to establish a 220/100/22 KV sub-station near Bhiwandi by tapping the existing 220 KV double circuit Nasik-Kalva line.

In the Kalyan-Ambernath-Badlapur area it is proposed to take 100 KV double circuit lines from Bhiwandi.

Future Plans

R.43 The Board is also going to undertake retail power distribution in New Bombay. It is proposed to plan for power supply on the basis of demand patterns observed in Greater Bombay. It has been decided to have the entire distribution network underground in order to achieve better system reliability.

Table R.06

Year	Population level expected (Lacs)	Power demand (MW)
1975-76	3	100
1980-81	8	220
1985-86	14	430
1990-91	20	640

6. BOMBAY TELEPHONES

Organisation

- R.44 Bombay telephones is a territorial unit of the Posts and Telegraphs Department of the Ministry of Transport and Communication of the Government of India. The Department has a monopoly in postal and telecommunication business in the country. Bombay Telephones is responsible for providing telephones (local, trunk and international) and telex facilities in Bombay city and suburbs, New Bombay and a portion of Thana District.
- R.45 Bombay Telephones is the largest metropolitan telephone system in India. In 1972 it had 22 local exchanges with an installed capacity of 1.55 lacs lines and employed 10,000 people in Greater Bombay. The number of working lines on March 1, 1972 was 1.35 lacs.
- R.46 There is a big waiting list for telephones and although the service is being expanded rapidly - with 17,000 connections given in 1970-72 and about 10,000 in 1972-73 - the waiting list continues to expand. On 1st February, 1972 the waiting list stood at 87,219. Out of this 61,353 applications were under the 'Own Your Telephone' (OYT) scheme under which the applicant deposits about Rs. 3,000/- with the organisation. The waiting time in this category is 3 to 4 years on an average.
- R.47 The waiting lines are ever increasing as the rate of provision of telephones is slow. The organisation would like to expand and instal more lines as this is a profitable service. The major bottlenecks however are (a) land for exchange buildings which is hard to acquire in Bombay and (b) exchange equipment and cables which are in short supply in the country, and imports are not normally permitted. Exchange equipment and instruments are manufactured only by I.T.I. Bangalore, a Government of India concern which is unable to meet the demand of the country.
- R.48 The waiting list, however, may not represent the true demand - a large portion of which might be latent. As more lines are provided and waiting time is reduced, more demand is expected to crop up with a fair prospect of ever increasing waiting lists in both categories - OYT and Ordinary.

Current Plans

- R.49 To cope with the existing and potential demand the Bombay Telephones are planning to put up a number of exchanges in the city and suburbs and to augment the capacity of existing exchanges where possible. Sites are being acquired for the new exchanges and where sites have been acquired construction is being started.
- R.50 The Trunk Telephone Service of Bombay Telephones handles about 12,000 originating calls daily. The service to many major centres has recently been improved by introduction of Demand Trunk Service and Subscriber's Trunk Dialling (STD) Services. It is estimated that since the introduction of STD the number of calls has increased substantially. No records are, however kept of long distance calls made by STD.

- R.51 The Telex service of Bombay Telephones has a capacity of 2500 lines. In 1972, 1651 lines were working and there was a waiting list of 434 applicants. It is planned to expand the capacity to 5000 lines.
- R.52 The Bombay Telephones have an annual revenue surplus of about Rs. 15 crores. Their expansion schemes are financed by the Government of India and form part of the P and T Budget.

Future Plans

- R.53 In 1972, the area under the jurisdiction of Bombay Telephones was extended to cover New Bombay. Starting with a clean slate Bombay Telephones plan to have shorter queues by trying to make telephones available at the same pace as the generation of demand, subject to availability of resources and equipment only. The land constraint is likely to be absent as the provision for exchange sites will be made in the land use plan of the new city. It is assumed that the demand pattern will be about the same as that in Bombay. The total lines required under these assumptions would be as follows :-

TABLE R.07

Year	Population (Lacs)	Telephones	
		Penetration percentage	Total no. of lines. ;
1975-76	3	5	15,000
1980-81	8	7	58,000
1985-86	14	10	1,40,000
1990-91	20	11	2,80,000

7. MAHARASHTRA AGRICULTURAL DEVELOPMENT AND FERTILISER
PROMOTION CORPORATION LTD.

Organisation

- R.54 The Maharashtra Agricultural Development and Fertiliser Promotion Corporation Ltd. (MAFCO) is a subsidiary of the State Industrial and Investment Corporation of Maharashtra Ltd. (SICOM), a Government of Maharashtra Undertaking. MAFCO was set up for improving agricultural production, encouraging use of agricultural inputs and developing marketing and processing facilities for agricultural products. In addition to these benefits accruing to the agriculturists, MAFCO's activities will increase availability of agricultural raw materials for industrial units and promote agricultural products processing industries in the State.

Current Plans

- R.55 MAFCO is developing a Rs. 1.7 crore, integrated market complex spread over 61 hectares for agricultural produce in New Bombay, at a site near Vashi village about 2 km. from the Thana Creek Bridge and about 20 Km. from Nhava Sheva port of New Bombay. The complex will have facilities for marketing, cold storage, (40,000 tonnes) and warehousing (20 warehouses), processing industries (60 units), and the requisite service facilities. The installed cold storage capacity in Bombay is only 15,000 tonnes as against over 1,50,000 tonnes in Calcutta and further development within Bombay is not possible because land for cold storage or market expansion is extremely difficult to get near any of the major markets.
- R.56 The objective of the project is to ensure that the farmer gets a better deal - a fair price for his product by eliminating wastage, increased facilities for cold storage and warehouses to store the surplus - at the same time benefiting the consumer by resultant stability in market prices.
- R.57 In addition to the above facilities the developed area will also provide land for petrol stations (4), banks (4), post offices, restaurants, repair garages (5), and other essential services for the market.
- R.58 The developed plots are currently being made available on a long term premium lease basis. The reserve price for commercial use has been fixed at Rs. 70 per sq.m. and for industrial use at Rs. 50 per Sq.m.
- R.59 CIDCO will provide water, drainage, sewage disposal, street lighting and other requisite civic facilities and the Maharashtra State Electricity Board will provide the power.

8. MAHARASHTRA HOUSING BOARD

Organisation

R.60 The Maharashtra Housing Board is a statutory body set up by the State Government. The Board which was initially set up with the sole objective of building houses for industrial workers now undertakes other housing schemes as well on behalf of the State Government in Western Maharashtra and Marathwada areas. The Board had, till January 1971, constructed about 86,000 tenements with nearly 70% of them in Bombay.

R.61 The breakup of the tenements constructed so far under different schemes initiated by the Board is as follows :

Table R.08

	Percentage
1) Subsidised industrial Housing Scheme	33.61
2) Slum clearance scheme	19.35
3) Housing for Economically weaker sections	1.24
4) Low Income Group Housing	10.57
5) Middle Income Group Housing	2.54
6) Rehabilitation Works	22.89
7) Other schemes including deposit works	9.80

	100.00

R.62 The Board has in hand plans for construction of 27,000 tenements under five types of housing schemes (i) Subsidised Industrial Housing Scheme (6960), (ii) Slum Clearance Scheme (12,224), (iii) Housing for Economically weaker sections (4240), (iv) Housing for Low Income Group (3610), and (v) Housing for Middle Income Group (72). In addition there is a Slum Clearance Scheme along the Western Express Highway. Under this scheme the Board will construct on reclaimed land along the Western Express Highway, 23,678 tenements and 9240 bed spaces in dormitories. This scheme is sponsored by the Central Government with the formation of a nucleus fund provided by the Housing and Urban Development Corporation Ltd., a Government of India Undertaking.

R.63 In its housing colonies the Board makes provision for space for social amenities like Primary and Secondary Schools, markets, shopping centres, dispensaries, post offices, police sub-stations, etc.

R.64 The different schemes are financed by the Board as follows:

- (a) Subsidised Industrial Housing Scheme - These schemes are financed by loans from the State Government and contributions from the employers of the industrial workers under the Employer's Contribution Scheme. In case of the industrial workers whose employers do not participate in the contribution scheme the State Government bears the full cost and tenants are charged a subsidised rent by the Board. The State Government also bears the difference between the economic rent and the subsidised rent. The subsidy varies from scheme to scheme but is approximately 50% of the economic rent.
- (b) Housing for Economically Weaker Sections - The State Government gives full loan for construction of houses. The houses are let out on subsidised rents fixed by the Central Government and the Government bears the difference between the economic rent and the subsidised rent.
- (c) Slum Clearance Schemes - These schemes are financed by the State Government in the form of a 50% loan and 50% capital subsidy. The tenements are rented out on a rent computed on the basis of 50% of the construction cost. The rent is used to pay back the loan.
- (d) The Low Income Group and Middle Income Group Schemes are financed by loans from the Life Insurance Corporation through the State Government. The tenements are given on a hire-purchase or cash-down basis and the money received is re-used for fresh construction under these two schemes. The Board might also float debentures to finance the L.I.C. schemes if permitted by the Reserve Bank to do so.
- (e) Slum Clearance Scheme, Western Express Highway - This scheme is financed by a nucleus fund provided by the Housing and Urban Development Corporation (HUDCO). Under the arrangement with HUDCO the Housing Board prepares a programme for expenditure and receipts on a six-monthly basis. HUDCO then advances the estimated expenditure as a loan and the receipts as they come in are deposited with HUDCO. At the end of six months the Board pays the interest on the loan to HUDCO. The interest is calculated on the basis of balance outstanding at the end of each month. The scheme has been designed to be self financing.

(f) Land acquisition and development- These are financed by loans from L.I.C. which the Board receives through the State Government.

- R.65 In addition to its own schemes the Board also undertakes construction projects on an agency basis for Government, semi-Government or private cooperative bodies. The likely expenditure on such future schemes is not available with the Board.
- R.66 The Board has plans to collaborate with the Hindustan Housing Factory, Delhi, a Government of India concern in setting up a pre-fabricated units construction factory. Estimated to cost about Rs.3 crores at this stage, the scheme is under active consideration of the State Government for approval.

9. DAIRY DEVELOPMENT DEPARTMENT

Organisation

- R.67 The Dairy Development Department is a department of the Government of Maharashtra. This department is responsible for development of dairies, procurement, processing and distribution of milk and milk products.
- R.68 The department has dairies at Aarey and Worli in Bombay. Milk is procured from Aarey (1 lac litres), Kaira District Milk Producer's Union, Anand, Gujarat (1 lac litres), Cooperative Societies in Bombay (9,000 litres) and mofussil schemes (1.5 lac litres). The milk is processed at the Worli and Aarey plants of the department and distributed through a network of about 1800 points to about 3 lakhs consuming families.

Current Plans

- R.69 The department has plans to :
- (a) expand the capacity of processing plants at Aarey and Worli in Bombay by 2 lakh litres per day. The proposed expansion is to cost Rs. 82 lakhs.
 - (b) establish a new processing plant at Kurla to supplement the Greater Bombay Milk Scheme. The proposed plant will have a capacity of 3 lakh litres per day and will cost about Rs. 3 crores.
 - (c) establish a new plant at Goregaon in Bombay to supplement the Greater Bombay Milk Scheme. The proposed plant will have a capacity of 2 lakh litres per day and will cost about Rs. 2 crores.
 - (d) develop a dairy at Dapchhari in District Thana, for 70,000 head of cattle to produce 1.25 lac litres of milk per day. The project will cost Rs. 7.29 crores and is expected to be completed by 1976.

Future Plans

- R.70 In order to cater to a population of 2 million in New Bombay, the DDD estimates that a full fledged plant processing 2 lakh litres of milk per day would be required. The department would however prefer to have the dairy located outside the city limits. The plant would occupy about 10 acres. The site would have to be selected in such a way that a railway siding and convenient road connection can be provided to facilitate collection and distribution of milk. A 2 lakh litre capacity dairy including the expenditure on railway siding and other transport infrastructure, distribution vehicles etc. would cost Rs. 2 crores. The funds for this will have to come from the State Government or CIDCO.

R.71 The demand for 2 lakh litres, however, will be generated over a long period of time as the new city develops. The demand in the interim period can be met from the department's existing plants at Aarey and Worli and later from the proposed processing plants at Goregaon and Kurla.

10. LIFE INSURANCE CORPORATION OF INDIA

Organisation

- R.72 The Life Insurance Corporation is an autonomous Corporation set up by the Government of India to transact life insurance business and certain categories of general insurance in the country. Apart from a restricted sphere of activities of P and T Department and a few State Governments who carry life insurance of their employees, the LIC has a monopoly in life insurance business. The Corporation has a network of offices all over the country and also transacts business in nine foreign countries namely the United Kingdom, Kenya, Singapore, Malaysia, Uganda, Aden, Fiji, Mauritius and Hongkong. The premia on policies carried by the Corporation are invested.
- R.73 The LIC's investment activities can be basically divided into the following categories :
- (a) Investments in Stock Exchange securities
 - (b) Loans to State Governments for water supply and sewage disposal schemes, power generation and transmission, Housing, etc.
 - (c) Underwriting equity issues
 - (d) Loans on mortgage of property
 - (e) Township development.
- R.74 The first four activities account for the bulk of investments but are not identifiable with a small region like the Bombay Metropolitan Region, even though a sizeable part of these might ultimately find its way to the region and affect the economic structure of the region directly or indirectly.

Current Plans

- R.75 The projects identifiable with the Bombay Metropolitan Region are :
- (i) Construction of Office Buildings in Bombay.
 - (ii) Construction of Community Halls in Bombay.
 - (iii) Development of Township at Borivli.
- R.76 The schemes are all financed from the internal resources of the Corporation and the cost of the Borivli township project will be recovered by sale of the constructed buildings to cooperative societies on cash-down or hire-purchase basis.

Future Plans

- R.77 Although the LIC does not have any plans at present to take up projects in New Bombay, on completion of its Borivli and Bangalore projects it might be persuaded to invest in the new city either by taking up its own construction programmes or by financing CIDCO or other parties in their activities. The disbursement of such funds is done through the State Government on an annual basis and the LIC does not have any long term or medium term building plans.

11. THE METROPOLITAN TRANSPORT ORGANISATION

(RAILWAYS)

Organisation

- R. 78 The Metropolitan Transport Organisation (Railways) at Bombay was set up by the Railway Board in July, 1969. This organisation, together with similar ones in the Metropolitan cities of Calcutta, Madras and Delhi functions under the direct control of the Railway Board, which has set up a separate Directorate in Delhi for this purpose.
- R. 79 The Metropolitan Transport Project (MTP) at Bombay undertaken by the MTC(R) has the following terms of reference given by the Railway Board :
- (a) To conduct feasibility studies for a third terminal station in Bombay city for reducing the over crowding at and around the existing terminals at Victoria Terminus and Churchgate.
 - (b) To conduct techno-economic feasibility studies for different mass rapid transit systems in Bombay.
- R. 80 The MTP has been divided into five principal departments :
(i) Civil Engineering, (ii) Signal and Telecommunication Engineering, (iii) Electrical Engineering, (iv) Traffic, and (v) Finance.

Study Plans

- R. 81 A feasibility report on the third terminal at Ballard Pier was submitted in December, 1970. The report recommended that while the project was feasible, it was not justified, and that the scope of its function should cater for siphoning off commuters from the northern suburbs to a terminal in the south, located at Shahid Bhagat Singh Road near Fort Market.
- R. 82 Concurrently with the above proposal, other studies were made regarding commuter transport problems in the city. The following factors were taken into account in making an assessment of future transport needs :
- (a) Rapid development in the suburbs of Bombay would increase the population of the suburbs from 22 lacs to 38.5 lacs by 1991.
 - (b) 67% of the total employment of 16.5 lacs in the city, is concentrated in Bombay Island. Further the development of Backbay Reclamation scheme would augment employment in South Bombay by 1.5 to 2 lacs. This would cause a severe strain on the already hard-pressed mass transit systems of the city.
- R. 84 Based on the data prepared by the Traffic cell of the State Government, a study was made of requirements for additional corridors upto 1991. The following additional requirements have been identified :

- (i) A Western corridor along the existing Borivli - Bombay Central line of the Western Railway.
- (ii) A Corridor from Thana to Dadar along the existing Central Railway route.
- (iii) A 'U' connector between Bandra and Kurla.
- (iv) An Eastern corridor from Raoli Junction to Fort Market, which would be integrated with the existing Harbour of Branch of the Central Railway.
- (v) A Central corridor from Sion or Dharavi area towards the south, with exchange points on the existing suburban system towards V.T. connecting Churchgate and continuing further south in the island.
- (vi) Extension of the take off of the harbour branch line from Bandra to Vile Parle as a separate pair of lines.

R.85 A techno-economic feasibility study for a network of 93 kms. including 18 kms. of underground has been completed.

R.86 In addition to the seven transit corridors serving Greater Bombay, a separate corridor, the eighth corridor, from Grant Road in Greater Bombay to Nhava-Sheva in New Bombay is being studied to facilitate the inter-city traffic between Greater Bombay and New Bombay.

R.87 Although arrangements for financing and operations have not been taken up, it has been the general experience all over the world that such projects are not financially viable. It is therefore expected that the project will be subsidised by the Government. The railways have taken up the present project with the understanding that :

- (a) funds for investment will be from outside the railway finance,
- (b) investment will be free of dividend liability,
- (c) operating losses will not be borne by the railways.

12. INTERNATIONAL AIRPORTS AUTHORITY OF INDIA

Organisation

- R.87 The International Airports Authority of India (IAAI) is an autonomous body set up by the Government of India to manage and develop the four international airports at Bombay, Calcutta, Delhi and Madras. The Authority took these airports over from the Department of Civil Aviation in April 1972. Santa Cruz International Airport at Bombay, until April 1972 managed by the Department of Civil Aviation along with 19 other airports in the western region, is therefore now under the new management of IAAI, while the other airports in the region remain under the control of the Department.
- R.88 The improvement, extension or modification schemes approved for Santa Cruz airport are based on the proposals of a Committee set up by the Government of India to suggest improvements in international airports. The committee headed by Mr. J.R.D. Tata had proposed a three phase development programme for Santa Cruz Airport. Phase I involving lengthening and strengthening of runways, taxiways and aprons, improvement and additions to Airport Traffic Control (ATC) communication, navigation and ground facilities, modification of terminal building etc. has been more or less completed. Phase II involving further work to cope with increasing traffic and larger aircraft is proposed to be taken up during the study period, 1972-76. Phase III will include only work on aprons, ground lighting and lighting aids, and the road system.
- R.89 Santa Cruz Airport has at present three runways out of which one is used as the taxiway, one as a stand-by runway and one as the main runway. The main runway which was originally 3353 m. x 45 m. has been enlarged to 3353 m. x 61 m. under phase I. Its bearing strength has been raised to international standards. There is a network of taxiways, of which three have been widened and strengthened to handle bigger jets (Boeing 747). There are two aprons with 14 bays for planes up to the size of Boeing 707, but, when stationary a Boeing 747 occupies two bays.
- R.90 Santa Cruz Airport handles more traffic in terms of number of aircraft, passengers, freight and mail than any of the other three international airports in India.

The Second Airport in the Bombay Region

- R.91 The International Airports Committee, in its report to the Minister of Tourism and Civil Aviation in April 1969, indicated that rapid urbanisation in the Bombay region would necessitate the development of a second major airport. This airport would supplement the capacity and services offered by the existing Santa Cruz Airport which is expected to be worked to its peak runway capacity by the early 1990's.

- R.92 The committee recognised the difficulty of finding suitable inexpensive land for an airport in the vicinity of Bombay. It was therefore, recommended by later investigators that the feasibility of an airport, built on land reclaimed from the sea and compatible with the development of harbours and coastal areas in the region, should also be studied.
- R.93 Seven alternative sites (five near New Bombay and two near Dahisar, Greater Bombay) for the second airport to handle international and domestic air services were examined in a study initiated by CIDCO. Evaluation of the alternative sites was mainly based on topography and flight path obstructions, development cost, area affected by noise, and connections with Greater Bombay and New Bombay.
- R.94 On account of the many hills around Bombay, each site required some degree of hill cutting to secure the clearances required for an international airport. Hill cutting was found to be by far the most expensive item in the airport development. Of all the seven sites, the site near Mandve (location $18^{\circ} 48' 0'' N$ and $72^{\circ} 53' 0'' E$) near New Bombay, south of the Uran promontory was finally chosen as the cheapest and best. An airport at this site would be 15 km. by ferry from Bombay's Fort area and 25 km. by road from the Nhava Sheva port.
- R.95 This site was accepted by the Director General of Civil Aviation, Government of India as the site for the second airport in the Bombay region. Necessary zoning regulations are being enforced in the approach zone over Greater Bombay. The airport would have two parallel runways, 4000 metres long and would occupy a total area of 25 sq.km. A high speed ferry service between the second airport and Greater Bombay would be possible. A bridge over the Dharamtar Creek connecting Mandvi to Karanja on the Uran promontory, being investigated for Konkan highway, would provide the necessary road link to the proposed airport. This site of the second airport would aid in opening up the Konkan hinterland for development.

APPENDIX S

DATA BASE

	Starting Section
* Existing Landuse	S.01
* Soil Study	S.19
* List of Tables and Diagrams	

Sr. No.	Table Number	Diagram Number	Titles
1.	S.01		Area, population and Growth of urban population in different regions.
2.		S.02	Decennial population growth rates.
3.	S.03		Distribution of towns by size-class and percentage of urban population in each class in different regions.
4.	S.04		Distribution of Class-I towns by population in different regions.
5.	S.05		Maharashtra - Growth of population in towns with population more than 100,000 in 1971.
6.		S.06	Growth of urban population in towns of different sizes 1951-1971.
7.	S.07		Working population in urban and rural areas in different regions.
8.	S.08		Economic classification of working population in different regions.
9.	S.09		Average size of households in different regions.
10.	S.10		Percentage distribution of population by education, age and sex (1961).
11.	S.11		Percentage distribution of population by education, age and sex (1971).
12.	S.12		Vital statistics.
13.	S.13		Changes in sex ratio during (1951-71).
14.	S.14		Employment in selected industries in different regions.
15.	S.15		Transport and communications.
16.	S.16		Greater Bombay : Wardwise distribution of population and employment.
17.		S.17	Ward-wise distribution of area, population, manufacturing jobs and total jobs.
18.	S.18		Greater Bombay : Percentage distribution of population and employment in city, suburbs, and extended suburbs.

Sr. No.	Table Number	Diagram number	Titles.
19.	S.19		Greater Bombay : Employment in reporting establishments in public and private sectors.
20.		S.20	Employment trend in non-primary sectors in Greater Bombay (1962-72).
21.	S.21		Greater Bombay : Employment in public sector - breakup by employer (1962-72).
22.		S.22	Employment growth in organised sector in Greater Bombay (1962-72).
23.	S.23		Greater Bombay : Percentage distribution of migrants by place of origin.
24.		S.24	Distribution of migrants to Bombay by place of origin.
25.	S.25		Migrants aged 15 or more : Duration of residence in Greater Bombay.
26.	S.26		Greater Bombay : Percentage distribution of population by educational level.
27.		S.27	Education levels in Greater Bombay.
28.	S.28		Greater Bombay : Economic classification of population.
29.		S.29	Economic classification of residents of Greater Bombay.
30.	S.30		Greater Bombay : Occupational classification of working population.
31.	S.31		Distribution of monthly incomes in Greater Bombay
32.		S.32	Percentage distribution of population and workers by household income (1971).
33.	S.33		Greater Bombay : Distribution of per capita consumer expenditure on different items.
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38.	S.38		Household size and type of dwelling in Greater Bombay.
39.	S.39		Housing facilities in Greater Bombay.
40.	S.40		Shops and establishments in Greater Bombay (1970-71).
41.	S.41		Time trend in number of shops and establishments in Greater Bombay.

Sr. No.	Table Number	Diagram Number	Titles
42.	S.42		Time trend in number of shops, commercial establishments, cinemas, hotels, restaurants etc. and persons employed in Maharashtra.
43.	S.43		Sources of finance - Bombay Municipal Corporation.
44.		S.44	Sources of finance - Bombay Municipal Corporation.
45.	S.45		Revenue expenditure incurred by Bombay Municipal Corporation in Greater Bombay.
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47.		S.47	Capital expenditure on the development of infrastructure incurred by Bombay Municipal Corporation in Greater Bombay.
48.	S.48		Existing towns in New-Bombay : Basic features.
49.	S.49		Growth of different types of motor vehicles on the road All-India (1950-51 to 1969-70).
50.	S.50	Diagram	Different types of motor vehicles in Greater Bombay.
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53.		S.53	Bombay Metropolitan Region : Roads.
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57.	S.57		Railways : density of suburban traffic (Approximate average of 1970-71 and 1971-72).
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59.		S.59	Bombay Metropolitan Region : Railways.
60.	S.60		Port : existing facilities.
61.		S.61	Port.

Sr. No.	Table Number	Diagram Number	Titles
62.	S.62		Port traffic.
63.	S.63		Port traffic forecasts for Bombay port.
64.	S.64		Factory employment and total industrial employment in Greater Bombay and other districts of Maharashtra (1961 and 1971)
65.	S.65		Growth of employment in registered and unregistered sector in districts of Maharashtra.
66.	S.66		Number of working factories and average daily employment in major groups of industries for districts in Maharashtra (1970).
67.	S.67		Growth of factory employment in districts of Maharashtra (1961-1970).
68.	S.68		Distribution of factory employment and working factories according to different employment size groups in districts of Maharashtra (1970).
69.	S.69		Sales and sales tax in Greater Bombay and Maharashtra (1968-69).
70.	S.70		Fish catch in Bombay metropolitan area (1971-72).
71.	S.71		Salt production (1972).
72.	S.72		Distribution of land under principal uses in 103 cities and towns of India.

EXISTING LAND USE

Introduction

- 3.01 The existing land use map has been prepared on the basis of an aerial survey carried out by the Survey of India in 1969, data available from village records, from the Maharashtra Industrial Development Corporation, and field inspections.

Boundaries, Areas and Population

- 3.02 The area as designated for New Bombay comprises of land from 95 villages, a list of which is attached. The private lands in the project area are being acquired by Government under the provisions of the Land Acquisition Act (1894).
- 3.03 The boundaries of the site are governed by natural features to some extent and administrative boundaries of the existing villages to a large extent. On the western side is the Thana Creek; in the northern portion the eastern boundary is governed by the Parsik hills and in the middle portion, the eastern boundary runs along the administrative boundaries of some of the villages between Taloja and Panvel along the foot of Adai hills. On the southern side the boundary coincides with the southern limit of village Kalundre and then runs in a south-westerly direction upto village Change along the Karanja Creek, leaving the range of Karnala hills on the southern side outside the project area. The South-Western corner fronts on the confluence of Thana Creek, Karanja Creek and Dharatar Creek. The total area of the designated site is 343.70 sq.kms. i.e. 34,300 Hectares (82,421 Acres). The area includes the Thana-Belapur and Taloja Estates of M.I.D.C. and excludes the already developed areas of Uran (entire Municipal limits) and Panvel (old Municipal limits). Most of the area along the western boundary from north to south is low lying land and covered by high tide, and includes a number of salt pans.

Physical Features

- 3.04 The Parsik hill range forming the eastern boundary in the northern portion runs north to south upto Panvel Creek, where the designated area enlarges extending eastwards side to a considerable extent. Some of the peaks of the Parsik hills which fall in the designated area rise to a height of 235 metres and above, and have steep slopes on the sides in between the height of 20 metres and 200 metres. There are a few points from where good views of the city of Bombay and various parts of the New Bombay site are available, in particular Devisaddle point and the Samadhi hill point. The Adai hills to the east of Panvel and the Karnala hills near Panvel also offer a beautiful background of hill ranges to the New Bombay site.
- 3.05 The middle portion of the New Bombay area to the south of the Panvel Creek, comprising village Ulve, Targhar, Bambavi, Padeghar, Kundevahal, Yahal etc., is an area dotted with a

number of small hills and some parts of the hills even rise to a height of 100 metres and above, the highest peak being 133 metres.

- S.06 There are two other steeply rising hills in the south-west portion in the Uran Tehsil; one of them is Mora hill which is mostly in the possession of the Defence Department, and further south is the Dronagiri hill, which is famous for the legend that God Hanuman carried the medicinal herbs on these hills to Laxmana in Lanka.
- S.07 The area on both sides of Dronagiri hill offers a view of the water front of Bombay harbour on the west and north and Karanja creek on the south east where there is considerable fishing activity.
- S.08 The islands of Nhava Sheva, which are separated from the other portion of the project area by low lying land, also are scenically beautiful spots. There is a creek between these two islands, which is deep enough for berthing large ships. It is here that the Bombay port Trust intends to set up new docks. Sheva island is connected by road to the Panvel-Uran road but Nhava island remains separated by water except at low tides.
- S.09 Most of the areas in the southern part of the Thana Belapur belt along the creek side and the area to the east of Sheva and Uran upto the firm land on the south-east and also to the east of Karanja along the Karanja Creek are being used for salt production. The Panvel Creek is in the central portion of the project area. It surrounds Waghivali island, which is mostly covered at high tide; a number of small inlets enter further inside towards Taloja on the north, Kamothe on the east, Panvel on the south east and village Dapoli, on the south. The village Kamothe is surrounded on three sides by such small creeks. Large portions of the villages of Kharghar, Kolhekhar, Navade Khar, and Pendhar are covered by low areas along the creek.
- S.10 The river Gadhi originating from the Matheran hills meets the Panvel Creek where the river Kalundri also joins it on the southern side of the town of Panvel.
- S.11 Geologically, the entire area is Deccan lava country. There are a number of rock outcrops throughout the area.
- S.12 Thus from the physiographic point of view we find four major hills within the designated area and some other smaller ones spread out in the central portion north and south of Panvel Creek; the remaining part gradually rises from MSL to an average height of 20 metres. Lastly there are large areas along the shore line which are covered by high tides. The high water spreads inside upto Taloja and Panvel through creeks. The coastal area has some islands like Jui and Vashi, Waghivali, Nhava, Sheva and Panje Dongri. Elephanta island, which is a picnic spot for Bombay's residents is just west of Nhava Sheva, outside the designated site.

Rain-fall

S.13 Rainfall is about 2550 mm. yearly.

Details of different categories of land uses

S.14 The following table gives the different categories of predominant land use. The locations are shown in the map attached.

EXISTING LANDUSE PATTERN 1973

Landuse	Area in sq.km.	Area in Acres	Percentage
1. Gaothans	2.91	717.84	0.80
2. Industrial Areas	28.70	7152.13	8.50
- Kalwa	2.60		
Taloja	7.06		
Trans- Thana	15.44		
Others	0.60		
3. Low-lying areas	66.94	14063.50	19.20
4. Salt Pans	19.69	14863.43	5.63
5. Forests	28.61	7066.61	8.20
6. Hills (Area above 30 M from MSL but not covered by forests)	21.72	5364.84	6.30
7. Defence	4.56	1127.06	1.30
8. M.S.E.B.	0.25	61.75	0.07
9. Cultivable Land	170.32	41705.00	50.00
Total	343.70	82122.86	100.00
10. Municipal area of Panvel and Uran	6.20	1531.40	

S.15 The total available area excluding land under defence and already developed industrial area works out to 310.7 Sq.Kms. i.e. 76,510 acres. This area, of course, includes low lying land measuring about 66 Sq.Kms. (14,000 acres), and about 50 Sq.Kms. (12,430 acres) of hills are forests. These areas may not be actually available for development. The feasibility of reclamation of the very low lying lands and use of the hills, may have to be studied. The cultivable land of about 170 Sq.Kms. (about 41,000 acres) and the salt pan area (about 4,100 acres) would be the actual land readily available for development. Even in the area under this category a number of small structures have come-up especially near

gaethans, (which are excluded from the acquisition) and we will have to consider how these areas should be treated.

Conclusion

- S.16 Thus the existing features, communication routes, industrial areas and other developments bring out a particular pattern into which the new developments in the New Bombay project will have to be properly fitted. The shore lines may have to be suitably treated if any water front is to be made available for development. The problem of low lying areas which cannot possibly be developed will have to be studied, it may not be possible to leave them as they are, as they could be a source of small and insect nuisance for nearby residential developments. The possibility of creating a large lake using extensive areas of the Panvel Creek including the low lying Vaghivali island by putting up a dam, will have to be studied further. Alternatively the feasibility of defining the shore line clearly in certain areas by building retaining walls as Apollo Bunder or Marine Drive in Bombay may have to be considered.
- S.17 The physiographic features, the existing industrial areas and the new docks contemplated at Nhava Sheva by the B.P.T., highways and railways will be the guiding factors for the immediate development, which needs to be planned to make it as functional and efficient as possible for the citizens. The hills and the water bodies offer a striking opportunity for the development of the new city. It will be necessary to study how these features can be effectively used as parts of the new urban landscape.
- S.18 The chemical industries on the Thana-Belapur Road and the Taleja Estate of the MIDC are likely to cause air and water pollution problems in view of the particular physiographic features and wind patterns of the new city area. Parts of the Thana-Belapur belt are already experiencing a smell and smoke nuisance and fishing in the Thana Creek has also been affected by the chemical effluents of industries not only in the Thana-Belapur area but also in the areas on the Ulhas river upstream of Thana. Proper controls therefore needs to be evolved if a liveable environment is to be created in the new city area.

List of villages included in the New Bombay Project Area

Thana Tehsil (Dist. Thana)

- | | |
|----------------|-------------------|
| 1. Airoli | 10. Pavane |
| 2. Dive | 11. Sonkhar |
| 3. Chinchavali | 12. Bonsari |
| 4. Babale | 13. Koparkhairane |
| 5. Gothivali | 14. Ju |
| 6. Talvali | 15. Sanpada |
| 7. Ghansoli | 16. Vashi |
| 8. Savali | 17. Turbhe |
| 9. Khairane | 18. Shahabaaj |

19. Daravee
20. Nerul
21. Shiravane
22. Kukshet
23. Sarsole
24. Karave

25. Digha
26. Telavali
27. Ilthan
28. Besin
29. Mahape

Panvel Tahsil (Dist. Kolaba)

1. Panvel Village (excluding the Panvel Municipal area as it stood prior to its extension by Government Notification, Urban Development, Public Health and Housing Department, No. DPM 1260/17991-A dated the 25th May 1964)
2. Asudgaon
3. Roadpali (including Ambetar-Khar, Kolhekhar)
4. Valavali
5. Tembhode
6. Kalamboli
7. Kamothe
8. Pendhar
9. Belpada
10. Kharghar
11. Ove
12. Taloje Panchmad
13. Nawade (including Nawadekhar)
14. Chatyacha Kotha
15. Ulwe
16. Dapoli
17. Kopar
18. Vadghar
19. Pargaon Dungi
20. Vaghivali
21. Pargaon
22. Owle
23. Targhar (including Nandaikhar)
24. Kalundre
25. Karanjade
26. Manghar
27. Kundevahal
28. Nhava
29. Gavan
30. Kharkopar
31. Wahal
32. Padeghar
33. Bombavi
34. Sonkhar
35. Chal
36. Tonchase
37. Pechage
38. Pendhar

Uran Tahsil (Dist. Kolaba)

1. Mhatawali (excluding the Uran Municipal area)
2. Chanaje (excluding the Uran Municipal area)
3. Kaladhonda
4. Kegaon
5. Ranwad
6. Boripakhadi (excluding the Uran Municipal area)
7. Nagaon
8. Bokadvira
9. Dongari
10. Panje
11. Funde
12. Sheva
13. Navghar
14. Pagote
15. Bhendkhal
16. Jaskhar
17. Sonari
18. Waltikhar
19. Kauli Belondkhar
20. Paundkhar
21. Shematikhar
22. Kauli Bandhankhar
23. Belondakhar
24. Muthekhar
25. Jasai (including Bandhkhar, Khatkhar and Ranjankhar)
26. Karal
27. Chirle
28. Savarkhar

SOIL STUDY

- S.19 A pedological and engineering soil survey has been carried out to provide basic information concerning sub-surface conditions for about 210 Sq.Kms. area of New Bombay.
- S.20 As the area involved was quite large and the initial investment on exploration in very low, principles of geomorphology, pedology and geotechnology, in conjunction with modern methods of exploration such as airphoto interpretation and ground engineering techniques, were utilised to evaluate the nature and extent of various sub-surface conditions.
- S.21 An extensive laboratory investigation programme of representative soil and rock samples has been carried out to evaluate the geotechnical engineering behaviour of various soils. Interpretations of field evaluation studies helped in forming and delineating soil boundaries. The geotechnical mapping units are formed on the basis of the thickness of various horizons and the range of geotechnical engineering properties.
- S.22 An attempt is made to visualise the nature and magnitude of stresses to be imposed on ground by the various civil engineering activities like residential buildings, office buildings, light and heavy industrial complexes, roads, excavations, etc.
- S.23 The data collected from soil explorations such as bore holes, auger holes, test pits and field tests etc. are utilised along with those collected from field visits to identify outcrops categorised into four major mapping units in marine areas and another four in residual areas was described below :-

Out-crop

- M_1 - Upto 1 m. marine clay underlain by residual soil or bed rock.
- M_2 - 1 to 2 m. marine clay underlain by residual soil or bed rock.
- M_3 - 2 to 4 m. marine clay underlain by residual soil or bed rock.
- M_4 - More than 4 m. depth of marine clay underlain by residual soil.
- R_0 - Exposed semi-weathered bed rock.
- R_1 - Upto 1 m. soil cover underlain by R_0 materials or bed rock
- R_2 - Soil cover of 1 to 4 m. underlain by R_0 materials or bed rock.
- R_3 - Soil cover of 4 to 12 m. underlain by R_0 material.
- S.24 Having identified these major mapping units, a generalised treatment of various civil engineering activities is also given. The whole area is divided into 105 blocks of 1 minute latitude and 1 minute longitude and a suitable nomenclature is adopted. The approximate amount of soil available as material for engineering construction is also indicated.

S.25 The method of successive approximation is adopted to evolve a reasonably accurate geotechnical engineering map in terms of the mapping units chosen to describe the area.

The sequence of operations involved is

- (i) Observe the terrain to be studied on Survey of India topo-sheets.
- (ii) Visit the area with CIDCO officials to ascertain the problems regarding the accessibility and get a broad picture of possible soil formations.
- (iii) Prepare a scheme indicating various phases and magnitudes of work involved in taking up the study. This helps in preparing an approximate estimate.
- (iv) Conduct reconnaissance survey, identify soil units based on pedological concepts and prepare an approximate pedological soil unit map.
- (v) With the help of the above map, other available base maps, possible ground control points and single sub-surface probing tools, chalk out a work plan to conduct field mapping and prepare field notes. Secondly, obtain data from test pits and auger-holes.
- (vi) Identify the geotechnical mapping units and prepare a geotechnical engineering map using airphoto interpretation techniques. Secondly, produce a programme of bore sampling and field tests. Plan a proper extensive laboratory test programme on samples obtained from the field.
- (vii) Analyse the bore-hole, auger-hole, and test-pit field test data and property data of various soil samples obtained from laboratory tests.
- (viii) With the help of all the available data improve the boundaries of various mapping units and define more precisely the geotechnical engineering series.
- (ix) Examine the response of each series in relation to various engineering activities.
- (x) Prepare a selected number of the following taxonomic (utility) maps
 - 1) Sub-surface taxonomic maps at RL's + 5.0 m + 2.5 m, 0.0 m, - 1.0 m. and -3.0 m. If needed for other RL's this can also be prepared.
 - 2) Reclamation map, which identifies the areas needing reclamation prior to civil engineering construction.

- 3) Materials map, showing the possible useful material for manufacture of bricks or light weight aggregates, and many sites for stone.
- 4) CBR - map - Useful for flexible and rigid pavement design.
- 5) Drainage pattern map.
- 6) Cross-sections through the soil.

S.26 All these taxonomic maps will help in tabling planning decisions and preparing development plans. These maps will also help in preparing taxo-economic maps for various civil engineering ventures.

TABLE 8.01
AREA, POPULATION AND GROWTH OF URBAN POPULATION IN STATES AND REGIONS

Region.	Year	Area (sq. kms.)	Population (lacs.)	Percentage growth during the preceding decade.	Urban population as percentage of total	Percentage growth of Urban population during the preceding decade	Population density (persons/sq. km.)
1.	2.	3.	4.	5.	6.	7.	8.
1. Greater Bombay	1951	457.70	29.66	75.36	100.00	75.96	6776
	1961	457.70	41.32	40.00	100.00	87.00	9486
	1971	457.70	59.70	43.80	100.00	83.80	13639
2. New Bombay	1951	540.10	0.88	—	26.69	—	259
	1961	540.10	1.08	22.30	26.30	20.51	317
	1971	540.10	1.51	46.10	26.00	38.20	444
3. Metropolitan Bombay.	1951	804.40	31.17	—	97.89	—	3875
	1961	804.40	43.61	39.92	98.10	40.32	5421
	1971	804.40	62.91	44.20	98.20	44.30	7820
4. B.M.R. Planning Area.	1951	—	—	—	—	—	—
	1961	4404.90	53.39	37.38	86.94	—	1212
	1971	4404.90	77.23	44.60	88.17	46.60	1753
5. Delhi (U.A.)	1951	326.55	14.37	106.58	100.00	106.58	4400
	1961	326.55	23.59	64.17	100.00	64.17	7224
	1971	326.55	36.47	54.60	100.00	54.60	11168
6. Calcutta (U.A.)	1951	1267.91	47.00	—	100.00	—	3707
	1961	1267.91	59.00	25.10	100.00	25.10	4653
	1971	1267.91	70.51	22.11	100.00	22.11	5545
7. Madras (U.A.)	1951	—	—	—	—	—	—
	1961	—	—	—	—	—	—
	1971	—	31.70	—	—	—	—
8. Maharashtra	1951	300575.70	320.02	19.87	28.75	62.42	106
	1961	306545.00	595.54	25.60	28.22	21.32	129
	1971	307762.00	504.12	27.45	31.17	40.75	164
9. U.P.	1951	295928.80	632.15	11.82	—	—	215
	1961	294947.60	737.46	16.66	12.86	9.90	250
	1971	294947.00	883.41	19.79	14.00	30.47	299
10. West Bengal	1951	80404.80	262.99	15.22	—	—	327
	1961	88562.70	349.26	32.00	24.45	35.97	394
	1971	87853.00	443.12	26.87	24.59	27.95	500
11. Tamil-nadu	1951	330035.90	301.19	14.66	—	—	91
	1961	329900.60	536.87	11.85	26.69	22.59	259
	1971	330069.00	411.99	22.30	30.28	38.44	317
12. India	1951	3192335.00	3610.88	15.51	17.30	—	115
	1961	3192335.00	4592.35	21.51	17.96	26.41	157
	1971	3280500.00	5479.60	24.74	19.90	38.20	167

Source :- Census of India 1951, 1961, 1971.

Note :- 1) B.M.R.P.A. is Bombay Metropolitan Region's Planning Area. 2) Metropolitan Bombay consists of Greater Bombay, New Bombay and Thana City. 3) 1971 Census figures are provisional. 4) U.A. is Urban Agglomeration as defined in Census 1971.

DIAGRAM S.02

Decennial population growth rates

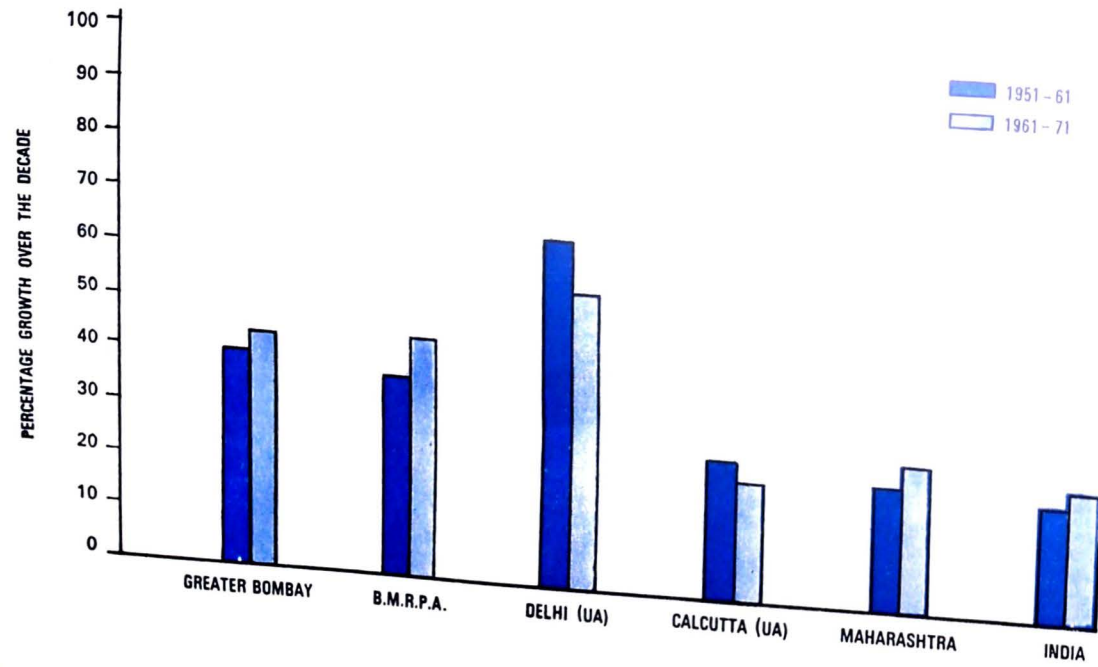


TABLE NO. 3.05

DISTRIBUTION OF TOWNS BY SIZE, CLASS AND PERCENTAGE OF URBAN
POPULATION IN EACH CLASS IN DIFFERENT REGIONS.

Sr.No.	Region	Year	Number of Towns with population						Total
			Above 1 lac.	Between 50 thousand and 1 lac.	Between 20 thousand and 50 thousand	Between 10 thousand and 20 thousand	Between 5 thousand and 10 thousand	Below 5 thousand	
			I	II	III	IV	V	VI	
1.	B.M.R. Planning Area	1951	-	-	-	-	-	-	-
		1961	8 (95.95)	1 (1.50)	3 (2.25)	3 (1.00)	8 (1.00)	1 (0.50)	19 (100.00)
		1971	3 (92.60)	4 (4.20)	3 (1.20)	5 (0.90)	6 (0.60)	3 (0.50)	24 (100.00)
2.	Maharashtra	1951	5 (45.47)	16 (11.05)	39 (17.05)	84 (12.80)	196 (15.05)	43 (1.80)	383 (100.00)
		1961	12 (60.49)	15 (9.17)	47 (13.00)	89 (11.17)	88 (5.65)	15 (0.52)	266 (100.00)
		1971	17 (64.75)	25 (11.07)	65 (11.71)	98 (8.78)	70 (5.59)	14 (0.50)	289 (100.00)
3.	West Bengal	1951	7 (57.46)	14 (14.43)	29 (15.68)	41 (9.59)	18 (2.18)	11 (0.66)	120 (100.00)
		1961	12 (55.47)	19 (14.92)	46 (17.00)	45 (7.44)	50 (4.51)	12 (0.66)	184 (100.00)
		1971	14 (70.25)	33 (12.32)	49 (9.77)	61 (5.15)	60 (2.40)	9 (0.11)	226 (100.00)
4.	Tamil Nadu	1951	7 (55.49)	11 (10.96)	36 (23.43)	99 (18.59)	97 (10.17)	27 (1.56)	297 (100.00)
		1961	9 (57.74)	19 (14.14)	61 (20.84)	119 (18.06)	95 (7.94)	36 (1.28)	339 (100.00)
		1971	17 (43.81)	27 (13.53)	79 (20.89)	118 (13.57)	97 (5.96)	101 (2.44)	439 (100.00)
5.	Uttar Pradesh	1951	14 (59.07)	15 (12.04)	47 (16.20)	75 (11.74)	179 (14.68)	158 (6.27)	486 (100.00)
		1961	17 (50.45)	18 (15.22)	56 (17.79)	81 (11.79)	79 (6.31)	16 (0.44)	267 (100.00)
		1971	24 (57.07)	21 (10.77)	71 (16.74)	99 (10.56)	94 (4.85)	17 (0.25)	326 (100.00)
6.	India	1951	76 (58.00)	111 (12.21)	374 (17.79)	675 (17.01)	1195 (15.62)	629 (3.57)	3060 (100.00)
		1961	107 (48.40)	139 (11.90)	518 (18.50)	828 (15.00)	848 (7.20)	268 (1.00)	2700 (100.00)
		1971	152 (52.40)*	221 (12.20)	628 (17.40)	987 (12.00)	822 (5.20)	288 (0.80)	3122 (100.00)

Source :- Census of India 1951, 61, 71.

Note :- (i) Figures in parenthesis are percentage of population in that class to total Urban population.

(ii) 1971 population figures are provisional.

TABLE S.04

DISTRIBUTION OF CLASS-I TOWNS BY POPULATION IN DIFFERENT REGIONS

Sr. No.	Region	Year	Number of Cities with population			Total
			10 lacs and above	5 lacs to 10 lacs	1 lac to 5 lacs	
1.	B.M.R. Planning Area	1951	1	-	-	1
		1961	1	-	2*	3
		1971	1	-	2*	3
2.	Maharashtra	1951	1	-	4	5
		1961	1	2	9	12
		1971	1	2	14	17
3.	West Bengal	1951	1	-	6	7
		1961	1	1	10	12
		1971	1	1	12	14
4.	Tamil Nadu	1951	1	-	6	7
		1961	1	-	8	9
		1971	1	2	14	17
5.	Uttar Pradesh	1951	-	1	13	14
		1961	-	2	15	17
		1971	-	3	21	24
6.	India	1951	4	4	68	76
		1961	7	5	95	107
		1971	7	10	135	152

Source: Census of India 1951, 1961, 1971.

* : The two Cities are Ulhasnagar and Thana.

TABLE S.05

MAHARASHTRA - GROWTH OF POPULATION IN TOWNS WITH POPULATION MORE THAN 100,000 IN 1971

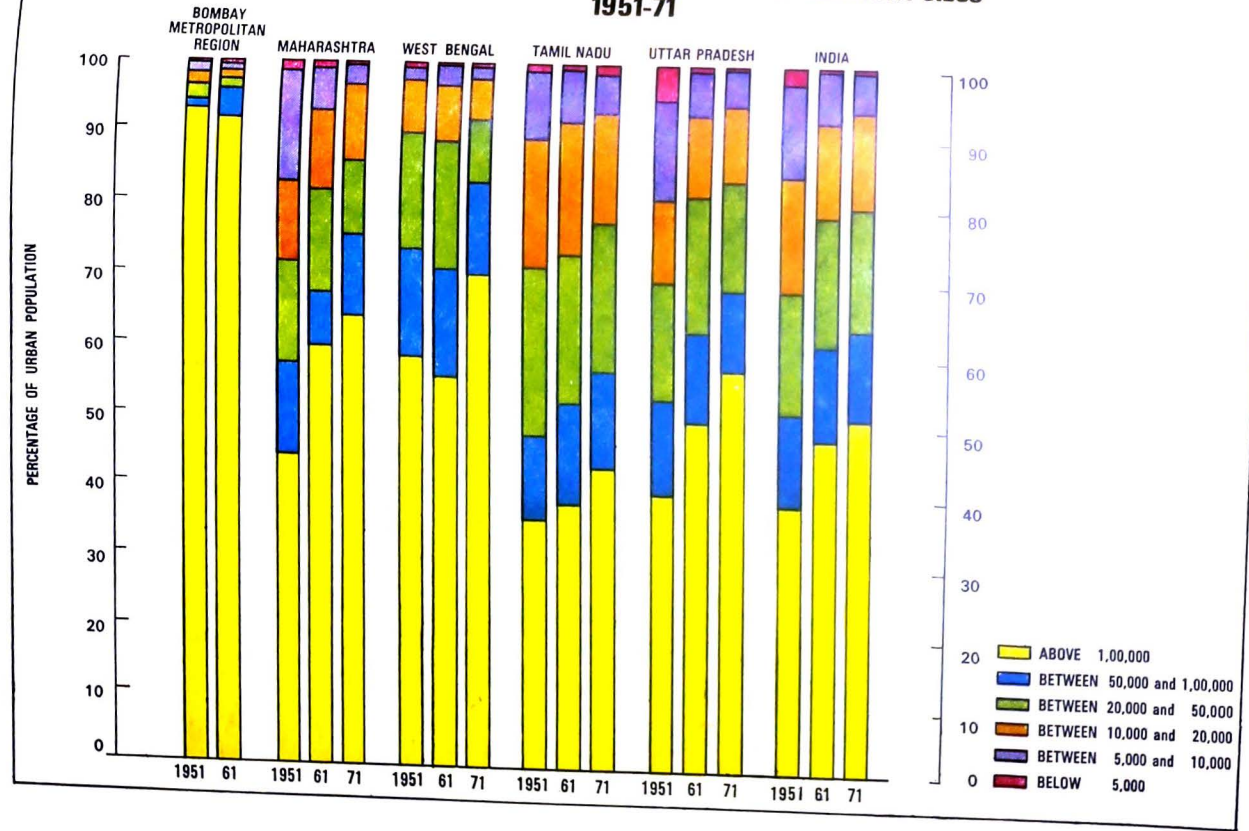
Sr. No.	Town	Population in ('000s)		Area (sq.km)	Growth Rate (population)		Density persons/sq.km.	
		1961	1971		1951-61	1961-71	1961	1971
1.	Greater Bombay	4152.0	5970.5	437.71	39.95	43.80	9485	13640
2.	Poona	606.7	856.1	138.85	24.23	41.09	4596	6166
3.	Nagpur	643.6	866.0	217.56	43.32	34.56	2959	3981
4.	Sholapur	337.5	398.3	23.23	21.83	18.00	15100	17149
5.	Ulhasnagar	107.7	168.4	13.34	33.33	56.33	8073	12628
6.	Nasik	131.1	176.0	58.28	35.10	34.32	2765	3021
7.	Kolhapur	187.4	259.0	66.82	36.98	38.20	2921	3877
8.	Thana	101.1	170.6	26.16	63.69	68.81	3779	6524
9.	Sangli	73.8	115.1	20.90	46.83	55.93	2586	5509
10.	Amravati	137.8	193.8	36.34	34.11	40.56	3792	5333
11.	Malegaon	121.4	191.8	12.95	120.65	58.02	11662	14814
12.	Akola	115.7	168.4	20.88	29.19	45.51	7059	8067
13.	Aurangabad	87.5	150.4	40.79	51.13	71.83	2141	3689
14.	Ahmednagar	119.0	118.2	19.87	19.92	00.66	4816	5950
15.	Dhulia	98.8	137.1	26.75	28.63	38.66	3693	5126
16.	Nanded	81.0	126.5	12.17	24.70	56.05	8385	10398
17.	Jalgaon	80.3	106.7	12.30	17.45	32.81	4532	8676

Source : Census of India 1961, 1971.

Note : The changes in population densities are partly due to changes in area also.

DIAGRAM 5.06

Growth of urban population in towns of different sizes 1951-71



WORKING POPULATION IN URBAN AND RURAL AREAS IN DIFFERENT REGIONS.

Sr.No.	Region	Urban Rural Total	Total workers		Population		Workers as percentage of population.	
			1961	1971	1961	1971	1961	1971
			4	5	6	7	8	9
1.	Greater Bombay	U	1686	2198	4192	5978	40.60	36.81
2.	Metropolitan Bombay.	U	1750	2266	4222	6179	40.40	36.67
		R	38	34	79	112	48.10	30.36
		T	1768	2300	4361	6291	40.54	36.56
3.	B.N.R. Planning Area	U	1877	2475	4642	6610	40.00	36.31
		R	341	529	697	913	48.92	36.05
		T	2198	2802	5339	7723	41.16	36.28
4.	Delhi (U.A.)	U	747	1177	2359	3647	31.66	30.63
5.	Calcutta (U.A.)	U	2412	2285	6720	751	35.98	32.58
6.	Madras (U.A.)	U	—	—	—	31.7	—	—
7.	Maharashtra	U	4066	4996	11162	15711	36.42	31.79
		R	14822	15394	28391	34701	32.41	38.60
		T	18948	18590	39553	50412	47.90	36.47
8.	U.P.	U	2935	3422	9479	12389	30.96	28.41
		R	25915	25906	64267	75953	40.32	32.77
		T	28850	27334	73746	88341	39.12	32.16
9.	West Bengal	U	2960	3305	8541	10967	34.65	30.12
		R	8620	9066	26385	33345	32.67	27.19
		T	11580	12368	34926	44312	33.15	27.91
10.	Tamil Nadu	U	3094	3769	8991	12465	34.41	30.83
		R	12232	10975	24696	28734	49.63	38.19
		T	15322	14742	33687	41199	45.57	36.67
11.	India.	U	26400	32157	78900	109094	33.46	29.47
		R	162100	151448	360500	458856	44.99	34.50
		T	188600	183605	439400	547950	42.95	33.50

Source : Census of India 1961, 1971.

Note : U - Urban.

R - Rural.

TABLE 8.05

ECONOMIC CLASSIFICATION OF WORKING POPULATION IN DIFFERENT REGIONS

Sr. No.	Region	Year	Primary Activity	Manufacturing	Construction	Transport	Others	Total Workers	Population	Workers as percentage of population, %
1	2	3	4	5	6	7	8	9	10	11.
1.	Greater Bombay	1961	51.91 (1.89)	668.57 (40.82)	44.90 (2.66)	189.26 (11.22)	732.00 (45.40)	1696.66 (100.00)	4192.00	40.60
		1971	27.66 (1.25)	929.50 (42.29)	67.02 (3.05)	256.90 (10.70)	957.08 (42.65)	2198.09 (100.00)	5970.00	36.81
2.	New Bombay	1961	30.32 (65.78)	5.97 (12.95)	0.47 (1.02)	1.60 (3.47)	7.75 (16.77)	46.09 (100.00)	100.00	45.00
		1971	21.39 (47.70)	9.89 (22.05)	1.65 (3.64)	2.18 (4.87)	9.76 (21.74)	44.85 (100.00)	151.00	30.00
3.	Metropolitan Bombay	1961	65.37 (5.60)	708.71 (40.08)	46.35 (2.68)	194.61 (11.00)	754.96 (42.79)	1768.18 (100.00)	4561.00	40.54
		1971	49.82 (9.17)	969.42 (42.14)	69.74 (3.02)	265.51 (10.59)	967.99 (42.00)	2500.46 (100.00)	6291.00	36.56
4.	B.N.R. Planning Area	1961	510.00 (14.12)	704.00 (55.72)	51.00 (2.32)	218.00 (9.95)	632.00 (27.91)	2195.00 (100.00)	5352.00	41.16
		1971	262.00 (9.36)	1110.00 (59.64)	81.00 (2.89)	274.00 (9.79)	1075.00 (58.32)	2800.00 (100.00)	7721.00	36.28
5.	Delhi (U.A.)	1961	11.86 (1.59)	167.74 (22.46)	32.54 (4.56)	47.00 (6.29)	427.67 (59.30)	746.81 (100.00)	2359.00	31.65
		1971	18.00 (1.61)	268.00 (25.97)	62.00 (5.55)	107.00 (9.57)	665.00 (59.30)	1118.00 (100.00)	5647.00	30.61
6.	Calcutta (U.A.)	1961	NA	NA	NA	NA	NA	NA	5900.00	NA
		1971	NA	NA	NA	NA	NA	2222.57 (100.00)	7005.00	32.50
7.	Madras (U.A.)	1961	NA	NA	NA	NA	NA	NA	NA	NA
		1971	NA	NA	NA	NA	NA	NA	5170.00	NA
8.	Maharashtra	1961	13656.47 (72.07)	2156.51 (11.22)	235.62 (1.24)	446.21 (2.56)	2475.08 (13.05)	18948.49 (100.00)	39555.00	47.90
		1971	12271.50 (66.75)	2595.25 (15.02)	276.42 (1.90)	560.59 (3.05)	2826.54 (15.70)	18590.28 (100.00)	50412.00	36.47
9.	West Bengal	1961	6807.00 (58.78)	1806.00 (15.60)	151.00 (1.30)	592.00 (5.39)	2424.00 (20.95)	11580.00 (100.00)	34926.27	33.25
		1971	7704.00 (62.22)	1758.00 (14.05)	124.00 (1.00)	517.00 (4.18)	2226.00 (18.49)	12569.00 (100.00)	44512.00	27.91
10.	U.P.	1961	21860.00 (75.77)	2609.00 (9.04)	214.00 (0.74)	400.00 (1.39)	5767.00 (13.06)	28850.00 (100.00)	75746.40	39.12
		1971	21530.00 (78.05)	1991.00 (7.22)	166.00 (0.61)	474.00 (1.74)	5575.00 (22.54)	27554.00 (100.00)	88541.00	30.94
11.	Tamil Nadu	1961	9721.00 (65.52)	2055.00 (15.59)	205.00 (1.54)	254.00 (1.85)	5117.00 (20.30)	15552.00 (100.00)	55686.95	45.57
		1971	9922.00 (64.79)	1972.00 (15.32)	234.00 (1.59)	465.00 (3.15)	2519.00 (17.09)	14742.00 (100.00)	41199.00	35.78
12.	India	1961	156564.00 (72.27)	20006.00 (10.61)	2059.00 (1.09)	5019.00 (1.60)	27228.00 (14.45)	188676.00 (100.00)	459957.00	42.98
		1971	150826.00 (72.56)	17068.00 (9.46)	2215.00 (1.25)	4401.00 (2.44)	25805.00 (14.51)	180571.00 (100.00)	547950.00	33.56

Source: Census of India 1961, 1971.

Note: 1) Figures in Parenthesis are expressed as percentage to total workers in that class.

2) 1971 Figures are provisional.

TABLE S.09

AVERAGE SIZE OF HOUSEHOLDS IN DIFFERENT REGIONS

Sr.No.	Region	Year	Number of Households	Average Number of persons per household
1.	Greater Bombay	1961	803,023	5.2
		1971	1,308,845	4.6
2.	New Bombay	1961	20,081	5.4
		1971	25,650	5.8
3.	Metropolitan Bombay	1961	843,062	5.2
		1971	1,370,625	4.6
4.	B.M.R. Planning Area	1961	1,032,575	5.2
		1971	1,645,564	4.7
5.	Delhi (U.A.)	1961	466,186	5.1
		1971	728,925	5.0
6.	Calcutta (U.A.)	1961	N.A.	N.A.
		1971	N.A.	N.A.
7.	Madras (U.A.)	1961	N.A.	N.A.
		1971	N.A.	N.A.
8.	Maharashtra	1961	7,698,455	5.1
		1971	9,432,769	5.3
9.	U.P.	1961	13,995,586	5.3
		1971	15,896,875	5.6
10.	West Bengal	1961	6,616,572	5.3
		1971	8,053,681	5.5
11.	Tamil Nadu	1961	7,257,363	4.6
		1971	8,593,049	4.8
12.	India	1961	84,511,887	5.2
		1971	100,431,955	5.5

Source : Census of India, 1961, 1971.

PERCENTAGE DISTRIBUTION OF POPULATION BY EDUCATION, AGE AND SEX
1961

	Greater Bombay				Maharashtra				India			
	Age				Age				Age			
	5 - 14 Yrs.	15 - 34 Yrs.	35 Yrs. and above	All ages	5 - 14 Yrs.	15 - 34 Yrs.	35 Yrs. and above	All ages	5 - 14 Yrs.	15 - 34 Yrs.	35 Yrs. and above	All ages
A. Males :												
1. Illiterate	89.91	84.93	52.76	54.90	54.00	41.15	59.20	57.96	61.99	54.42	64.71	65.54
2. Literate, below Matriculation	70.09	56.69	50.94	32.11	45.97	51.21	56.51	38.39	37.94	39.92	32.09	31.39
3. Matriculation and above	-	18.82	16.30	12.99	0.03	7.64	4.29	3.65	0.07	5.66	3.20	3.07
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
B. Females :												
1. Illiterate	75.80	81.16	56.57	51.21	72.64	77.53	91.24	85.34	79.66	83.45	92.30	87.04
2. Literate, below Matriculation	64.20	45.58	57.94	48.21	27.38	19.95	6.10	15.74	20.30	15.96	7.40	12.36
3. Matriculation and above	-	13.26	5.69	6.58	0.01	2.54	0.66	1.02	0.04	2.39	0.30	0.60
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
C. Total :												
1. Illiterate	82.71	70.67	40.96	41.40	65.05	58.86	74.27	70.10	70.46	68.24	77.76	75.90
2. Literate, below Matriculation	67.29	52.56	46.42	48.15	36.94	35.90	25.23	27.44	29.40	28.11	20.41	22.16
3. Matriculation and above	-	16.77	12.62	10.45	0.05	5.16	2.50	2.32	0.06	3.65	1.83	1.94
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source : Census of India 1961

TABLE B.11

PERCENTAGE DISTRIBUTION OF POPULATION BY EDUCATION, AGE AND SEX

1971

	Greater Bombay				India			
	Age				Age			
	5 - 14 Yrs.	15 - 29 Yrs.	30 Yrs. and above	All ages	5 - 14 Yrs.	15 - 29 Yrs.	30 Yrs. and above	All ages
Males :								
1. Illiterate	21.55	27.07	13.45	24.02	57.92	45.86	69.04	61.06
2. Literate including Matriculation.	78.47	53.08	54.94	56.24	42.07	55.41	35.47	37.71
3. Degree or Diploma	-	19.85	31.65	17.65	0.01	2.75	1.52	1.21
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Females :								
1. Illiterate	20.70	45.85	58.60	57.59	72.82	75.99	89.66	81.67
2. Literate including Matriculation.	79.50	42.68	37.63	50.66	27.05	25.15	10.19	17.98
3. Degree or Diploma	-	15.47	25.77	11.75	0.15	0.86	0.15	0.35
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Total Persons								
1. Illiterate	21.21	34.14	24.97	29.95	65.04	58.67	75.49	71.01
2. Literate including Matriculation.	78.79	48.62	46.95	54.98	34.89	39.55	25.56	28.21
3. Degree or Diploma	-	17.24	28.00	15.07	0.07	1.80	0.95	0.78
	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Note :

- 1) For 'Greater Bombay' the figures are obtained from household Survey of 1500 households.
- 2) The figures for 'Greater Bombay' may not add up to hundred because of 'non response' from some sample units.
- 3) For India the figures are obtained from census of India, 1971, Series I, Part II special, one percent sample estimates.

TABLE 3.12

VITAL STATISTICS

Sr. No.		Urban/rural	Birth rate			Death rate		
			1970	1971	1972	1970	1971	1972
1.	Greater Bombay	U	28.0	26.3	23.3	7.6	7.8	6.0
2.	Maharashtra	U	30.0	28.9	28.6	9.8	9.6	8.6
		R	32.1	33.7	31.7	13.0	13.5	13.2
3.	West Bengal	U	21.7	24.8	25.1	6.3	9.2	11.0
		R	-	-	-	-	-	-
4.	U.P.	U	34.7	34.5	31.9	13.7	13.1	14.0
		R	46.9	46.3	43.4	22.7	21.1	24.8
5.	Tamil Nadu	U	23.8	27.8	26.7	9.4	9.3	8.3
		R	32.6	32.7	35.4	18.1	16.4	17.5
6.	India	U	29.7	30.0	28.6	10.2	9.7	9.8
		R	38.8	38.8	37.1	17.3	16.4	17.3

Source: Sample Registration Bulletin, Vol. VII, No. 1, January-March, 1973.

Note : 1. Greater Bombay figures are provisional and taken from Census Office - Maharashtra State

2. Except for Greater Bombay and Maharashtra, 1972 estimates are based on 1st half yearly returns.

TABLE S.13

CHANGES IN SEX RATIO DURING 1951-71

Sr.No.	Place	Sex Ratio (Females per 1000 males)		
		1951	1961	1971
1.	Greater Bombay	603	663	716
2.	New Bombay	N.A.	963	904
3.	Metropolitan Bombay	N.A.	672	722
4.	B.M.R. Planning Area	N.A.	710	749
5.	Delhi (U.A.)	N.A.	N.A.	798
6.	Calcutta (U.A.)	N.A.	N.A.	701
7.	Madras (U.A.)	N.A.	N.A.	N.A.
8.	Maharashtra	941	936	930
9.	U.P.	910	909	879
10.	West Bengal	865	878	891
11.	Tamil Nadu	1,007	992	978
12.	India	946	941	930

Source : Census of India 1951, 1961, 1971.

TABLE 8.14

EMPLOYMENT IN SELECTED INDUSTRIES IN DIFFERENT REGIONS

Sr. No.	Industry	Greater Bombay		New Bombay	Thana Dist.		Greater Bombay + Thana Dist.		Maharashtra		India	
		1961	1969	1970	1961	1969	1961	1969	1961	1969	1961	1970
1.	Food, food products and Tobacco.	16.66	19.60	0.26	2.69	2.24	19.36	21.85	90.34	92.31	7,38.00	8,11.52
2.	Textiles	2,45.62	2,30.64	0.39	12.55	21.45	2,58.16	2,52.09	3,28.30	3,11.77	12,06.00	12,23.59
3.	Leather, Wood works, paper printing and publishing.	31.15	36.21	-	1.17	3.94	32.32	40.16	50.65	60.41	2,64.00	3,58.95
4.	Chemicals and Petro Chemical products.	30.31	49.28	5.90	6.30	19.02	36.81	68.30	43.47	80.32	2,03.00	3,25.56
5.	Basic and nonmetallic industries.	29.90	31.15	1.05	3.96	9.68	33.86	40.84	44.54	59.95	3,66.00	5,22.07
6.	Metal products, machinery transport equipment repairs etc.	1,42.60	1,77.88	8.14	7.55	30.86	1,49.95	2,08.91	1,78.74	2,73.23	9,25.00	14,23.66
7.	Other industries.	7.95	6.97	-	1.39	1.75	9.34	8.72	28.54	46.93	2,12.00	9,19.72
TOTAL ..		5,04.39	551.73	15.72	35.59	88.94	539.80	640.87	7,88.38	929.11	3914.00	4885.05

Source : 1) Maharashtra Statistical Abstract, 1961-62, 1969-70. 2) India Labour Journal, May 1973 and 1962. 3) Survey of Industries in Trans-Thana Area, 'CICCO', 1971.

Note : Employment figures in 000's.

TRANSPORT AND COMMUNICATIONS.

A) ROAD TRANSPORT

Sl. No.	Subject	Greater Bombay	Thane	Kolaba	Maharashtra	India	Year
1.	Route length in operation (km.)	1,500	25,456	12,656	3,82,059	-	1972
2.	Average Daily Passengers (No.)	2,122,411 *	1,45,424	67,531	18,13,681	-	1972
3.	Average Daily Buses	1,157 *	509	188	5,285	-	1972
4.	Road length Surfaced (km.)	1,151	2,277	1,558	40,579	3,99,494	1969/70
	Unsurfaced (km.)	16	251	2,219	16,580	7,89,254	1969/70
	Total (km.)	1,167	2,528	3,887	77,159	11,88,728	1969/70
5.	Private Cars	96,400	-	-	1,53,073	6,18,922 **	1972
6.	Total No. of Motor Vehicles (Private & Public)	1,79,259 @	-	-	3,42,370 @	16,36,395	1969/70

Note :- 1) Sl. No. 1, 2 & 3 of A refer to Public transport i.e. B.R.S.T.

In Greater Bombay and State Transport in rest of Maharashtra.

* figures relate to the year 1965-70.

@ figures relate to the year 1972.

** includes jeeps and motor vehicles.

B) COMMUNICATIONS

Sl. No.	Region	Number of post offices	Number of telegraph offices.	Number of letter boxes.	Number of telegrams	Year
1.	Greater Bombay	231	107	1,067	1,55,000 +	1968-69
2.	Thane and Kolaba	672	116	1,745	7,206	1968-69
3.	Maharashtra	8,565	931	10,619	1,28,631	1968-69
4.	India	1,09,059	15,160	2,15,025	15,00,000	1972.

+ refers to the year 1972.

Source :- 1) Maharashtra State Statistical Abstracts, 1969-70

2) Maharashtra in Command Review, 1971-1972.

3) India, 1972, 1975.

4) Maharashtra Statistical Summary, 1971-72.

TABLE 8.16

GREATER BOMBAY : WARDWISE DISTRIBUTION OF POPULATION & EMPLOYMENT

Sr.No.	Ward	Area in Acres	Population ('000)		Percentage change in population 61-71	Density (Persons/acre)		Workers ('000)
			1961	1971		1961	1971	
1.	A	2,589.02	195.66	185.47	- 7.00	76	71	284.16
2.	B	608.30	170.05	175.15	- 8.07	288	287	72.49
3.	C	441.40	339.45	308.47	- 9.15	769	699	122.04
4.	D	1,638.87	333.64	382.74	8.22	216	233	75.12
5.	E	1,838.55	498.81	508.72	5.99	272	288	154.50
6.	F	3,231.61	549.22	662.36	20.65	105	127	165.95
7.	G	8,411.76	660.17	824.67	24.91	150	137	261.55
	City	16,751.42	2,771.95	3,065.78	10.60	165	185	1,132.44
8.	H	4,835.05	290.40	325.58	80.29	60	108	45.32
9.	K	11,728.00	302.90	373.72	89.40	29	49	92.42
10.	L	3,326.00	142.05	273.44	92.49	43	82	60.60
11.	M	13,971.00	135.72	316.37	135.10	10	23	41.48
12.	N	13,275.00	165.49	479.66	189.84	12	36	81.21
	Suburbs	46,735.05	1,056.58	2,166.78	109.05	22	46	319.05
13.	P	15,881.00	167.62	372.53	122.12	11	23	37.21
14.	R	19,167.00	117.37	235.85	160.92	6	12	42.00
15.	T	8,609.00	38.53	125.16	115.85	7	14	11.23
	Extended Suburbs	43,657.00	343.55	733.55	115.46	7	15	111.61
TOTAL : Greater Bombay		1,07,341.47	4,132.05	5,965.90	45.60	39	56	1,565.32

Source : Census of India 1961, 1971.

Note : The employment figures are from Establishment Schedule, Census of India 1971.

DIAGRAM S.17

Ward wise percentage distribution of area, population, manufacturing jobs and total jobs 1971

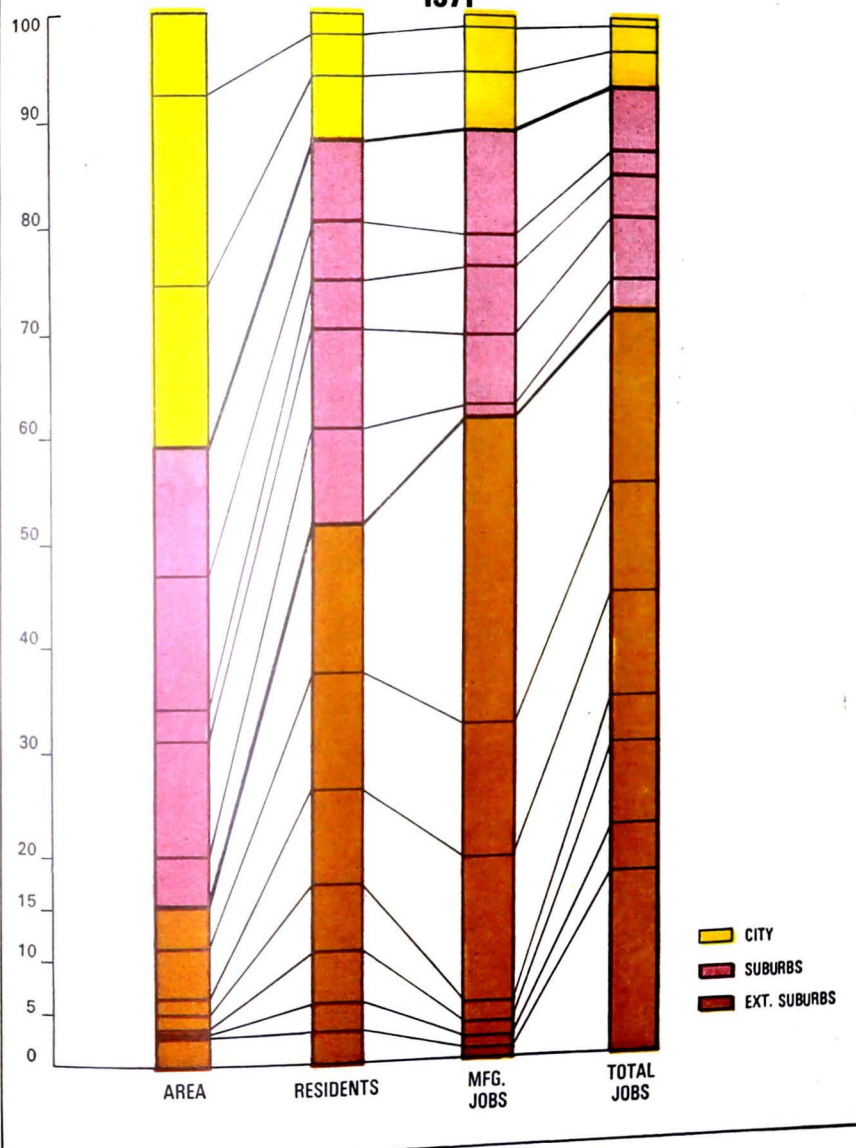


TABLE S.18

GREATER BOMBAY : PERCENTAGE DISTRIBUTION OF POPULATION
AND EMPLOYMENT IN CITY, SUBURBS AND EXTENDED SUBURBS

Sr. No.	Population		Employment in Manufacturing	Total Employment
	1961	1971	1971	1971
1. City	66.79	51.39	60.96	72.44
2. Suburbs	24.95	36.37	29.58	20.41
3. Extended Suburbs	8.26	12.24	11.46	7.15
4. Greater Bombay	100.00	100.00	100.00	100.00

Source: Census of India 1961, 1971.

Employment figures for 1971
are from Establishment
Schedule Census 1971.

TABLE B.19

GREATER BOMBAY : EMPLOYMENT IN REPORTING ESTABLISHMENTS IN PUBLIC AND PRIVATE SECTORS.

Year	Sector	Primary		Manufacturing		Construction		Trade and commerce		Transport and communication		Services		Total for the year	
		Estts.	Empl.	Estts.	Empl.	Estts.	Empl.	Estts.	Empl.	Estts.	Empl.	Estts.	Empl.	Estts.	Empl.
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
March 1962	Public	2	0.1	25	0.2	76	43.8	40	14.5	74	159.8	405	114.9	610	343.2
	Private	6	0.4	1,075	441.8	18	3.5	210	57.3	34	5.0	375	58.3	1,709	326.4
	Total	8	0.5	1,098	450.0	94	47.3	261	73.8	110	164.8	778	173.2	2,319	672.6
March 1963	Public		0.1		11.6		32.8		16.0		161.8		113.9		336.4
	Private		0.4		469.7		2.2		39.0		6.9		43.2		561.4
	Total	8	0.5	1,103	481.3	94	35.0	259	55.0	132	168.7	867	157.1	2,342	897.8
March 1964	Total		0.4		495.0		49.6		38.0		182.0	NA	171.5		937.0
March 1965	Public		0.09		12.8		45.8		19.5		165.1		136.0		395.3
	Private		0.06		307.7		3.9		46.1		6.7		49.2		613.8
	Total	6	0.15	1,231	320.5	99	47.7	302	65.6	144	169.8	971	185.2	2,815	1,009.1
March 1966	Public		0.1		12.3		43.6		21.6		166.7		142.1		306.4
	Private		0.2		325.4		6.5		48.6		8.3		52.0		639.0
	Total	6	0.3	1,401	335.7	107	50.1	351	70.2	146	175.0	992	194.1	3,003	1035.4
March 1967	Public		0.1		26.7		31.8		23.0		121.0		155.3		418.8
	Private		0.1		511.9		3.5		44.1		7.2		54.0		623.1
	Total	3	0.2	1,343	538.6	97	35.3	320	69.1	139	128.2	987	209.3	2,091	1,041.1
March 1968	Public	2	0.1	20	34.4	76	24.6	47	24.4	87	192.0	429	158.7	661	454.2
	Private	3	0.1	1,389	457.9	23	3.5	278	46.3	53	6.5	349	53.8	2,235	367.9
	Total	5	0.2	1,349	492.3	99	27.9	325	70.7	140	198.5	778	212.5	2,896	1002.1
March 1969	Public	2	0.1	20	35.2	78	25.1	58	24.9	87	189.7	423	161.1	660	456.2
	Private	3	0.2	1,390	494.6	22	2.7	296	49.5	57	6.4	361	54.5	2,328	607.7
	Total	5	0.3	1,409	529.8	100	27.8	354	74.2	144	196.1	784	215.6	2,996	1,063.9
March 1970	Public	2	0.1	24	36.5	78	24.8	104	40.7	98	191.5	451	164.9	729	458.3
	Private	3	0.2	1,425	510.3	20	2.7	260	35.7	58	6.4	376	56.9	2,342	612.8
	Total	5	0.3	1,449	546.8	98	27.5	364	76.4	146	197.7	1007	221.8	3,071	1070.5
March 1971	Public	2	0.2	23	39.5	81	24.8	104	45.5	92	195.7	438	171.4	740	472.9
	Private	3	0.2	1,382	511.1	20	4.1	269	36.4	57	5.8	387	60.1	2,456	637.7
	Total	5	0.4	1,345	550.6	101	28.9	373	79.7	149	199.5	1023	231.5	3,196	1,110.6
March 1972	Public	2	0.1	26	50.9	81	25.6	176	33.9	95	195.6	446	175.7	824	501.8
	Private	3	0.4	1,373	534.4	22	5.8	247	32.6	59	5.9	398	61.7	2,502	640.8
	Total	5	0.5	1,599	585.3	103	31.4	423	66.5	152	201.5	1,044	237.4	3,326	1,142.6

Note : 1) Estts. - No. of Establishments 2) Empl. - Employment in 000's.
 3) 'non-reporting' establishments - covered under the Employment Market Information but default in supplying the relevant information.

Source : Directorate of Employment Government of Maharashtra - quarterly employment market reports.

DIAGRAM S. 20

EMPLOYMENT TREND IN NON-PRIMARY SECTORS IN GREATER BOMBAY.
1962-72

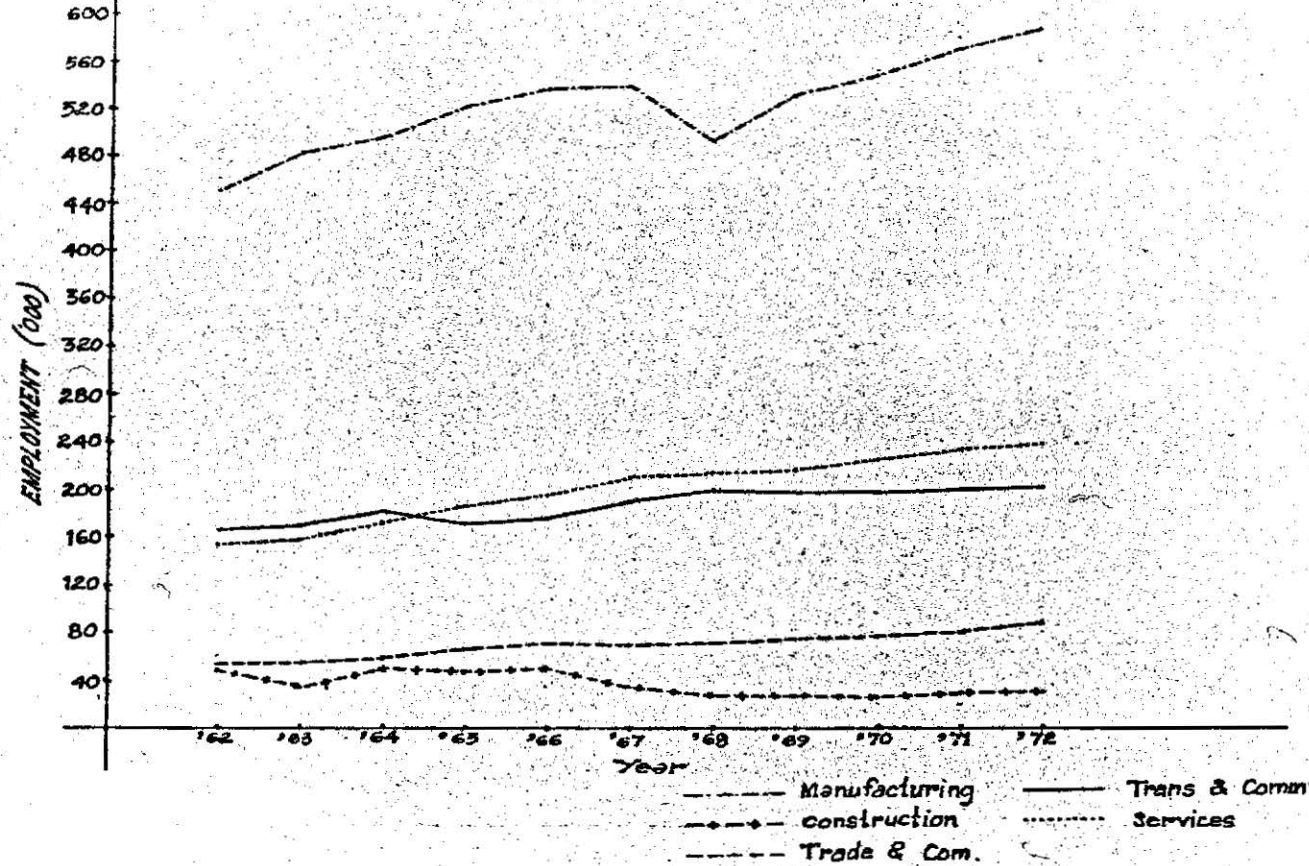


TABLE 3.21

GRAND TOTALS: EMPLOYMENT IN PUBLIC SERVICE - MAINTAINED BY EMPLOYER
1961-72

No. Category of Bkts.	1961		1962		1963		1964		1965		1966		1967		1968		1969		1970		1971		1972	
	No.	Empl.	No.	Empl.	No.	Empl.	No.	Empl.	No.	Empl.	No.	Empl.	No.	Empl.	No.	Empl.	No.	Empl.	No.	Empl.	No.	Empl.	No.	Empl.
1. Central Government	186	67	195	65	202	79	215	80	220	86	194	90	194	90	167	89	167	88	182	92	182	91	85	95
2. Banking	16	6	18	7	21	7	24	8	22	9	27	10	23	11	24	11	25	11	21	27	21	20	180	75
3. Railways	25	91	30	95	29	98	29	100	29	100	29	97	29	96	29	104	29	102	31	105	33	109	34	106
4. State Government	218	41	229	44	245	47	250	51	245	51	246	50	246	50	243	50	237	50	241	62	246	66	244	79
5. Local Bodies.	86	70	105	66	85	88	89	88	85	91	85	89	89	92	86	91	84	92	85	95	86	97	87	101
6. Quasi Government.	59	55	68	69	75	63	70	66	80	70	79	70	82	67	110	79	170	102	179	94	249	105	230	104
TOTAL	390	350	645	348	657	374	685	395	694	405	694	415	660	416	659	532	722	454	729	475	817	492	820	514

Notes: 1. Railways are a part of Central Government, However, these are shown separately under I.C.L. Code No. 700

2. Banking is a part of Quasi Government, However, it is not included in Quasi Government, but shown separately, under I.C.L. Code No. 695 and includes State Bank and Reserve Bank of India.

3. Quasi Government includes Housing Board, Government of India undertakings, Maharashtra State Road Transport Corporation, Life Insurance Corporation, Bombay Labour Board, State Financial Corporation of India.

4. Local bodies include all offices under the Bombay Municipal Corporation.

5. No. - Number of Establishments.

Empl. - Employment in ('000)

Source: Direct Reports of Employment.

DIAGRAM S. 22

EMPLOYMENT GROWTH IN ORGANISED SECTOR IN GREATER BOMBAY.
1962-72

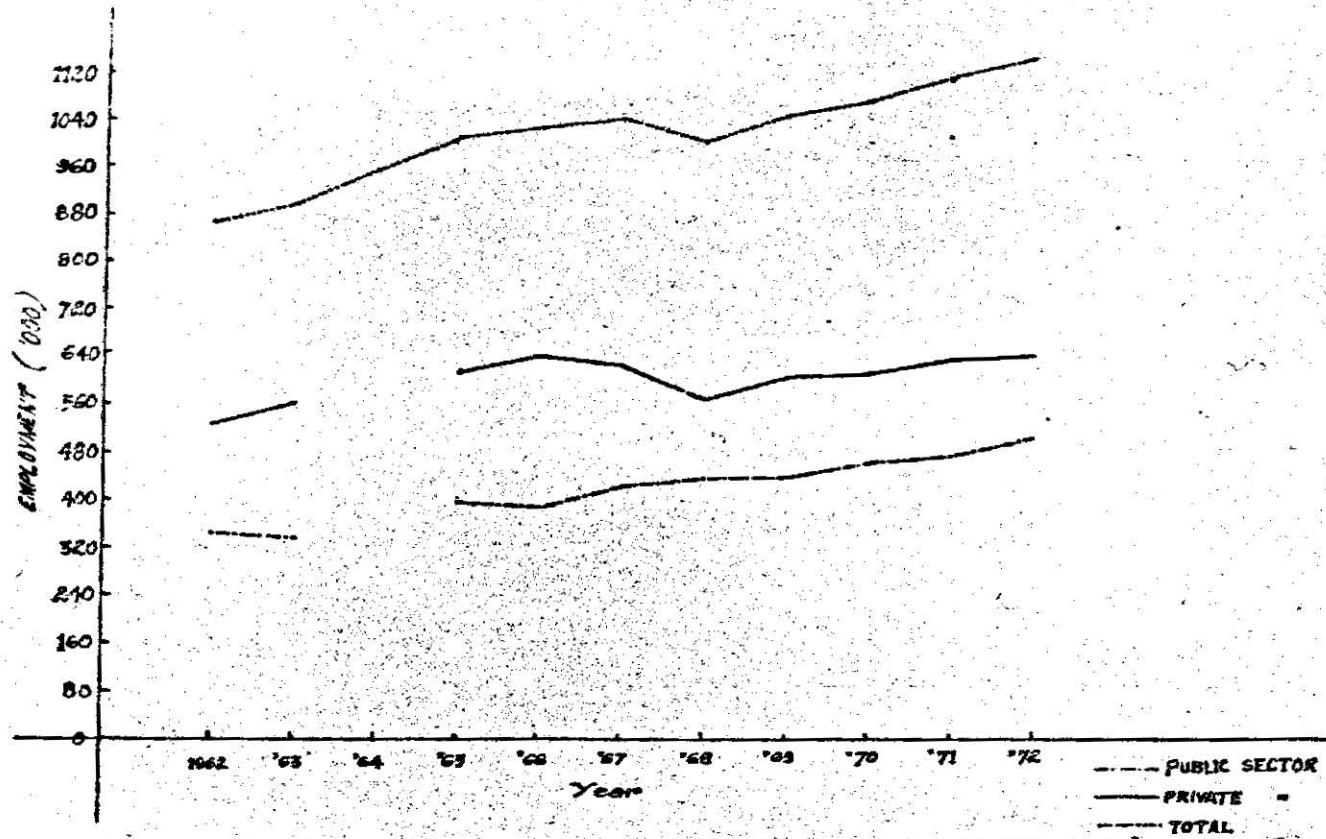


TABLE S.23

GREATER BOMBAY : PERCENTAGE DISTRIBUTION OF
MIGRANTS BY PLACE OF ORIGIN

Sr. No.	Place of origin	Percentage	
		1961	1971
1.	Maharashtra	41.64	46.56
	Ratnagiri district	18.54	17.80
	Satara district	5.27	5.38
	Kolaba district	4.09	5.83
	Other districts	13.74	17.55
2.	Gujarat	16.90	14.56
3.	Uttar Pradesh, Bihar	12.23	11.36
4.	Mysore	6.44	5.54
5.	Pakistan	4.17	2.72
6.	All other Indian States	18.62	19.22
	Total	100.00	100.00

Source: 1. 1961 - Census of India 1961.

2. 1971 - Sample Survey of 1500 Households in Greater Bombay.

DIAGRAM S.24

Distribution of migrants to Bombay by place of origin

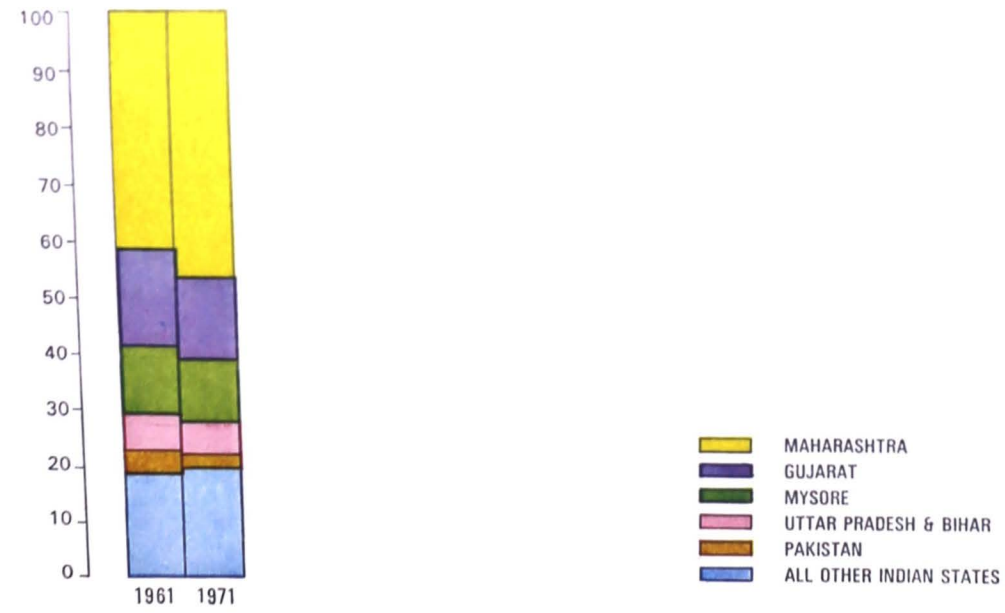


TABLE S.25

MIGRANTS AGED 15 OR MORE : DURATION OF
RESIDENCE IN GREATER BOMBAY

Sr. No.	Duration of residence	Percentage	
		1961	1971
1.	0 - 1 year	6.47	2.36
2.	1 - 4 years	17.05	13.00
3.	5 - 9 years	15.71	16.66
4.	10 - 14 years	20.24	16.09
5.	15 + years	40.51	51.89
Total		100.00	100.00

Source : 1. 1961 - Census of India 1961.

2. 1971 - Sample Survey of 1500 House-
holds in Greater Bombay.

TABLE S.26

GREATER BOMBAY : PERCENTAGE DISTRIBUTION OF POPULATION BY EDUCATIONAL LEVEL

Sr. No.	Education level	Total Population		Migrants		Persons born in Bombay	
		1961	1971	1961	1971	1961	1971
1.	Illiterate	41.42	29.94	39.45	28.64	44.98	31.30
2.	Literate without formal education	24.20	23.16	24.31	22.64	23.98	23.81
3.	Primary or Junior basic	24.02	31.88	24.29	30.99	23.54	32.53
4.	Matriculation or higher secondary	7.79	10.62	8.95	12.65	5.69	8.55
5.	Technical diploma not equal to degree	0.18	0.35	0.20	0.55	0.14	0.18
6.	University degree	2.39	3.20	2.80	4.10	1.67	2.38
7.	Others	-	0.85	-	0.43	-	1.25
Total		100.00	100.00	100.00	100.00	100.00	100.00

Source : 1. 1961 - Census of India 1961.

2. 1971 - Sample Survey of 1500 Households
in Greater Bombay.

DIAGRAM 5.27

Education levels in Greater Bombay

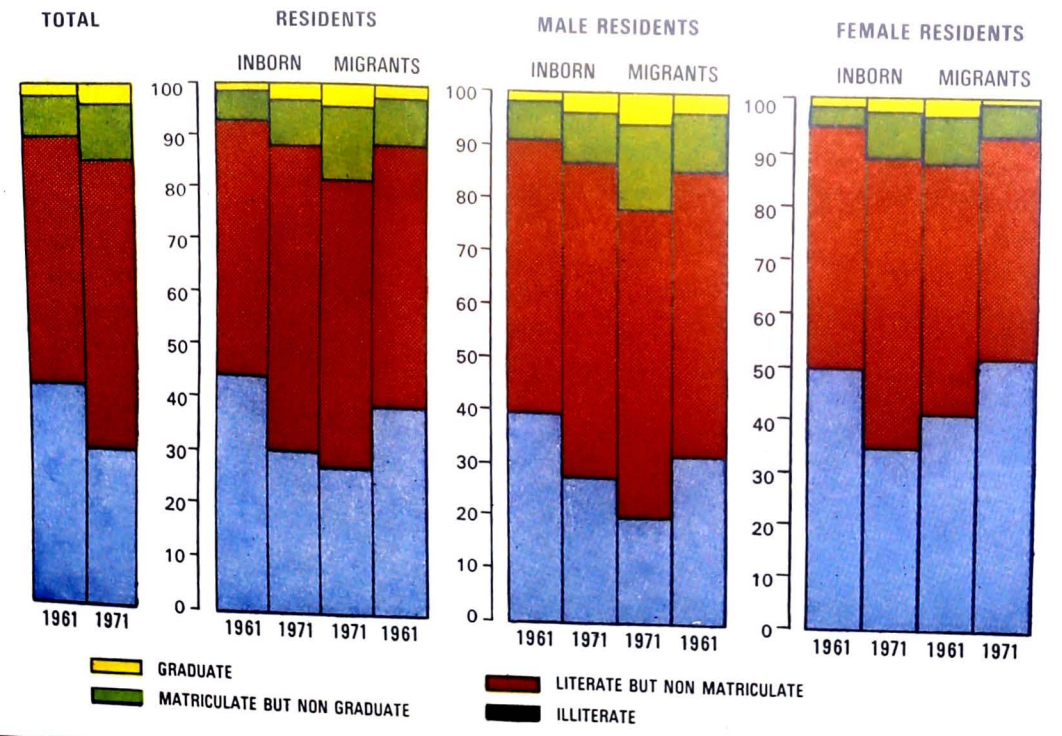


TABLE S.26

GREATER BOMBAY : ECONOMIC CLASSIFICATION OF POPULATION

Sr. No.	Industry	Total Population		Migrants		Persons born in Bombay	
		1961	1971	1961	1971*	1961	1971*
1.	Primary	0.76	0.53	0.83	0.53	0.65	0.32
2.	Manufacturing	16.59	15.56	21.99	10.10	6.86	4.95
3.	Construction	1.09	1.12	1.53	1.00	0.28	0.43
4.	Trade and Commerce	7.32	8.20	9.52	9.27	3.38	4.59
5.	Transport and Communication	4.55	3.96	6.03	6.57	1.93	1.41
6.	Services	10.31	7.44	13.85	27.38	3.95	6.18
	Total workers	40.63	36.81	53.75	54.85	17.06	17.88
	Total Non-workers	59.37	63.19	46.25	45.15	82.94	82.12
	Total	100.00	100.00	100.00	100.00	100.00	100.00

Source : 1. 1961 - Census of India 1961.
 2. 1971 - Census of India 1971.
 3. 1971*- Sample Survey of 1500 Households in Greater Bombay.

Note : All the figures are expressed as percentages to total.

Economic classification of residents of Greater Bombay

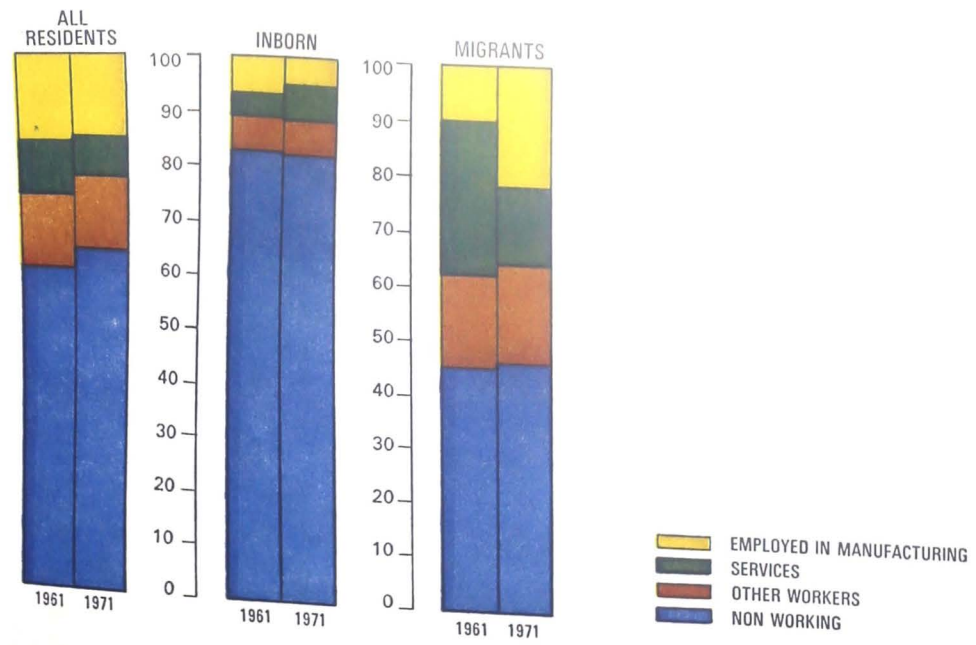


TABLE S.30

GREATER BOMBAY : OCCUPATIONAL CLASSIFICATION OF WORKING POPULATION

Sr. No.	Division	Total Population		Migrants		Persons born in Bombay	
		1961	1971	1961	1971	1961	1971
1.	Professional, technical & related workers	5.03	8.09	5.28	6.89	6.34	11.43
2.	Administrative executive & managerial workers	4.14	3.36	4.03	3.37	3.54	3.14
3.	Clerical & related workers	12.69	14.19	14.36	13.31	21.65	16.70
4.	Sales workers	12.96	17.61	12.26	16.67	9.20	18.78
5.	Farmers, fishermen, hunters, loggers & related workers	1.18	2.01	1.25	0.85	1.57	4.95
6.	Miners, quarrymen & related workers	0.04	0.09	0.07	0.15	0.39	-
7.	Workers in transport & communication occupations	4.26	5.11	4.15	5.54	3.69	4.29
8.	Craftsmen, production process workers & labourers not elsewhere classified	48.42	38.62	44.67	42.08	28.28	30.62
9.	Service, sport & recreation workers	11.20	10.80	13.81	11.11	25.19	9.92
10.	Workers not classifiable by occupation	0.08	0.12	0.12	0.03	0.15	0.17
Total		100.00	100.00	100.00	100.00	100.00	100.00

Source : 1. 1961 - Census of India 1961.

2. 1971 - Sample Survey of 1500 Households in Greater Bombay, CIDCO.

Note : All the figures are expressed as percentages to total.

TABLE S.31

DISTRIBUTION OF MONTHLY INCOMES IN GREATER BOMBAY

Sr.No.	Income group	% of workers	% of population
1.	0 - 100	3.30	3.02
2.	101 - 200	12.20	13.86
3.	201 - 300	19.77	22.97
4.	301 - 400	13.71	13.36
5.	401 - 500	13.25	13.45
6.	501 - 750	13.64	12.77
7.	751 - 1000	0.09	7.23
8.	1001 - 1500	8.75	5.28
9.	1500 and more	5.60	4.69
10.	No response	0.89	1.35
<hr/>			
	Total	100.00	100.00

Source : Sample Survey of 1500 Households in
Greater Bombay, 1971.

DIAGRAM S.32

Percentage distribution of population and workers by household income 1971

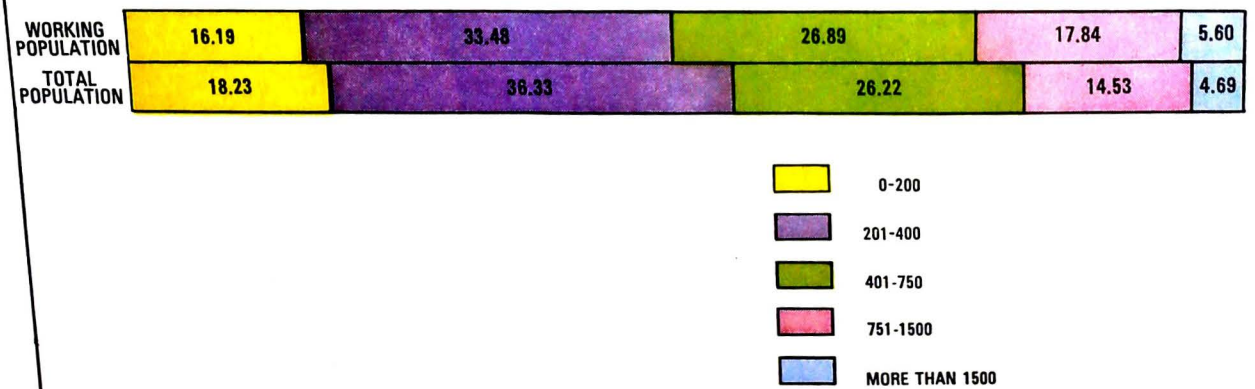


TABLE 9.33

GREATER BOMBAY : DISTRIBUTION OF PER CAPITA CONSUMER
EXPENDITURE ON DIFFERENT ITEMS

Sr. No.	Item	Expenditure (Rs)	Percentage
1.	Food	39.22	48.55
2.	Beverages & Refreshments	9.87	12.22
3.	Consumer Rent	5.57	6.90
4.	Fuel and Light	4.13	5.12
5.	Transport	2.85	3.53
6.	Education	2.45	3.03
7.	Intoxicants	2.27	2.81
8.	Clothing & Footwear	2.08	2.57
9.	Medicines	1.38	1.71
10.	Recreation	1.22	1.51
11.	Durable Goods	0.75	0.93
12.	Consumer Taxes & Cesses	0.40	0.47
13.	Miscellaneous Goods & services	8.59	10.65

	Total	80.78	100.00

Source : N.S.S. 24th Round 1969-70.

DIAGRAM S.34

Consumer expenditure in Greater Bombay 1969-70

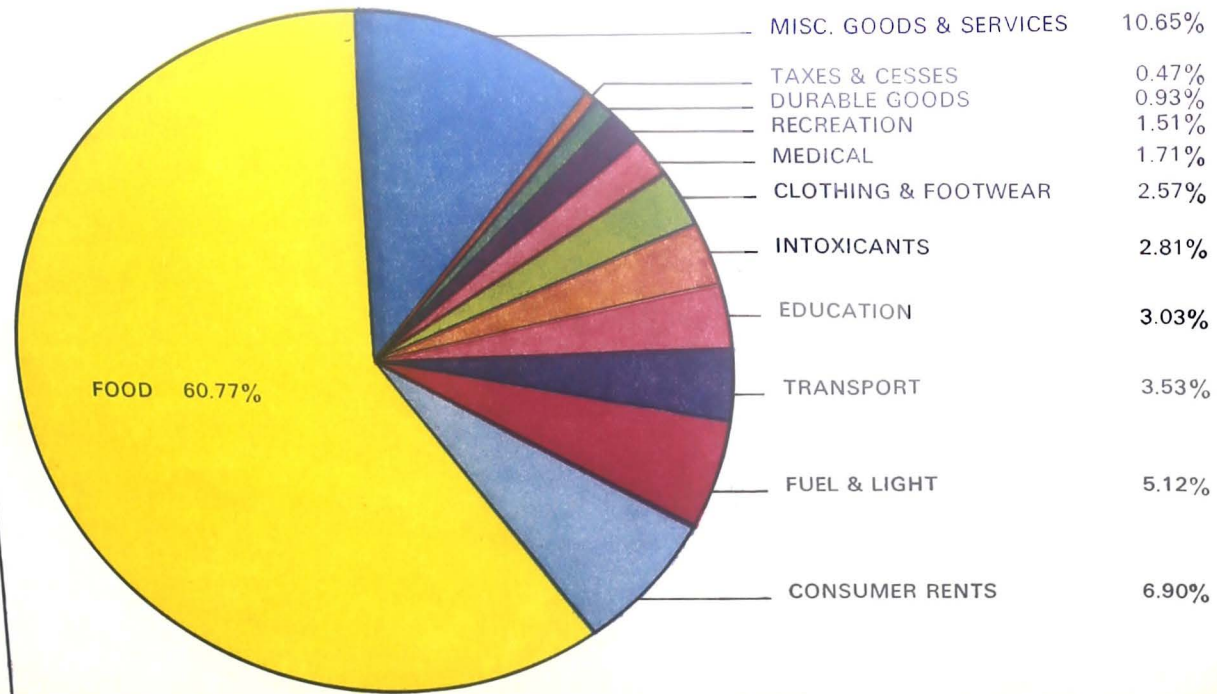


TABLE 8.75

EDUCATIONAL FACILITIES IN GREATER BOMBAY

YEAR	1963	1965	1969	1970	YEAR	1963	1965	1969	1970
POPULATION (000')	4577	4897	5654	5825	POPULATION (000')	4577	4897	5654	5825
1. Pre-Primary and Nurseries					4. Higher Education				
Number	115	115	112	111	Number	80	80	45	46
No. of Students	10,441	9,898	11,497	11,221	No. of Students	56,653	56,653	74,012	77,549
No. of Teachers	475	448	419	439	No. of Teachers	3,061	3,061	—	—
No. of Students per Teacher	22	22	25	25	No. of Students per Teacher	18	18	—	—
2. Primary Schools.					5. Others Including Special Institutions.				
Number	1,375	1,494	1,582	1,612	Number	145	145	157	147
No. of Students	5,51,854	6,05,875	6,64,861	6,79,105	No. of Students	22,160	22,160	15,626	16,868
No. of Teachers	15,927	17,819	19,485	19,854	No. of Teachers	1,288	1,282	—	—
No. of Students per Teacher	34	33	34	34	No. of Students per Teacher	17	17	—	—
3. Secondary including High Schools.					6. Total.				
Number	550	590	641	680	Number	1,263	2,422	2,517	2,998
No. of Students	2,95,265	3,35,611	4,05,727	4,15,354	No. of Students	95,655	10,28,155	11,69,725	12,00,095
No. of Teachers	11,505	12,845	14,667	14,745	No. of Teachers	32,248	54,453	54,571	55,018
No. of Students per Teacher	25	26	27	28	No. of Students per Teacher	29	29	55	54

Source : Municipal Year Books, Maharashtra State (Bureau of Economics and Statistics).

TABLE 8.36

MEDICAL FACILITIES IN GREATER BOMBAY

1. HOSPITALS AND DISPENSARIES

YEAR	NUMBER OF DISPENSARIES						YEAR	NUMBER OF HOSPITALS						YEAR	NUMBER OF BEDS					
	MUNICIPAL	GOVT.	OTHER PUBLIC BODIES	SUB-TOTAL	PRIVATE	TOTAL		MUNICIPAL	GOVT.	OTHER PUBLIC BODIES	SUB-TOTAL	PRIVATE	TOTAL		MUNICIPAL	GOVT.	OTHER PUBLIC BODIES	SUB-TOTAL	PRIVATE	TOTAL
1963	73	5	6	84	-	84	1963	29	10	6	45	81	126	1963	3,460	3,306	953	7,721	4,106	11,827
1965	75	4	6	85	-	85	1965	29	12	6	47	81	128	1965	4,073	3,306	953	8,332	4,106	12,438
1968	80	4	6	90	-	90	1968	29	12	6	47	81	128	1968	4,997	3,338	953	9,288	4,106	13,394
1969	80	4	6	90	-	90	1969	32	12	6	50	81	131	1969	5,605	3,358	953	9,896	4,106	14,002

2. MEDICAL STAFF IN PUBLIC HOSPITALS

YEAR	MUNICIPAL HOSPITALS			YEAR	GOVT. HOSPITALS			YEAR	OTHER PUBLIC BODIES HOSPITALS			YEAR	TOTAL		
	DOCTORS	NURSES	DAYS		DOCTORS	NURSES	DAYS		DOCTORS	NURSES	DAYS		DOCTORS	NURSES	DAYS
1963	546	1,123	—	1963	1,459	854	—	1963	71	100	—	1963	1,076	2,077	—
1965	629	997	420	1965	459	854	—	1965	71	100	—	1965	1,759	1,951	420
1968	669	1,048	599	1968	460	854	—	1968	71	100	—	1968	1,200	2,002	599
1969	667	1,219	644	1969	460	854	—	1969	71	100	—	1969	1,198	2,175	644

3. NUMBER OF PATIENTS (000') IN PUBLIC HOSPITALS

YEAR	MUNICIPAL HOSPITALS			YEAR	GOVT. HOSPITALS			YEAR	OTHER PUBLIC BODIES HOSPITALS			YEAR	TOTAL		
	IN-DOOR	OUT-DOOR	TOTAL		IN-DOOR	OUT-DOOR	TOTAL		IN-DOOR	OUT-DOOR	TOTAL		IN-DOOR	OUT-DOOR	TOTAL
1963	203	2123	2328	1963	100	873	973	1963	16	121	137	1963	321	3117	3438
1965	187	2766	2953	1965	92	1224	1316	1965	16	121	137	1965	293	4111	4406
1968	354	1721	2075	1968	129	1371	1500	1968	16	121	137	1968	499	3213	3712
1969	424	1708	2132	1969	127	1570	1697	1969	16	121	137	1969	567	3399	3966

Source : Municipal Year Books, Maharashtra State (Bureau of Economics and Statistics)..

TABLE 3-77

RECREATIONAL FACILITIES IN GREATER BOMBAY.

YEAR	Theatres					Total Number of seats in all theatres	Number of Stadia	Open Spaces within municipal limits					Number of Swimming pools	Public Libraries and Reading Rooms	Museums	
	Cinema	Drama	Open Air	Others	Total			Playgrounds		Park & Gardens		Aggregate Area of all other open Spaces (Hectares)				Total open space (Hectares)
								No.	Area (Hectares)	No.	Area (Hectares)					
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.
1. 1963	83	27	5	48	163	-	6	72	-	66	-	-	-	-	-	3
2. 1965	85	27	5	48	165	-	7	78	-	100	-	-	-	8	-	3
3. 1969	95	25	5	-	125	69,185	7	82	14	116	76	-	90	8	119	3
4. 1970	98	25	5	-	128	75,461	7	82	14	130	77	-	91	8	119	3

Source : Municipal Year Books, Maharashtra State, (Bureau of Economics and Statistics).

TABLE S. 38
HOUSEHOLD SIZE AND TYPE OF DWELLINGS IN GREATER BOMBAY.

Sr. No.	Households Size (No. of persons)	Type of dwelling (percentages*)				Total Respondents.
		Hut	Chawl	Flat	Bungalow	
1.	1	22	64	11	2	45
2.	2 - 3	20	62	17	-	254
3.	4 - 6	19	59	20	1	532
4.	7 - 9	11	60	25	3	210
5.	10 + 12	9	72	15	2	47
6.	13 +	9	64	24	3	33
Overall		18	61	20	1	1,138

Source: P. Ramchandran, Housing Situation in Greater Bombay, (Bombay, CIDCO Ltd., 1972), Page 41.

* Percentages may not add up to 100 because of rounding.

TABLE 3.19

HOUSING FACILITIES IN GREATER BOMBAY.

1. Housing stock at different points of time.

YEAR	Type of user	TOTAL NO.	Annual letting Value (Rs. in thousands)	Presumption Demand of House tax (Rs. in thousands)	Houses exempted From House-tax (No.)	Total No.
1963-64	Residential	1,15,285	3,05,158	72,753	N.A.	N.A.
	Non-residential	24,874	1,72,702	41,447	N.A.	N.A.
	Total	1,40,159	4,77,860	1,14,200	N.A.	N.A.
1964-65	Total	1,53,947	5,17,953	2,35,626	7,401	1,61,348
1968-69	Total	1,85,340	6,20,453	2,60,181	7,717	1,93,057
1969-70	Total	1,93,737	7,28,290	2,85,879	7,099	2,00,836

2. New Constructions.

YEAR	New plans sanctioned	New structures completed				Total		No. of plans sanctioned for Additions and Alterations.
		Residential		Non-residential		Number	Floor Area (sq.m.)	
		Number	Floor Area (sq.m.)	Number	Floor Area (sq.m.)			
1963-64	N.A.	1,681	N.A.	829	N.A.	2,510	N.A.	N.A.
1964-65	420	180	6,32,036	N.A.	2,36,116	N.A.	8,68,152	N.A.
1968-69	2,736	1,405	N.A.	660	N.A.	2,065	N.A.	1029
1969-70	2,074	1,839	N.A.	328	N.A.	2,167	N.A.	1075

Sources : Municipal Year Books, Maharashtra State (Bureau of Economics and Statistics).

TABLE S.40
SHOPS AND ESTABLISHMENTS IN GREATER BOMBAY
1970-71

Ward	No. of Registered Shops and Establishments.	Storage of trades	Hawkers	Stall-boards	Eating houses	Permitted factories	Motor garages.
A	14,800	3,300	732	3,030	469	485	32
B	12,343	5,631	756	5,358	312	400	18
C	21,195	6,700	1,050	8,700	479	1,297	-
D	12,734	6,804	894	4,815	559	2,371	-
E	20,909	11,035	567	5,324	657	2,371	-
F (South)	7,253	4,500	550	3,500	385	1,119	72
F (North)	2,928	2,478	1,148	979	182	382	-
G (South)	3,147	4,009	431	2,000	359	1,092	51
G (North)	7,048	4,781	722	2,783	315	1,354	20
H	6,349	2,315	574	414	299	402	85
K	6,480	4,550	517	360	351	892	3,500
P	7,023	3,605	104	218	211	1,003	8
R	2,919	1,001	80	92	128	449	2
L	4,570	954	147	548	283	430	31
M	2,845	2,200	115	6	114	306	64
N	3,859	2,130	279	181	171	672	25
T	3,660	2,915	254	145	278	500	12
TOTAL ..	1,42,062	68,908	8,920	38,458	5,552	15,481	3,920

Source: Know Your Ward, Facts and Figures, (Bombay Municipal Corporation of Greater Bombay.)

TABLE S.11

TIME TREND IN NUMBER OF SHOPS AND ESTABLISHMENTS IN GREATER BOMBAY.

Year	City					Suburbs					Extended Suburbs				
	Shops	Commercial Establishments.	Residential Hotels	Restaurants and Eating Houses.	Theatres etc.	Shops	Commercial Establishments.	Residential Hotels	Restaurants and Eating Hotels	Theatres etc.	Shops	Commercial Establishments.	Residential Hotels	Restaurants and Eating Hotels	Theatres etc.
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1965-64	55,255	19,246	231	5,044	71	12,555	1,545	54	1,500	16	4,755	1,570	16	405	9
1965-66	53,727	22,120	296	4,879	71	12,632	1,155	55	1,305	15	4,659	1,505	11	455	8
1966-67	59,279	24,349	278	5,052	71	15,901	1,752	65	1,577	16	5,515	2,165	12	508	8
1967-68	57,411	24,099	298	5,347	75	16,968	1,948	70	1,645	18	5,817	2,457	16	511	9
1968-69	58,512	26,269	296	5,144	75	17,559	2,245	74	1,656	17	7,093	2,908	19	732	11
1970-71	60,546	29,967	284	5,668	80	19,090	5,141	76	1,977	24	8,859	5,754	25	895	12

Source : Administration Reports of the Municipal Commissioner For Greater Bombay.

TABLE S.42**TIME TREND IN NUMBER OF SHOPS, COMMERCIAL ESTABLISHMENTS, CINEMAS, HOTELS, RESTAURANTS
ETC., AND PERSONS EMPLOYED IN MAHARASHTRA**

Sr. No.	Year	Shops		Commercial Establishments		Cinema Theatres, Hotels, Restaurants		Total Establishments.	
		No.	Persons Employed	No.	Persons Employed	No.	Persons Employed	No.	Persons Employed.
1.	1965	196,685	186,102	53,102	270,829	19,616	93,222	269,403	117,286
2.	1966	213,981	193,753	59,770	287,973	21,288	90,597	295,039	581,323
3.	1967	222,239	192,435	69,524	306,748	22,943	102,699	314,706	601,882
4.	1968	226,393	195,928	70,977	313,919	23,970	107,107	321,345	621,954
5.	1969	231,364	194,612	76,139	339,047	25,126	109,311	332,629	542,972

Source:- The Indian Labour Year Books, (Labour Bureau,
Ministry of Labour and Employment,
Government of India).

TABLE S.43
SOURCES OF FINANCE - BOMBAY MUNICIPAL CORPORATION.

(Rs. in Lacs)

Sr. No.	Item	Income				
		1967-68	1968-69	1969-70	1970-71	1971-72
1.	General Tax	1260.48	1489.18	1512.67	1634.34	1808.54
2.	Octroi	975.74	1008.96	1248.72	1532.06	1808.11
3.	Water Tax	750.14	789.29	838.03	991.31	924.11
4.	Halalkhor Tax	192.52	203.57	222.97	245.57	269.46
5.	Education Cess	94.45	142.50	151.28	143.06	160.69
6.	Wheel Tax	97.19	108.08	106.19	118.08	124.19
7.	Fire Tax	40.74	49.06	49.17	53.09	59.26
8.	Dog Tax	0.70	0.73	0.74	0.76	0.78
9.	Theatre Tax	10.38	10.73	11.54	12.74	13.10
Total Taxes		3422.34	3782.10	4141.31	4731.01	5168.24
Other Sources		1141.21	1178.31	1292.68	1366.52	1628.48
Total Income		4563.55	4960.41	5433.99	6097.53	6796.72
*Population (Lacs)		(53.86)	(55.83)	(57.79)	(59.68)	(62.29)

Source: B.M.C. Budget Estimate.

* Estimated from census and B.M.C. data.

DIAGRAM S. 44

SOURCES OF FINANCE -

BOMBAY MUNICIPAL CORPORATION

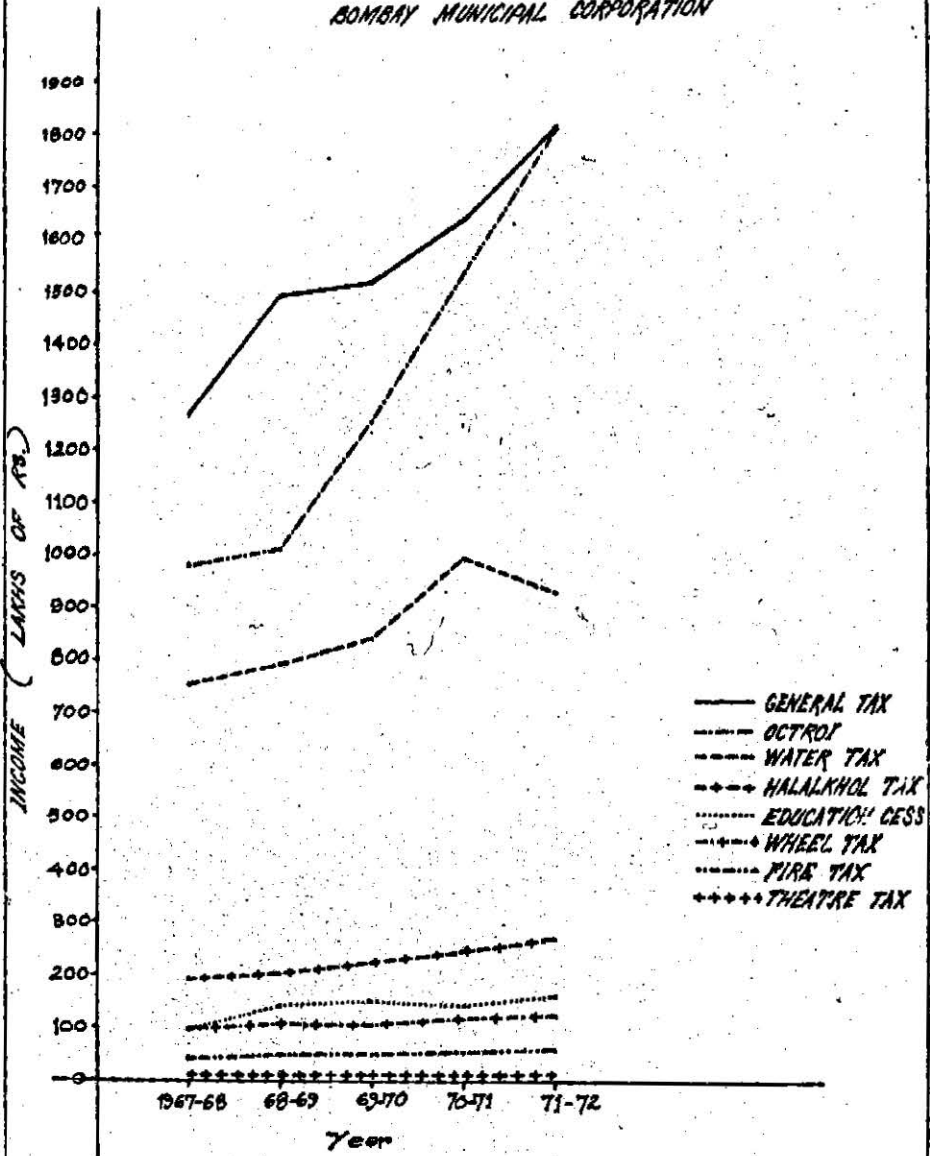


TABLE S.45

REVENUE EXPENDITURE INCURRED BY BOMBAY MUNICIPAL CORPORATION IN GREATER BOMBAY

Sr.No.	Item of Expenditure	Expenditure									
		1967/68		1968/69		1969/70		1970/71		1971/72	
		Total (Rs.lacs)	Per Capita (Rs.)	Total (Rs.lacs)	Per Capita (Rs.)	Total (Rs.lacs)	Per Capita (Rs.)	Total (Rs.lacs)	Per Capita (Rs.)	Total (Rs.lacs)	Per Capita (Rs.)
1.	Primary Education	766.76	14.23	825.97	14.79	819.56	14.18	881.94	14.77	976.41	15.67
2.	Secondary Schools	20.31	0.37	29.66	0.53	31.80	0.53	37.77	0.63	41.50	0.66
3.	Reading Room, Library etc.	8.53	0.16	9.67	0.17	7.44	0.12	24.47	0.41	15.48	0.25
4.	Medical Relief and Medical Education										
	a) Hospitals	407.29	7.56	407.02	7.29	511.59	8.85	615.49	10.31	676.12	10.85
	b) Maternity Homes and Child Welfare Centre.	37.26	0.69	38.96	0.69	48.28	0.83	61.95	1.05	74.23	1.19
	c) Dispensaries	25.51	0.47	28.17	0.50	35.61	0.61	45.77	0.76	47.91	0.76
	d) Other Expenditure	162.27	3.02	167.38	3.01	178.77	3.10	250.52	4.21	246.96	3.97
	sub total ...	652.53	11.74	641.53	11.49	774.25	13.39	973.71	16.31	1045.22	16.77
5.	Public Health	156.28	2.90	214.49	3.84	213.93	3.70	186.67	3.12	212.90	3.41
6.	General Administration	177.41	3.29	195.86	3.47	236.28	4.08	236.05	3.93	232.64	4.05
7.	Roads, Roads Maintenance, Storm Water and Drainage mains and Public Lighting.										
	a) Roads Maintenance	180.89	3.35	145.81	2.61	236.45	4.09	208.10	3.48	294.51	4.72
	b) Storm Water and drainage mains	9.37	0.17	7.02	0.12	14.87	0.25	29.14	0.48	49.18	0.78
	c) Public Lighting	92.95	1.72	100.74	1.80	118.14	2.04	133.01	2.26	160.25	2.57
	d) Other Expenditure	181.27	3.38	182.86	3.28	208.96	3.62	236.52	3.97	285.96	4.57
	sub total ...	464.48	8.62	436.43	7.81	578.42	10.00	626.57	10.49	787.90	12.64
8.	Gardens and Open Spaces	40.99	0.76	39.84	0.71	45.88	0.75	46.22	0.77	54.08	0.86
9.	Others items	2312.79	42.94	2414.59	43.24	2736.98	47.36	3362.35	56.33	3465.58	55.63
	TOTAL EXPENDITURE ...	4579.88	85.03	4806.04	86.08	5444.54	94.21	6139.70	102.87	6851.71	109.99

Source : Budget Estimate 1973-74 B.M.C.

TABLE S.46
CAPITAL EXPENDITURE INCURRED ON THE DEVELOPMENT OF INFRASTRUCTURE BY BOMBAY MUNICIPAL CORPORATION IN
GREATER BOMBAY (Rs. in lacs).

Sr. No.	Item	Year				
		1967-68	1968-69	1969-70	1970-71	1971-72.
1.	Water Works	903.02	459.36	418.29	841.13	509.62
2.	Education	71.82	96.10	59.40	25.33	73.67
3.	Public Health	8.48	3.74	2.29	3.27	1.88
4.	Medical Relief and Education	119.93	106.99	68.04	39.39	39.99
5.	Roads, S.W. Drains etc.	299.64	283.07	184.12	227.90	244.93
	Total	1402.89	949.26	732.14	1137.02	870.09
	*Population (lacs)	53.86	55.83	57.79	59.68	62.29
	Per Capita Capital Expenditure (Rs.)	26.04	17.00	12.66	19.05	13.96

Source: Annual Accounts B.M.C.

* Estimated from Census and B.M.C. data.

DIAGRAM S.47

Capital Expenditure on the Development of Infrastructure incurred by BMC in Greater Bombay.

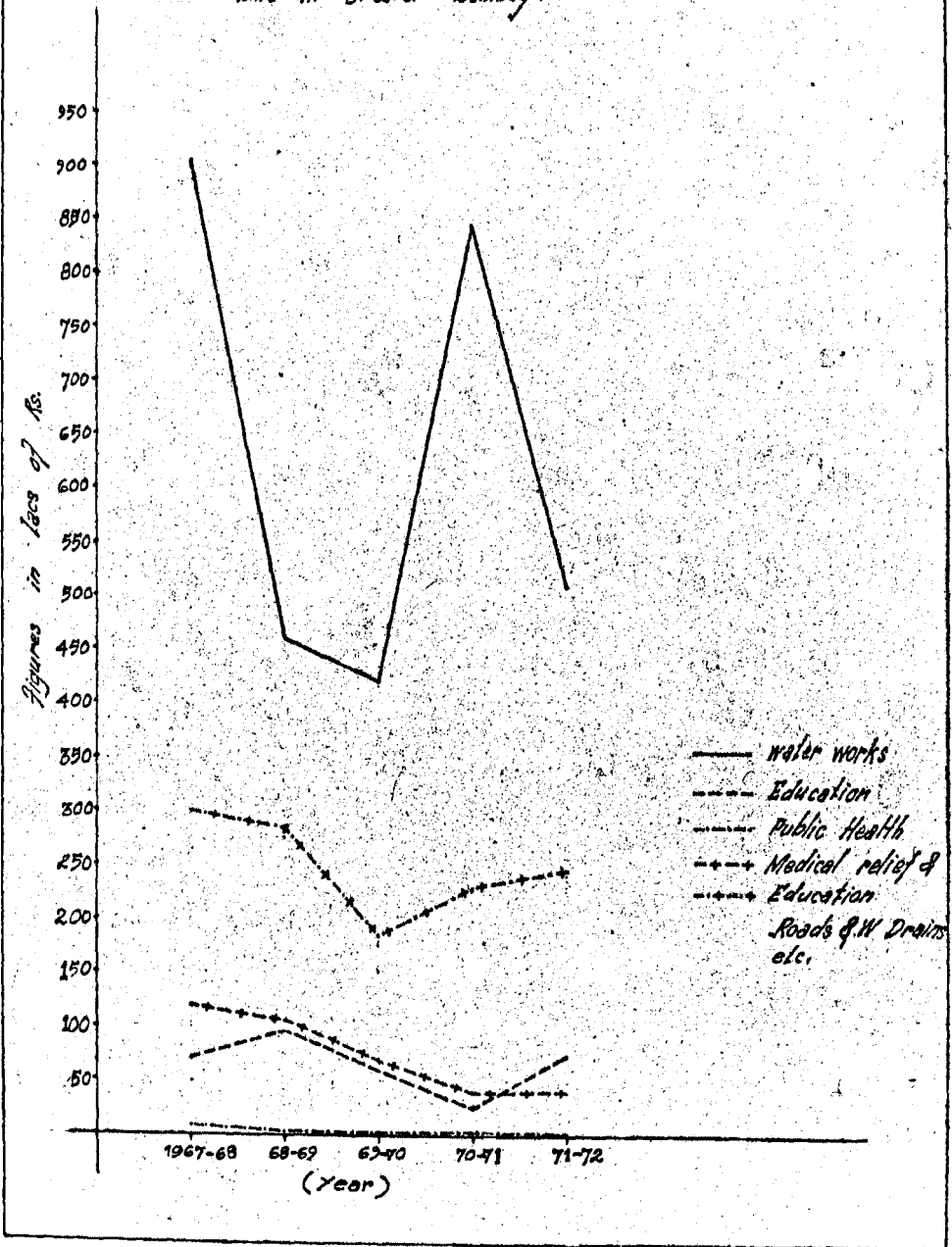


TABLE NO 8.48

EXISTING TOWNS IN NEW BOMBAY : BASIC FEATURES

URAV MUNICIPAL AREA				PANVEL MUNICIPAL AREA			
1. Geography :-				1. Geography :-			
i) Area - 2.10 km ²				i) Area - 12.15 km ²			
ii) Altitude - 11.5 mts. above M.S.L.				ii) Altitude - 12.0 mts. above M.S.L.			
iii) Rainfall - 2,078.5 mm				iii) Rainfall - 2,761.2 mm			
iv) Temperature - Maximum - 32.2°C Minimum - 22.2°C				iv) Temperature - Maximum - 36.0°C Minimum - 26.0°C			
2. Communications :-				2. Communications :-			
i) Panvel-Urav Road				i) Biva-Panvel-Urav-Apta Railway line			
ii) Panvel-Urav Railway (Goods)				ii) Bombay-Poona Highway			
iii) Ferry Service-Seven trips a day from Nava to Bombay				iii) Proposed Expressway to Poona via Thana Creek Bridge			
iv) Narrow Roads within the town				iv) M.S.R.T.C. bus service			
v) 50 Tongas for public hire				v) Tongas, Bullock Carts			
vi) M.S.R.T.C. bus service				vi) Road length - Pakka Roads - 30.57 km. Katcha Roads - 1.40 km.			
vii) Road length - Pakka Roads - 12.40 k.m.							
3. Population :-				3. Population :-			
<u>Year</u>	<u>Population</u>	<u>Decennial percentage increase (+) or decrease (-)</u>		<u>Year</u>	<u>Population</u>	<u>Decennial percentage increase (+) or decrease (-)</u>	
1901	12,277	-		1901	18,128	-	
1911	4,161	-66.00		1911	6,757	-33.44	
1921	4,808	+15.40		1921	7,837	+15.98	
1931	4,981	+ 3.73		1931	8,366	+ 6.75	
1941	5,794	+16.28		1941	10,960	+31.01	
1951	8,672	+49.67		1951	14,061	+35.59	
1961	10,229	+17.95		1961	18,170	+29.00	
1971	12,616	+23.34		1971	26,608	+46.73	
4. Economy :-				4. Economy :-			
i) Economic Activities : Salt, fishing and Building material				i) Economic Activities : Household industries, Mining, Fishing, Agriculture, Construction			
ii) Industrial Workers engaged in other than household industry : 1,078 (as per census 1971)				ii) Industrial Workers engaged in other than household industry : 1,574 (as per census 1971)			
5. Trade :-				5. Trade :-			
i) Important commodities imported - 1) Gur 2) Edible Oil 3) Tobacco				i) Important commodities imported - 1) Paddy 2) Edible Oil 3) Gur			
ii) Important Commodities exported - 1) Grinding wheels 2) Salt 3) Fish				ii) Important commodities exported - 1) Ayurvedic Medicines 2) Bullock cart wheels 3) Rice			
iii) Important Commodities manufactured - 1) Grinding wheels				iii) Important commodities manufactured - 1) Ayurvedic Medicines 2) Bullock cart wheels			
6. Banking and Credit Societies :-				6. Banks :-			
i) No. of Banks - 3				i) No. of Banks - 5			
ii) No. of credit societies - 2.							

Contd.....

TABLE NO 2-18 (Contd.)

7. Educational Institutions :-
 i) Secondary Schools - 2 ii) Jr. Secondary Middle School - 1
 iii) Primary Schools - 5 iv) Balmandir (Montessori) - 4

8. Medical :-
 Hospitals - 2, No. of Beds - 20, Dispensaries - 10.

9. Water Supply :-
 Service Reservoir - 62,000 Litres

10. Electric Supply :-
 No. of connections - Domestic - 1207, Industrial - 36
 Commercial - 164, Road lighting - 305.

11. Recreation :-
 One Cinema, One Library, One Small Garden, One Daily Market

12. Nearest :- City with 1 lac population : Bombay (68 km)
 - Dist. H.Q. : Alibag (81 km)
 - Railway Station : Panvel (24 km)
 - Port : Bombay (10 km)

13. Municipal Finance 68-69 :-
Receipts (Rs. '00)

Taxes etc.	Non Tax Revenue	Govt. Grant	Loan	Advance	Other sources	Total receipts
1951	141	418	-	159	169	2857

Expenditure (Rs. '00)

General Administration	Public Safety	Public Health	Public works	Public Institutions	Others	Total Expenditure
796	164	897	156	206	358	2557

14. Public Offices :- Office of Tehsildar, B.D.O., Sub-Inspector of Police, Custom Office
 P. & C. Department stores, Inspection Bungalow, Home Guard's Office
 Customs Quarters, Police lines, Post Office, Telephone Exchange

Source : 1) Census of India 2) Development Plan Report for Uran and Panvel
Note : Information pertains to the year 1968-69

7. Educational Institutions :-
 i) Secondary Schools - 4 ii) Jr. Secondary Middle School - 2
 iii) Primary Schools - 10 iv) Balmandir (Montessori) - 4
 v) Training College i and vi) Polytechnic - 1
 Arts-Science-Commerce -
 combined college - 1
 vii) Typing Institutes - 2 viii) Others - 3.

8. Medical :-
 Hospitals - 6, No. of Beds - 87, Dispensaries - 26.

9. Water Supply :-
 Service Reservoir - 22,50,000 Litres

10. Electric Supply :-
 No. of connections - Domestic - 2114, Industrial - 109
 Commercial - 789, Road lights - 608, Others - 9.

11. Recreation :-
 Two Cinemas, One Library, Two Gardens, Two Clubs, One Matten, Fish and Vegetable Market

12. Nearest :- City with 1 lac population : Thane (32.00 km)
 - Dist. H.Q. : Alibag (59 km.)
 - Railway Station : Panvel (0 km)
 - Port Ulva : (12 km)

13. Municipal Finance 68-69 :-
Receipts (Rs. '00)

Taxes etc.	Non Tax Revenue	Govt. Grant	Loan	Advance	Other sources	Total receipts
8,460	615	2,240	-	1117	2063	14,495

Expenditure (Rs. '00)

General Administration	Public Safety	Public Health	Public works	Public Institutions	Others	Total Expenditure
2,628	615	3,831	1,762	1037	3931	13,797

14. Public Offices :- Office of Tehsildar, Dy. Engineer, E. & C. Department, Sub-Judge's Court
 Khar Land Development Board, Post Office, Telephone Exchange
 Town Library, N.S.E.B. Office, Taluka Panchayat Samiti

Source : 1) Census of India 2) Development Plan Report for Uran and Panvel
Note : Information pertains to the year 1968-69.

TABLE 8.49

GROWTH OF DIFFERENT TYPES OF MOTOR VEHICLES* ON THE ROAD

ALL INDIA (1950-51 to 1969-70)

Year	Motor Cycles and autorickshaws	Passenger Cars and Jeeps.	Taxis	Buses	Trucks	Others	Total
1	2	3	4	5	6	7	8
1950-51	26,860	147,712	11,551	34,411	61,888	3,891	306,313
1951-52	26,841	149,340	12,264	34,637	84,013	2,651	309,746
1952-53	29,211	153,234	13,313	38,728	91,425	6,450	331,241
1953-54	30,242	159,630	14,279	40,276	98,902	9,724	353,053
1954-55	33,324	170,682	15,354	40,987	104,389	11,841	376,477
1955-56	40,961	187,866	15,318	46,461	119,097	15,837	425,560
1956-57	45,868	203,312	16,027	38,413	123,386	20,091	447,299
1957-58	59,200	227,824	15,325	35,595	113,111	31,427	502,482
1958-59	66,931	250,673	16,934	48,026	147,625	32,241	562,430
1959-60	76,698	262,799	19,187	53,674	156,671	33,873	604,902
1960-61	94,595	287,913	21,663	36,792	167,649	33,863	664,475
1961-62	116,533	314,024	25,620	59,560	189,096	44,343	749,176
1962-63	139,767	347,603	27,793	62,560	215,408	54,297	847,428
1963-64	167,793	358,906	29,341	66,313	224,181	59,030	905,964
1964-65	201,920	396,293	31,762	20,470	241,840	64,162	1,006,447
1965-66	241,701	420,096	35,725	73,175	258,977	69,369	1,099,043
1966-67	285,892	443,629	38,321	76,033	266,190	80,347	1,190,412
1967-68	346,826	480,362	41,990	82,729	284,836	93,609	1,332,352
1968-69	416,608	526,479	51,233	86,226	297,989	99,133	1,478,690
1969-70	491,034	533,083	59,240	90,246	327,471	100,985	1,624,039

* Motor vehicles taxed, tax exempted and temporarily withdrawn from use.

Notes: (1) Figures for 1953-54 onwards include tax exempted vehicles whereas earlier figures relate to vehicles taxed only.

(ii) No. of Motor vehicles relate to last quarter of the financial year.

Source: Basic Road Statistics 1970-71, Ministry of Shipping and Transport, Government of India, October 1972.

TABLE S.50

DIFFERENT TYPES OF MOTOR VEHICLES IN GREATER BOMBAY

Year	Motor cars	Taxis	Buses	Lorries	Motor Cycles	Total Registered (includes miscellaneous)	Cars per 1000 Pop.
1950	19707	1495	490	6870	2188	30877	6.92
1951	22701	2031	603	7187	2213	35051	7.58
1952	22986	2374	495	6873	2183	35345	7.41
1953	23200	2644	537	7000	2200	36081	7.22
1955	25800	3390	672	7363	2350	40210	7.48
1956	26200	3650	751	8130	2600	42075	7.35
1958	30624	3800	1016	9620	3650	49726	8.08
1959	33440	3872	1064	10616	4275	54430	8.57
1960	36899	5150	1067	11653	5325	61381	9.17
1961	39910	6370	1100	12799	6576	68128	9.61
1962	41078	6475	1188	14326	7056	71597	9.55
1963	43132	6529	1296	15622	7784	75891	9.59
1964	44892	7129	1309	16554	8373	79834	9.57
1965	46119	7543	1310	17335	8972	83008	9.49
1966	52739	8846	1364	18422	11231	94456	10.46
1967	58438	9741	1529	19659	13725	105092	11.19
1968	66347	12328	1539	20982	16498	119859	12.28
1969	74959	13999	1542	22770	20293	136026	13.34
1970	82586	15924	1569	24003	24792	151479	14.23
1971	89575	17395	1717	25083	28637	165220	15.00
1972	96400	19054	1746	25917	33069	179259	16.07

Source : Regional Transport Office,
Greater Bombay

TABLE S.51

TRIP ATTRACTION CHARACTERISTICS OF DIFFERENT
LAND USES IN GREATER BOMBAY (1972)

Sr.No.	Land uses	Index of attraction* (Business trips)
1.	Manufacturing (small)	0.9
2.	Repairing	1.6
3.	Wholesale trade	0.7
4.	Banking	7.8
5.	Insurance	1.7
6.	Hotels and Restaurants	0.9
7.	Commission Agents	0.6
8.	Miscellaneous Commercial Firms	2.1
9.	Transport*	1.3
10.	Government Offices	2.7
11.	Office of Manufacturing concerns	1.4
12.	Import-export	2.1
13.	Other business services	1.1
14.	Professional Services	1.4
15.	Recreation	0.7

* Index of attraction = $\frac{\text{Trips attracted (visitors)}}{\text{Trips generated (employees' work trips)}}$

Source : Study on Economic Activity Profile for Bombay, 1972.
(O.R. Group Baroda).

TABLE S.52

DISTRIBUTION OF TRIPS BY PURPOSE
IN GREATER BOMBAY, 1968

<u>Sr.No.</u>	<u>Purpose</u>	<u>Percentage of Trips</u>
1.	Work	31.00
2.	School	1.20
3.	Personal Business	4.57
4.	Social & Recreational	2.97
5.	Employer's Business	2.17
6.	Home	46.45
7.	Others	11.64
Total		100.00

Source : Mass Transportation Study of Bombay
(1968) Traffic Cell.

TABLE S.54

MODAL SPLIT OF PASSENGER TRIPS IN GREATER BOMBAY, ACCORDING TO
INCOME CLASSIFICATION (1968)

Income group	Household Income per Month	Percentage in each Mode to the total in the Group			Percentage using all Mechanical Modes in the Group
		Train	Bus	Others	
I	0 - 150	71.6	25.2	3.2	24.4
II	151 - 400	68.5	27.7	3.8	35.4
III	401 - 1000	58.7	32.9	8.4	46.5
IV	101 - 2000	42.4	33.7	23.9	56.4
V	2001 - 3000	20.9	33.0	46.0	61.1
VI	Above 3000	36.7	15.8	47.5	61.1
Total		59.6	30.3	10.1	41.0

Source : Mass Transportation Study of Bombay (1968)
Traffic Cell.

TABLE S.55

MODAL SPLIT OF DAILY PASSENGER TRIPS IN A FEW CITIES

Sr. No.	City	Year	Percentage Distribution								Total
			Cars	Motor Cycles Scooters	Bus	Tram	Railways	Taxi of Hire Cars	Cycle	Other Vehicles	
1.	Greater Bombay	1968	10.7	N.A.	39.0	-	39.0	9.3	N.A.	2.0	100.0
2.	Delhi	1957	9.9	1.7	22.2	-	0.5	12.2	34.2	19.3 ^A	100.0
3.	Hong Kong	1965	...14.6...		60.6	15.0	0.6	4.5	-	4.7	100.0
4.	Hyderabad	1969	12.5	14.7	33.8	-	-	-	34.5	4.5	100.0
5.	Manila	1968	11.6	0.7	29.3	-	-	57.7 ^B	-	0.7	100.0
6.	Singapore	1968	23.1 ^C	8.1	40.4	-	-	20.7 ^D	4.6	3.1	100.0
7.	Tokyo	1962	7.6 ^E	-	18.4	11.9	62.1	-	-	-	100.0

A Includes trips by horse driven vehicles also.

B Includes trips by jitneys also.

C Includes trips by 'private taxis' (i.e. cars illegally carrying passengers charging fare at per seat basis)

D Includes trips by taxis illegally carrying passengers charging fares at per seat basis.

E Includes trips by individual transport and taxis.

Source: 1. Reorganisation of Routes of Bus Transport System in Bangalore, N.S. Srinivasa, P.S. Shetty, Khem Chand and P.V. Kulkarni published in The Journal of the Indian Roads Congress No. 1, Vol. 35-1, 1973.

2. Mass Transportation Study of Bombay Traffic Cell.

3. A Small Scale Origin & Destination Survey in Hyderabad City, R.K. Zha & S. Raghavachari Published in Transport Communications Quarterly Review No. 243, September, 1973.

TABLE S.56

RESIDENT TRIP GENERATION IN 23 U.S. CITIES
(BASED ON HOME-INTERVIEW DATA)

Sr. No.	City	Approximate Population	Date of Survey	Person trips per Capita (by all vehicular modes)
1.	St. Louis, Mo	1,480,000	1945	1.76
2.	Baltimore, Md	912,900	1945	1.35
3.	Seattle, Wash	518,600	1946	1.68
4.	Portland, Oreg	422,700	1947	2.07
5.	Indianapolis, Ind	411,600	1945	1.11
6.	Denver, Colo	360,000	1944	1.64
7.	Memphis, Tenn	278,500	1944	0.91
8.	Nashulle, Tenn	195,000	1945	0.92
9.	Tacoma, Wash	138,700	1948	1.85
10.	Spokane, Wash	138,400	1946	1.18
11.	Little Roak, Ark	130,300	1944	0.78
12.	Tueson, Ariz	126,900	1949	2.28
13.	Chattanooga, Tenn	126,100	1945	0.83
14.	Reading, Pa	119,800	1945	1.10
15.	South Bend, Ind	119,400	1945	1.04
16.	Ft. Wayne, Ind	114,900	1944	1.15
17.	Charlotte, Ne	100,600	1945	1.10
18.	Harrisburg, Pa	95,000	1946	2.54
19.	Columbus, Ga	79,000	1947	0.95
20.	St. Joseph, Mo	75,000	1945	0.85
21.	Port Huron, Mich	33,800	1945	2.22
22.	Ottumwa, Iowa	29,500	1945	1.41
23.	Mason City, Iowa	23,200	1945	1.76
Average		262,209	-	1.41
Range		-	-	0.78 - 2.54

Source : Tressider, Meyers, Burrell & Powell: "The London Transportation Study Methods and Techniques", Journal of the Institution of Civil Engineers, March, 1968. P. 120.

TABLE 8.37
RAILWAYS
DENSITY OF SUBURBAN TRAFFIC
(APPROXIMATE AVERAGE OF 1970-71 AND 1971-72)

Section	CENTRAL RAILWAY											WESTERN RAILWAY			
	Bombay V.T. Kurla	Kurla Thane	Thane Kalyan	Kalyan Kandivli	Kalyan Aher- nath	Aher- nath Kerjat	Bombay V.T. Vadala	Vadala Kurla	Kurla Cherbur	Cherbur Mankhurd	Vadala Bandra	Church- gate Bandra	Bandra Andheri	Andheri Borivli	Borivli Virar
Route Kilometers	16	18	20	60	7	40	9	5	2	4	5	15	7	18	26
No. of lines	Quadru- ple	Quadru- ple	Quadru- ple	Double	Double	Double	Double	Double	Double	Single	Double	"	Quadru- ple	Quadru- ple	Double
Gauging Gradient	1 in 150	1 in 150	1 in 150	1 in 100	1 in 150	1 in 100	1 in 57	1 in 57	1 in 57	1 in 57	1 in 57	1 in 200	1 in 200	1 in 200	1 in 200
Traction	Electric 1.5 KV. D.C.											Electric 1.5 KV. D.C.			
Average Number of Coaching Trains per day (in one direction)	123	126	66	5	36	12	124	66	65	32	50	232	214	154	37
Average Number of Vehicles (in 4-wheelers) per day (in one direction)	3280	2600	1180	72	500	190	2125	1140	1110	900	900	4190	3900	2770	664
	1970-71											1970-72			
Total Annual Trains Km. ('000)												7,079			
Total Annual Passenger-Km. ('000)												8,252,241			
No. of Passengers Carried. ('000)												482,970			
												9,477			
												N.A.			
												452,639			

* Churchgate to Grant Road - double line, now being quadrupled.
Grant Road to Bandra - quadruple

TABLE 8.58
RAILWAYS
DENSITY OF MAINLINE TRAFFIC
(APPROXIMATE AVERAGE OF 1970-71 AND 1971-72)

Section	CENTRAL RAILWAY						WESTERN RAILWAY			
	BOMBAY - KALYAN		KALYAN - IGATPURI		KALYAN - NUNE		BOMBAY CENTRAL - BANDRA		BANDRA - WALSAD	
Route Kilometres	UP	DOWN	UP	DOWN	UP	DOWN	UP	DOWN	UP	DOWN
Route Kilometres	54		84		139		11.55		182.77	
No. of lines	Quadruple		Double		Double		Quadruple		Quadruple upto Borivli and Double: Borivli to Walsad	
Rolling Gradient	1 in 150		1 in 56		1 in 37		1 in 200		1 in 200	
Traction	Electric: 1.5 KV D.C.		Electric: 1.5 KV D.C.		Electric: 1.5 KV D.C.		Diesel and Steam		Diesel and Steam	
Average daily number of Passenger trains run on the section	24	24	11	11	24	24	15	15	18	18
Average daily total No. of passenger coaches (in 4 wheelers) run on the section	550	550	250	250	540	540	450	450	470	470
Average daily number of goods trains run on the Section	25	25	11.5	15	7.8	8.2	8.60	8.60	15.5	15.5
Average daily total No. of goods wagons (in 4 wheelers) run on the section	1,400	1,050	590	580	594	537	21	22	700	800
Nett (freight tonnes per route km. per day)	10,750	8,250	9,800	6,100	4,960	5,370	550	540	5,500	6,450
Gross (freight tonnes per route km. per day)	25,100	22,150	17,500	15,950	10,150	10,050	700	700	19,750	18,700
Gross tonnes per passenger coaches per route km. per day	17,150	17,150	7,800	7,750	16,150	16,200	12,800	12,900	11,850	11,950
Total Gross tonnes per route km. per day	42,250	39,300	25,300	21,700	26,300	26,250	13,500	13,600	31,600	30,650

Total Annual of Indian Railways:

1970-71

Freight traffic:	
Originating (Mn. tonnes)	199
Tonne km. (Mn.)	126,000
Passenger traffic:	
Originating (Mn.)	2,458
Passenger km. (Mn.)	119,000

DIAGRAM S.59

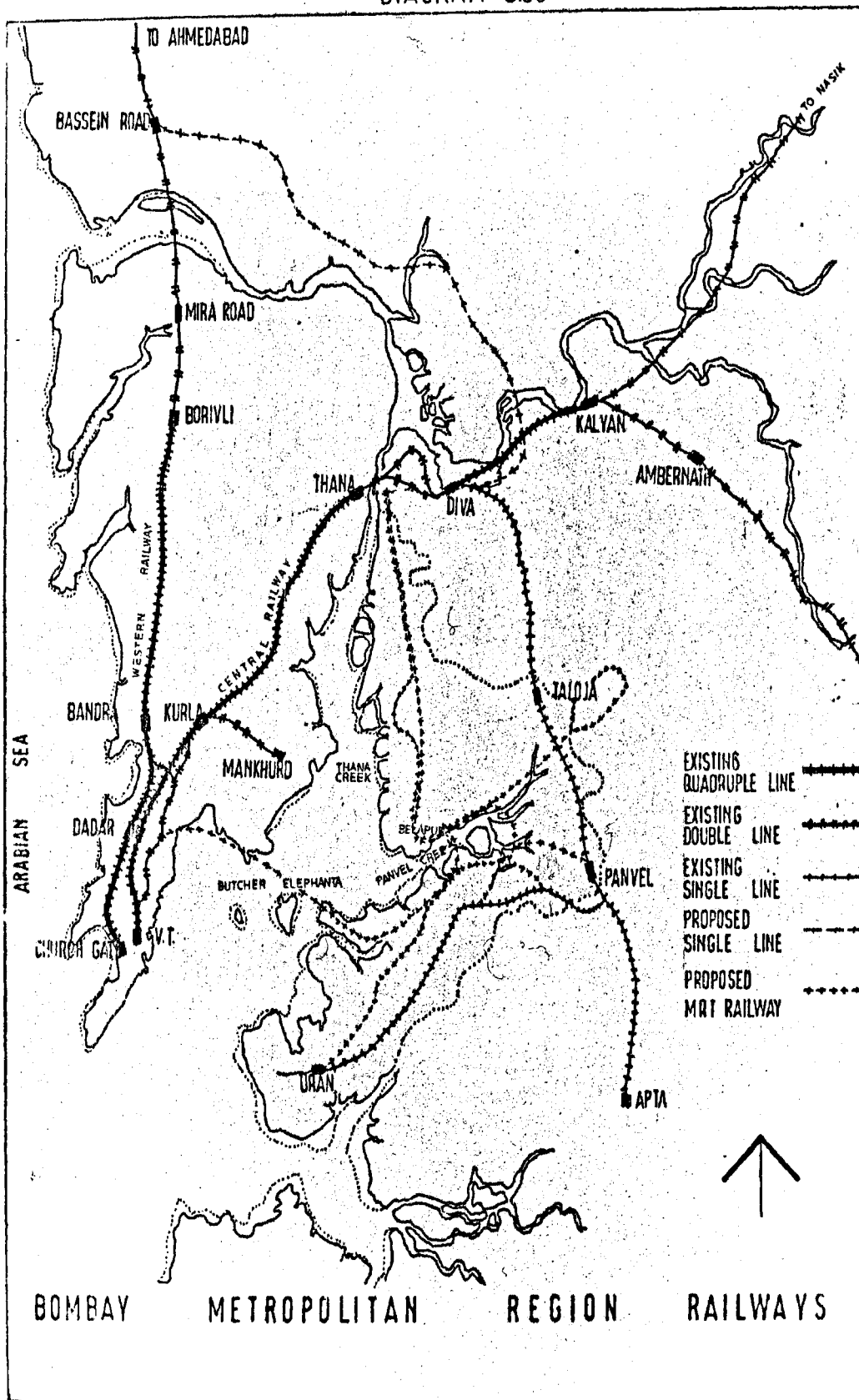


TABLE S.60

PORT: EXISTING FACILITIES

1. Wet Docks

	Width of entrance in feet	Maximum draft available in feet	Number of Berths		
			In wet basin	Along harbour wall	Total
Princess Dock	66	21	10	1	11
Victoria Dock	80	23	13	-	13
Alexandra Dock	100	30	21	6	27
					51

2. Deep Water Open Berths outside the docks are:

Berths	Draft available Feet	Number of berths
Ballard Pier	30	2
Pir Pau (Bulk Oil Pier)	29	1
Marine Oil Terminal (Butcher Island)	36	3

3. Dry Docks

	Maximum length Feet	Width at entrance Feet	Normal Minimum depth of water over sill Feet
Merewether	525	65.5	21
Hughes	1,000 (divisible into 2 compartments of varying lengths)	100.0	32

Nocil Barge Jetty at Belapur, New Bombay.

The NOCIL Barge Jetty 460 feet long, on Panvel Creek is used for bulk export of liquid chemicals using 9-tonne tanker trucks for transport to the jetty and 500-tonne tanker barges for transport to tankers for shipment. The jetty accommodates two barges at a time and the annual volume of chemicals is expected to be 12,000 tonnes by 1973. The draft available at the jetty at low tide is 10 feet.

TABLE S.62

PORT TRAFFIC

(Figures in brackets indicate percentages)

	1951-52	1960-61	1961-62	1962-63	1963-64	1964-65	1965-66	1966-67	1967-68	1968-69	1969-70	1970-71	1971-72	1972-73
IMPORTS (IN '000 SW TONNES)														
Grain of all kinds	2,010 (55.1)	2,011 (28.0)	1,105 (11.0)	1,694 (14.9)	1,499 (12.2)	2,248 (16.9)	2,475 (19.2)	3,042 (23.0)	2,257 (18.2)	1,295 (10.7)	1,507 (11.1)	875 (7.9)	130 (5.2)	551 (2.6)
Petroleum, Oil and Lubricant	1,764 (29.1)	5,507 (49.5)	5,506 (55.7)	5,883 (51.6)	6,952 (56.7)	7,588 (55.5)	6,609 (51.5)	6,384 (47.8)	5,996 (48.2)	7,151 (59.0)	6,848 (58.4)	6,885 (62.5)	7,792 (61.8)	8,104 (65.7)
Others	2,298 (57.2)	5,402 (51.7)	5,441 (55.3)	2,850 (55.5)	3,822 (51.1)	5,718 (27.8)	5,762 (29.5)	5,861 (29.0)	4,191 (55.6)	5,668 (50.5)	5,578 (50.5)	5,295 (29.8)	4,412 (55.8)	4,288 (55.7)
Total	6,072 (100.0)	10,720 (100.0)	10,013 (100.0)	11,407 (100.0)	12,272 (100.0)	15,554 (100.0)	18,061 (100.0)	15,227 (100.0)	12,444 (100.0)	12,096 (100.0)	11,755 (100.0)	11,055 (100.0)	12,614 (100.0)	12,725 (100.0)
EXPORTS (IN '000 SW TONNES)														
Manganese Ore	255 (15.7)	577 (9.6)	869 (6.4)	250 (5.5)	845 (6.4)	405 (6.8)	277 (5.2)	151 (3.1)	89 (2.0)	102 (2.4)	74 (2.0)	81 (2.5)	48 (2.5)	10 (0.5)
Oil Cakes	7 (0.4)	201 (5.1)	190 (4.5)	566 (7.6)	410 (7.5)	565 (6.2)	578 (7.1)	557 (6.5)	217 (2.8)	506 (7.2)	290 (7.9)	548 (9.7)	285 (7.6)	571 (11.2)
Petroleum, Oil and Lubricant	258 (4.6)	2,000 (51.1)	2,205 (52.7)	2,578 (49.7)	5,291 (59.6)	5,750 (65.2)	5,512 (62.1)	5,067 (57.0)	2,224 (59.5)	2,472 (56.5)	1,206 (49.5)	1,959 (45.7)	1,976 (52.6)	1,558 (47.8)
Others	1,128 (69.3)	1,359 (54.2)	1,522 (56.4)	1,892 (57.1)	1,522 (28.5)	1,405 (55.8)	1,366 (25.6)	1,478 (55.6)	1,691 (57.3)	1,412 (54.1)	1,494 (40.6)	1,585 (44.5)	1,448 (58.5)	1,576 (41.5)
Total	1,628 (100.0)	3,217 (100.0)	4,184 (100.0)	4,766 (100.0)	5,476 (100.0)	5,905 (100.0)	5,555 (100.0)	5,059 (100.0)	4,521 (100.0)	4,509 (100.0)	3,678 (100.0)	3,571 (100.0)	3,757 (100.0)	3,515 (100.0)

PASSENGER MOVEMENT (IN '000)

Year	Foreign			Coastal, Ferries		
	Inward	Outward	Total	Inward	Outward	Total
1960-61	24	26	170	323	566	689
1965-66	76	68	144	299	509	654
1966-67	57	58	115	512	518	628
1969-70	58	55	115	232	232	448
1970-71	54	52	106	251	248	499
1971-72	42	53	100	197	226	425
1972-73	45	51	96	204	255	459

TABLE 2.63

PORT TRAFFIC FORECASTS FOR BOMBAY PORT

Commodity	Forecast											
	Imports				Exports				Total			
	1970	1975	1980	1985	1970	1975	1980	1985	1970	1975	1980	1985
OVERSEAS TRAFFIC	Million Tonnes				Million Tonnes				Million Tonnes			
TOTAL POL ..	7.75	10.12	12.45	15.66	0.20	0.25	0.30	0.40	7.95	10.37	12.75	16.06
Bulk :—												
Foodgrains ..	2.50	2.00	1.50	1.20					2.50	2.00	1.50	1.20
Rock phosphate ..	1.26	1.32	2.04	2.66					1.26	1.32	2.04	2.66
Sulphur (powder) ..	0.15	0.23	0.24	0.31					0.15	0.23	0.24	0.31
Sulphur (molten) ..	0.20	0.20	0.30	0.40					0.20	0.20	0.30	0.40
Potash & fertilisers ..	0.45	0.59	0.90	1.22					0.45	0.59	0.90	1.22
Liquid gases (ammonia, etc.)	0.12	0.15	0.25	0.25					0.12	0.15	0.25	0.25
Phosphoric acid ..	0.24	0.35	0.50	0.64					0.24	0.35	0.50	0.64
Other liquid chemicals ..	0.02	0.02	0.10	0.14	0.05	0.04	0.08	0.13	0.05	0.06	0.18	0.27
Vegetable oils ..	0.07	0.22	0.42	0.61	0.02		0.18	0.56	0.09	0.22	0.60	0.97
Manganese & iron ores ..					0.40	0.32	0.70	0.90	0.40	0.52	0.70	0.90
Sugar ..					0.22	0.22	0.52	0.55	0.22	0.22	0.52	0.55
Oilseeds ..					0.50	0.70	1.00	1.50	0.50	0.70	1.00	1.50
Total Bulk ..	5.01	5.06	6.25	7.45	1.17	1.34	2.34	3.42	6.18	6.60	8.39	10.85
General Cargo :—												
Break Bulk ..	1.92	1.65	1.65	1.42	0.90	1.10	1.34	1.59	2.82	2.75	2.99	3.01
Container ..		0.62	0.80	1.32		0.26	0.50	0.90		0.88	1.50	2.22
Total General ..	1.92	2.27	2.45	2.74	0.90	1.36	1.84	2.49	2.82	3.65	4.29	5.23
Total Overseas ..	14.60	17.45	21.15	25.05	2.27	3.15	4.48	6.31	16.95	20.60	25.63	32.14
COASTAL TRAFFIC												
Total Coastal ..	1.82	2.25	3.16	4.17	2.07	2.45	3.12	0.75	3.89	5.68	4.28	4.92
TOTAL TRAFFIC												
Overseas & Coastal ..	16.50	19.68	24.51	30.00	4.34	4.60	5.60	7.06	20.84	24.28	29.91	37.06

TABLE B.6A

Factory employment and total industrial employment in Greater Bombay and other districts of Maharashtra
1961 and 1971

Districts (1)	Total factory employment		Total industrial employ- ment as per census*		Column (2) as % of column (4)	Column (3) as % of column (5)
	1961	1971	1961	1971		
	(2)	(3)	(4)	(5)		
1. Greater Bombay	505,390	592,646	688,578	929,503	73.4	63.8
2. Thane	35,399	107,084	98,116	102,148	36.1	58.8
3. Kolaba	2,943	7,866	22,087	26,661	13.3	29.3
4. Ratnagiri	1,779	2,418	36,177	27,926	4.9	8.7
5. Nashik	18,128	23,358	98,664	98,720	18.4	23.7
6. Dhulia	8,775	8,101	38,106	35,387	23.0	22.8
7. Jalgaon	16,165	12,949	54,682	50,973	29.6	25.4
Bombay Division	588,579	734,422	1,036,404	1,331,438	56.8	55.8
8. Ahmednagar	18,140	21,850	72,662	65,817	25.0	33.2
9. Pune	35,361	80,302	124,722	167,691	29.3	47.9
10. Satara	6,014	7,812	33,176	39,465	11.3	19.8
11. Sangli	5,127	8,862	46,634	45,199	11.0	19.5
12. Solapur	36,804	24,485	127,972	98,786	28.8	24.8
13. Kolhapur	10,315	16,833	73,763	81,328	14.0	20.7
Pune Division	111,761	160,130	498,959	498,486	22.4	32.1
14. Aurangabad	6,303	5,687	44,213	33,613	14.3	16.8
15. Parbhani	2,673	1,383	28,664	23,049	9.3	6.6
16. Dhule	376	693	26,408	18,333	2.1	3.8
17. Handed	6,015	6,033	32,221	29,890	10.7	20.2
18. Osmanabad	1,033	1,279	33,160	27,400	3.0	4.7
Aurangabad Division	16,604	15,215	166,606	134,307	10.0	11.3
19. Buldhana	3,163	3,680	25,026	20,407	20.6	18.0
20. Akola	6,979	6,608	28,388	25,808	24.6	25.6
21. Amravati	6,879	6,619	34,344	31,143	20.0	21.3
22. Yavatmal	4,472	4,713	24,402	23,615	18.3	20.0
23. Wardha	7,416	6,409	23,792	20,133	31.2	31.8
24. Nagpur	31,298	29,268	133,701	116,818	23.1	25.3
25. Bhandara	3,671	4,928	123,236	133,617	4.6	3.7
26. Chandrapur	2,533	3,337	39,686	37,339	6.4	14.3
Nagpur Division	704,33	67,908	434,333	418,922	16.2	16.3
Maharashtra State	787,379	997,673	2,136,304	2,393,233	36.9	41.7

* This includes the unorganized sector (factories not registering) and also household industry.

Source: (1) Factory employment 1961 - Statistical Abstract (1961-62)

(2) Factory employment 1971 - Unpublished data from Directorate of Factories collected by SICOM.

(3) Total employment 1961, 1971 - Census publications.

TABLE B.65

Growth of employment in registered and unregistered sector in districts of Maharashtra.

Districts	Registered employment		Unregistered employment ^a		Total employment		Percentage Growth in Employment (1961-1971)	
	1961	1971	1961	1971	1961	1971	Registered	Unregistered
Greater Bombay	505,390	592,646	160,140	307,715	665,530	900,361	17.3 (+)	92.2 (+)
Thana	35,399	107,084	45,647	65,616	81,046	170,700	202.5 (+)	39.4 (+)
Kolaba	2,943	7,866	8,245	12,035	11,188	19,921	167.5 (+)	46.2 (+)
Ratnagiri	1,779	2,418	11,443	14,155	15,222	16,571	35.9 (+)	23.7 (+)
Nasik	18,128	23,358	44,085	54,849	62,215	78,207	100.0 (+)	24.4 (+)
Dhulia	8,775	8,101	6,763	11,804	15,538	19,905	7.7 (+)	74.5 (+)
Jalgaon	16,165	12,949	4,130	16,231	20,295	29,180	19.9 (-)	29.3 (+)
Bombay Division	588,579	754,422	280,453	480,423	869,032	1,234,845	28.2 (+)	71.3 (+)
Ahmadnagar	18,140	21,830	17,324	17,250	35,464	39,080	20.5 (+)	0.4 (-)
Poona	35,361	80,302	47,825	64,905	83,186	145,207	127.1 (+)	35.7 (+)
Satara	6,014	7,812	10,273	14,998	16,287	22,810	29.9 (+)	46.0 (+)
Bangli	5,127	8,862	9,795	20,230	14,920	29,092	72.8 (+)	106.6 (+)
Sholapur	56,804	24,485	25,462	46,983	62,266	71,468	33.5 (-)	84.5 (+)
Kolhapur	10,315	16,839	24,544	40,408	34,859	57,247	63.2 (+)	64.6 (+)
Poona Division	111,761	160,130	135,221	204,774	246,982	364,904	43.3 (+)	51.4 (+)
Aurangabad	6,305	5,687	5,970	6,764	12,275	12,451	9.8 (-)	15.3 (+)
Parbhani	2,673	1,523	4,182	5,088	6,855	6,611	43.0 (-)	21.7 (+)
Bhir	556	695	4,319	3,556	4,875	4,249	24.6 (+)	17.7 (-)
Wanded	6,815	6,033	4,369	9,649	10,384	15,682	0.3 (+)	120.9 (+)
Osmanabad	1,055	1,279	5,371	12,538	6,426	13,817	21.2 (+)	133.4 (+)
Aurangabad Division	16,604	15,215	24,211	37,598	40,815	52,810	8.4 (-)	35.3 (+)
Buldhana	5,165	3,680	4,428	6,096	9,593	9,776	28.8 (-)	37.7 (+)
Akola	6,979	6,608	8,002	9,909	14,981	16,517	5.3 (-)	23.8 (+)
Aravati	6,879	6,619	10,318	12,203	17,197	18,822	3.8 (-)	18.3 (+)
Yeotmal	4,472	4,715	5,134	6,953	9,606	11,668	5.4 (+)	35.4 (+)
wardha	7,416	6,409	4,900	6,291	12,316	12,700	13.6 (-)	28.4 (+)
Nagpur	31,298	29,568	30,079	37,539	61,377	67,107	5.5 (-)	24.8 (+)
Bhandara	5,671	4,952	8,496	22,212	14,167	27,164	12.7 (+)	161.4 (+)
Chanda	2,555	5,357	5,714	10,236	8,269	15,593	109.7 (+)	79.1 (+)
Nagpur Division	70,435	67,908	77,071	111,439	147,506	179,347	3.6 (-)	44.6 (+)
Maharashtra State	787,379	997,675	516,956	834,231	1,304,335	1,831,906	26.7 (+)	61.4 (+)

^a Excluding household industries

TABLE B.66

Number of working factories and average daily employment in major groups of industries in Maharashtra (1970)

(Figures in brackets indicate no. of units)

Industry/Category	Food	Textiles	Ferrous	Leather	Wood	Paper	Printing	Chemicals	Products of petroleum and coal	Non-metals	Basic Metals	Metal products, Machinery, Electrical machinery	Transport Equipment	Utilities	Others	Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Greater Bombay	17283 (308)	2628 (6)	275505 (605)	7007 (116)	5242 (126)	5182 (110)	12622 (266)	37732 (366)	3267 (30)	12153 (207)	11921 (217)	122792 (1467)	54955 (166)	5190 (39)	422 (734)	5624 (253)
2. Thane	2221 (66)	10 (2)	21227 (173)	1420 (10)	621 (12)	1757 (19)	176 (7)	17923 (112)	226 (5)	4600 (62)	5226 (35)	22445 (225)	2722 (17)	1722 (15)	5799 (66)	2622 (254)
3. Kolaba	622 (21)	213 (2)	22 (2)	-	-	622 (5)	62 (3)	1222 (12)	-	222 (6)	1212 (2)	1222 (12)	213 (5)	212 (6)	22 (2)	622 (2)
4. Botmangal	1122 (15)	22 (1)	7 (1)	-	12 (1)	-	17 (1)	-	-	22 (2)	-	22 (2)	112 (12)	222 (2)	-	222 (2)
5. Nashik	1722 (122)	-	1222 (2)	-	22 (2)	22 (1)	222 (11)	222 (6)	22 (2)	222 (21)	122 (2)	222 (21)	122 (12)	222 (2)	222 (12)	1222 (252)
6. Solapur	2222 (125)	-	2222 (2)	22 (2)	-	22 (1)	-	-	-	122 (7)	-	-	222 (7)	22 (1)	222 (12)	2222 (172)
7. Jalgaon	2222 (22)	22 (2)	2222 (2)	22 (1)	-	222 (2)	22 (2)	222 (2)	-	222 (12)	22 (2)	-	222 (2)	222 (2)	222 (2)	2222 (122)
Bombay Division	27222 (722)	2122 (2)	272222 (622)	2222 (122)	2122 (122)	2722 (122)	2222 (222)	27222 (222)	222 (22)	22222 (222)	22222 (222)	272222 (1222)	22222 (222)	2222 (22)	22222 (222)	272222 (1222)
8. Ahmednagar	2222 (22)	1222 (12)	2222 (2)	22 (1)	-	-	22 (2)	222 (2)	-	222 (12)	22 (2)	222 (2)	222 (2)	22 (1)	222 (22)	2222 (222)
9. Pune	2222 (21)	1222 (12)	2222 (2)	222 (7)	222 (2)	222 (12)	2222 (22)	2222 (22)	222 (2)	2222 (22)	2222 (22)	22222 (222)	2222 (22)	222 (2)	2222 (22)	22222 (222)
10. Satara	2222 (11)	22 (1)	22 (1)	-	-	22 (1)	22 (2)	222 (2)	-	2222 (12)	22 (1)	2222 (11)	2222 (11)	222 (2)	2222 (12)	2222 (22)
11. Sangli	1222 (2)	22 (2)	2222 (2)	22 (2)	-	22 (1)	22 (7)	222 (2)	-	222 (2)	222 (2)	2222 (22)	222 (2)	22 (1)	222 (2)	2222 (22)
12. Shalapur	2222 (2)	2222 (2)	22222 (122)	222 (2)	222 (2)	-	222 (7)	222 (1)	222 (1)	222 (2)	222 (2)	2222 (22)	2222 (12)	222 (2)	2222 (22)	22222 (222)
13. Kolhapur	2222 (2)	-	2222 (12)	22 (1)	222 (2)	-	222 (2)	222 (2)	-	222 (2)	222 (2)	2222 (22)	2222 (12)	222 (2)	2222 (22)	22222 (222)
Pune Division	27222 (22)	27222 (22)	272222 (222)	2222 (22)	2222 (22)	2722 (12)	2222 (22)	27222 (222)	222 (22)	22222 (222)	22222 (222)	272222 (2222)	22222 (222)	2222 (22)	22222 (222)	272222 (2222)
14. Amravathi	2222 (2)	222 (12)	222 (2)	-	-	222 (1)	222 (2)	222 (1)	-	222 (2)	222 (2)	2222 (22)	2222 (22)	222 (2)	2222 (22)	22222 (222)
15. Parbhani	222 (12)	-	-	-	-	-	-	-	-	222 (2)	222 (2)	2222 (22)	2222 (22)	222 (2)	2222 (22)	22222 (222)
16. Akur	222 (12)	222 (12)	-	-	-	-	-	-	-	-	-	222 (1)	222 (1)	-	2222 (22)	22222 (222)
17. Beed	222 (12)	-	2222 (2)	-	-	-	-	-	-	-	-	-	-	-	2222 (2)	22222 (222)
18. Chandrapur	222 (12)	-	222 (2)	-	-	222 (2)	222 (2)	-	-	222 (2)	-	-	-	-	2222 (2)	22222 (222)

TABLE B.66

Number of working factories and average daily employment in major groups of industries for districts in Maharashtra (1970)

(Figures in brackets indicate no. of units)

District/ Category	Food	Tobacco	Fertiliser	Leather	Wood	Paper	Printing	Chemicals	Products of petro- leum and coal.	Non- metals	Basic Metals	Metal products, Machinery, Electrical machines.	Transport Equipment	Utili- ties.	Others	Total	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Greater Bombay	17325 (506)	2602 (6)	877705 (607)	7007 (116)	9412 (186)	2122 (110)	19620 (456)	37732 (562)	3867 (30)	22155 (207)	12921 (217)	102799 (1467)	54951 (166)	3190 (39)	4000 (73)	5684 (497)	
2. Thane	2621 (66)	20 (0)	21087 (175)	1220 (10)	621 (10)	1737 (12)	176 (7)	17955 (122)	206 (5)	4600 (62)	5896 (75)	20445 (225)	2752 (17)	1728 (15)	5799 (66)	96601 (85)	
3. Kolaba	609 (31)	245 (2)	20 (2)	-	-	699 (5)	62 (5)	1205 (10)	-	722 (6)	1022 (8)	1025 (10)	215 (5)	210 (6)	20 (2)	6656 (86)	
4. Santacruz	1122 (15)	36 (1)	7 (1)	-	15 (1)	-	17 (1)	-	-	105 (8)	-	35 (5)	210 (10)	236 (2)	-	2087 (25)	
5. Vashi	3799 (102)	-	1062 (25)	-	96 (5)	9 (1)	923 (11)	332 (6)	22 (2)	337 (21)	122 (2)	226 (21)	1765 (12)	225 (5)	638 (19)	12262 (250)	
6. Ulhas	2012 (125)	-	2260 (2)	13 (1)	-	2 (1)	-	-	-	105 (7)	-	-	229 (7)	16 (1)	350 (12)	2722 (172)	
7. Jalgaon	2022 (28)	122 (2)	3799 (5)	2 (1)	-	122 (2)	2 (1)	332 (7)	-	222 (11)	122 (5)	-	332 (5)	272 (6)	372 (2)	2272 (122)	
Amber Division	5792 (75)	312 (15)	26226 (22)	222 (122)	622 (150)	722 (122)	2622 (462)	3722 (52)	222 (27)	2222 (32)	2222 (22)	12222 (1222)	6222 (222)	622 (22)	2222 (222)	7122 (222)	
8. Ahmednagar	662 (2)	1227 (12)	22 (2)	27 (1)	-	-	122 (6)	22 (2)	-	22 (2)	22 (5)	22 (5)	22 (7)	2 (1)	22 (2)	2222 (222)	
9. Pune	2222 (2)	122 (19)	222 (2)	222 (7)	622 (25)	722 (12)	3222 (22)	2222 (32)	222 (2)	2222 (22)	2222 (22)	3222 (222)	2222 (22)	222 (2)	2222 (22)	2222 (222)	
10. Satara	222 (1)	2 (1)	22 (1)	-	-	22 (1)	22 (6)	22 (1)	-	2222 (10)	22 (1)	222 (11)	222 (11)	22 (2)	22 (10)	2222 (222)	
11. Solapur	2222 (2)	22 (2)	2222 (15)	22 (2)	-	22 (1)	222 (7)	22 (2)	-	222 (20)	22 (2)	2222 (22)	222 (22)	22 (1)	222 (7)	2222 (222)	
12. Sholapur	2222 (2)	222 (2)	2222 (12)	22 (1)	22 (5)	-	222 (7)	22 (1)	-	222 (2)	22 (2)	2222 (22)	222 (22)	22 (1)	222 (7)	2222 (222)	
13. Kolhapur	2222 (2)	-	2222 (12)	22 (1)	22 (5)	-	222 (7)	22 (1)	-	222 (2)	22 (2)	2222 (22)	222 (22)	22 (1)	222 (7)	2222 (222)	
Yashwantrao Chavan Division	2222 (2)	2222 (2)	2222 (2)	222 (2)	222 (2)	222 (2)	2222 (2)	2222 (2)	222 (2)	2222 (2)	2222 (2)	2222 (2)	2222 (2)	222 (2)	2222 (2)	2222 (2)	
14. Amravati	2222 (2)	222 (2)	222 (2)	-	-	222 (2)	222 (2)	222 (2)	-	222 (2)	222 (2)	2222 (2)	222 (2)	222 (2)	2222 (2)	2222 (2)	
15. Parbhani	222 (2)	-	-	-	-	222 (2)	-	-	-	222 (2)	222 (2)	222 (2)	222 (2)	-	2222 (2)	2222 (2)	
16. Bidar	222 (2)	22 (2)	-	-	-	-	-	-	-	-	-	222 (2)	222 (2)	-	2222 (2)	2222 (2)	
17. Beed	222 (2)	-	222 (2)	-	222 (2)	-	-	222 (2)	-	-	-	222 (2)	222 (2)	-	2222 (2)	2222 (2)	
18. Osmanabad	222 (2)	-	222 (2)	-	-	222 (2)	-	-	-	-	-	222 (2)	222 (2)	-	2222 (2)	2222 (2)	

TABLE B-66 (Continued)

Districts/ Category.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	Total
<u>Surrogate Division</u>	4406 (104)	929 (16)	4266 (15)	-	26 (2)	47 (2)	314 (5)	88 (2)	-	277 (2)	64 (1)	424 (12)	322 (15)	34 (2)	4597 (72)	16146 (252)
19. Balasore	509 (5)	74 (1)	-	-	-	-	27 (2)	28 (2)	-	21 (1)	110 (1)	-	150 (2)	-	3690 (97)	4627 (84)
20. Akola	201 (2)	-	276 (2)	-	21 (5)	-	21 (2)	-	10 (1)	116 (5)	-	66 (2)	275 (5)	322 (1)	2732 (57)	7588 (102)
21. Amravati	1045 (27)	50 (1)	1770 (5)	-	17 (5)	-	24 (2)	36 (1)	2 (2)	-	11 (1)	44 (1)	117 (2)	-	3874 (45)	7022 (88)
22. Yavatmal	94 (5)	121 (2)	-	-	51 (5)	-	24 (2)	-	-	221 (11)	-	-	92 (2)	53 (1)	4676 (88)	5277 (75)
23. Wardha	739 (9)	-	4732 (5)	-	-	-	21 (2)	-	-	-	-	-	24 (5)	27 (1)	1617 (20)	6617 (57)
24. Nagpur	1590 (40)	1562 (6)	12504 (11)	12 (1)	1685 (34)	123 (5)	2327 (55)	258 (1)	32 (5)	1609 (27)	265 (10)	1315 (45)	2220 (19)	226 (6)	1122 (24)	28534 (33)
25. Bhandara	647 (27)	2227 (26)	-	-	47 (2)	12 (1)	223 (2)	125 (7)	-	22 (2)	276 (5)	125 (2)	54 (1)	-	26 (2)	4729 (174)
26. Chandrapur	226 (11)	220 (2)	-	-	220 (6)	2290 (2)	-	24 (2)	-	1994 (15)	-	13 (2)	-	222 (1)	255 (5)	3554 (42)
<u>Surrogate Division</u>	5127 (214)	4272 (66)	21222 (23)	12 (1)	1927 (35)	2422 (6)	2222 (5)	222 (2)	42 (5)	4227 (26)	1222 (17)	1222 (66)	2275 (26)	1715 (7)	12272 (242)	62722 (965)
<u>Maharashtra State</u>	64475 (1377)	34261 (305)	212467 (1256)	2222 (149)	2225 (377)	11225 (162)	24222 (622)	24225 (372)	2222 (51)	27222 (572)	27222 (242)	172222 (2122)	72222 (262)	27222 (102)	242222 (1572)	251222 (2222)

Source: Bureau of Economic and Statistics, Govt. of Maharashtra.

TABLE 2.67

GROWTH IN FACTORY EMPLOYMENT IN DISTRICTS OF MAHARASHTRA (1961-1970)

Districts/ Employment.	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Greater Bombay	5,07,396 (406)	5,22,868 (4326)	5,32,309 (4509)	5,72,738 (4666)	5,72,447 (4655)	5,32,678 (4490)	5,36,357 (4478)	5,39,005 (4571)	5,31,957 (4831)	5,60,490 (4953)
Thane	35,399 (495)	30,080 (514)	45,568 (534)	52,710 (575)	60,050 (674)	66,508 (707)	71,575 (700)	79,519 (769)	88,947 (825)	96,608 (854)
Kolaba	2,945 (76)	3,395 (77)	4,164 (80)	4,186 (70)	4,675 (81)	4,681 (82)	4,810 (85)	5,555 (81)	6,091 (85)	6,696 (86)
Baungir	1,779 (56)	1,787 (58)	1,647 (59)	1,966 (57)	2,132 (45)	2,055 (50)	2,204 (57)	2,008 (57)	2,508 (45)	2,009 (45)
North	18,128 (315)	19,564 (302)	20,579 (300)	21,706 (301)	21,075 (301)	19,961 (301)	20,054 (275)	21,175 (301)	21,581 (306)	16,360 (350)
South	2,775 (178)	2,844 (204)	2,855 (194)	2,902 (125)	2,449 (200)	2,446 (194)	2,826 (170)	2,540 (184)	2,798 (184)	2,780 (178)
Jalgaon	16,165 (225)	14,679 (211)	14,508 (256)	14,988 (249)	15,109 (255)	12,228 (206)	12,754 (169)	12,047 (170)	11,600 (158)	12,700 (159)
Bombay Division :	5,80,579 (5385)	6,10,129 (5782)	6,47,084 (5911)	6,76,076 (6094)	6,85,955 (6197)	6,05,325 (6005)	6,75,440 (5995)	6,66,387 (6005)	6,35,308 (6460)	7,11,040 (6922)
Ahmadnagar	18,140 (252)	18,704 (255)	20,805 (285)	21,155 (270)	21,268 (260)	18,558 (222)	19,159 (255)	19,496 (255)	20,506 (257)	20,518 (252)
Pune	35,361 (716)	39,799 (816)	45,188 (891)	51,225 (850)	55,876 (895)	55,380 (797)	60,059 (906)	61,712 (804)	60,471 (862)	74,812 (891)
Satara	6,014 (66)	6,510 (82)	6,942 (82)	5,158 (90)	7,671 (95)	7,619 (80)	8,016 (60)	7,504 (60)	7,665 (66)	8,022 (66)
Sangli	5,127 (85)	5,620 (82)	6,126 (84)	6,755 (89)	7,448 (97)	7,960 (105)	7,852 (99)	8,145 (90)	8,649 (111)	8,804 (134)
Sholapur	36,804 (324)	34,885 (358)	31,100 (355)	30,457 (357)	29,575 (355)	27,826 (310)	28,089 (304)	26,008 (309)	25,118 (298)	26,156 (355)
Kolhapur	10,515 (315)	10,170 (300)	10,686 (354)	11,874 (342)	13,057 (358)	14,492 (359)	15,732 (358)	15,965 (366)	16,668 (366)	16,675 (370)
Poona Division :	1,11,761 (1744)	1,15,048 (1519)	1,22,845 (2051)	1,26,622 (1970)	1,34,887 (2040)	1,32,009 (1881)	1,38,887 (2027)	1,38,680 (1864)	1,46,977 (1954)	1,54,121 (2046)
Aurangabad	6,505 (104)	6,040 (96)	6,004 (101)	6,444 (101)	5,910 (122)	5,658 (99)	4,868 (94)	4,854 (105)	5,185 (109)	5,402 (114)
Parbhani	2,675 (50)	2,412 (53)	2,400 (48)	2,740 (54)	2,732 (47)	3,087 (44)	2,844 (46)	2,755 (46)	2,855 (48)	2,850 (46)
Bhir	596 (25)	644 (26)	541 (24)	662 (25)	786 (55)	476 (22)	458 (20)	696 (24)	751 (24)	728 (24)
Nanded	6,015 (42)	5,589 (40)	4,527 (37)	5,204 (56)	5,787 (42)	5,394 (51)	5,521 (39)	5,704 (42)	6,232 (45)	5,915 (42)
Osmanabad	1,055 (20)	1,111 (25)	875 (25)	1,041 (24)	1,099 (27)	824 (21)	862 (20)	1,514 (20)	1,886 (24)	1,765 (26)
Aurangabad Division :	16,604 (241)	15,796 (240)	14,545 (255)	16,171 (255)	16,274 (220)	15,451 (217)	14,605 (218)	15,605 (239)	17,205 (240)	16,146 (222)
Buldhan	5,165 (55)	5,255 (62)	5,546 (66)	5,227 (62)	4,529 (67)	4,155 (60)	4,700 (67)	4,481 (61)	4,758 (57)	4,607 (64)
Akola	6,979 (85)	6,078 (89)	7,888 (87)	8,551 (88)	6,252 (89)	5,550 (78)	5,765 (85)	6,620 (89)	7,666 (95)	7,388 (102)
Amravati	6,879 (77)	6,505 (80)	7,525 (82)	7,826 (82)	8,244 (89)	6,781 (90)	6,511 (91)	6,865 (88)	7,355 (80)	7,022 (80)
Tootmal	4,478 (52)	4,699 (65)	5,550 (69)	5,190 (71)	5,595 (71)	7,649 (79)	4,976 (69)	4,818 (64)	5,504 (71)	5,257 (75)
Yardha	7,416 (40)	7,256 (40)	7,228 (57)	7,715 (56)	5,852 (59)	5,962 (46)	5,521 (44)	6,550 (44)	6,669 (59)	6,657 (57)
Nagpur	31,298 (329)	29,745 (326)	31,650 (355)	30,948 (360)	29,285 (354)	29,524 (376)	28,064 (365)	27,675 (368)	27,605 (368)	28,554 (325)
Bhandara	5,671 (121)	5,045 (121)	5,648 (155)	5,180 (127)	4,505 (166)	4,832 (162)	4,970 (120)	5,150 (170)	4,967 (170)	4,789 (175)
Chand	2,555 (50)	2,971 (48)	2,911 (45)	3,505 (46)	3,557 (50)	4,097 (51)	4,179 (45)	4,189 (45)	4,470 (42)	5,554 (42)
Nagpur Division :	70,455 (865)	69,324 (821)	75,706 (914)	75,714 (942)	64,197 (955)	60,576 (942)	64,822 (946)	66,564 (950)	69,614 (920)	69,788 (965)
Maharashtra State :	7,87,579 (8255)	8,10,297 (8762)	8,50,780 (9050)	8,95,545 (9207)	9,05,295 (9472)	8,79,541 (9045)	8,95,822 (9186)	8,97,174 (9116)	9,27,098 (9570)	9,51,625 (9205)

Source : Statistical Abstract of Maharashtra State.

TABLE B.67

GROWTH IN FACTORY EMPLOYMENT IN DISTRICTS OF MAHARASHTRA (1961-1970)

Districts/ Employment	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970
Greater Bombay	5,05,390 (406)	5,22,868 (4362)	5,38,389 (4509)	5,72,738 (4626)	5,78,447 (4655)	5,76,678 (4490)	5,56,357 (4478)	5,39,005 (4571)	5,31,957 (4631)	5,66,498 (4955)
Thane	35,599 (495)	38,820 (514)	45,568 (534)	50,710 (575)	60,050 (676)	66,502 (727)	71,575 (788)	79,319 (769)	88,947 (885)	96,604 (954)
Kolaba	2,945 (76)	3,555 (77)	4,164 (80)	4,186 (70)	4,675 (81)	4,681 (82)	4,810 (85)	5,555 (84)	6,051 (85)	6,656 (86)
Bhatnagar	1,779 (56)	1,787 (58)	1,647 (59)	1,566 (512)	2,132 (45)	2,075 (58)	2,204 (57)	2,088 (59)	2,588 (65)	2,889 (65)
Masik	18,128 (515)	19,564 (502)	20,375 (508)	21,706 (512)	21,075 (501)	19,961 (261)	20,934 (275)	21,175 (505)	21,201 (506)	16,260 (250)
Bhamburda	8,775 (170)	9,244 (204)	9,235 (194)	8,928 (185)	8,449 (200)	8,446 (194)	8,386 (170)	7,348 (152)	7,798 (164)	8,788 (170)
Jalgaon	16,165 (225)	16,659 (261)	16,508 (256)	16,588 (249)	17,109 (255)	12,228 (206)	12,754 (169)	12,807 (170)	14,680 (152)	12,748 (158)
Bombay Division	5,88,579 (5585)	6,10,129 (5722)	6,47,884 (5912)	6,76,876 (6094)	6,85,955 (6197)	6,65,325 (6005)	6,75,448 (5995)	6,66,287 (6085)	6,55,502 (6468)	7,11,648 (6548)
Ahmednagar	18,140 (238)	18,704 (255)	20,805 (285)	21,355 (270)	21,262 (260)	18,552 (222)	19,159 (255)	19,496 (255)	20,386 (257)	20,318 (252)
Poona	35,561 (716)	39,759 (816)	45,188 (891)	51,225 (850)	55,876 (895)	55,580 (797)	60,079 (904)	61,712 (904)	60,471 (862)	74,012 (891)
Satara	6,014 (66)	6,510 (82)	6,942 (82)	7,158 (90)	7,671 (95)	7,619 (80)	8,016 (96)	7,564 (62)	7,665 (60)	8,098 (66)
Sangli	5,127 (85)	5,680 (92)	6,126 (94)	6,755 (89)	7,448 (97)	7,960 (105)	7,952 (99)	8,145 (90)	8,649 (111)	9,084 (124)
Shelgaon	36,804 (324)	34,225 (355)	37,100 (385)	36,457 (352)	29,575 (355)	27,826 (318)	28,089 (304)	26,028 (290)	25,118 (290)	26,156 (355)
Kolhapur	10,515 (515)	10,170 (520)	10,606 (534)	11,874 (542)	15,057 (538)	14,458 (559)	15,752 (549)	15,565 (550)	16,668 (566)	18,675 (570)
Poona Division	1,11,761 (1744)	1,15,048 (1919)	1,22,845 (2051)	1,26,602 (1978)	1,34,887 (2040)	1,32,009 (1881)	1,58,887 (2027)	1,58,680 (1864)	1,46,977 (1554)	1,54,121 (2046)
Aurangabad	6,505 (104)	6,040 (96)	6,004 (101)	6,444 (101)	5,910 (122)	5,650 (99)	4,868 (94)	4,954 (105)	5,485 (111)	5,488 (111)
Parbhani	2,673 (50)	2,412 (55)	2,400 (48)	2,740 (47)	2,752 (54)	3,087 (44)	2,944 (45)	2,755 (46)	2,855 (48)	2,250 (46)
Bhir	556 (25)	644 (26)	541 (24)	668 (25)	786 (35)	476 (22)	458 (20)	696 (24)	721 (24)	728 (24)
Nanded	6,015 (40)	5,989 (40)	4,927 (37)	5,284 (36)	5,747 (42)	5,594 (51)	5,521 (59)	5,784 (42)	6,252 (45)	5,915 (42)
Amalgaon	1,055 (20)	1,111 (25)	875 (25)	1,041 (24)	1,099 (27)	824 (21)	862 (20)	1,214 (21)	1,286 (24)	1,765 (26)
Aurangabad Division	16,604 (841)	15,796 (240)	16,545 (255)	16,171 (255)	16,276 (200)	15,451 (217)	14,605 (218)	15,605 (259)	17,205 (248)	16,146 (222)
Buldhana	5,165 (55)	5,255 (62)	5,646 (66)	5,027 (67)	4,529 (67)	4,155 (60)	4,700 (67)	4,421 (61)	4,758 (57)	4,627 (64)
Akola	6,979 (85)	8,072 (89)	7,888 (87)	8,551 (88)	6,252 (79)	5,558 (78)	5,765 (85)	6,620 (89)	7,666 (95)	7,588 (102)
Amravati	6,879 (77)	6,505 (80)	7,525 (82)	7,826 (82)	8,244 (89)	6,781 (90)	6,511 (81)	6,865 (88)	7,855 (80)	7,022 (88)
Yeratol	4,472 (58)	4,699 (65)	5,350 (69)	5,190 (71)	5,555 (71)	7,649 (79)	4,974 (69)	4,818 (64)	5,584 (71)	5,357 (75)
Wardha	7,416 (40)	7,856 (40)	7,288 (37)	7,715 (56)	5,852 (59)	5,968 (46)	5,921 (46)	6,550 (44)	6,669 (59)	6,677 (57)
Nagpur	31,298 (329)	29,745 (326)	31,650 (355)	30,942 (360)	29,285 (354)	29,524 (376)	28,064 (505)	27,675 (568)	27,685 (568)	28,554 (505)
Bhandara	5,671 (101)	5,045 (101)	5,648 (105)	5,180 (107)	4,525 (166)	4,252 (166)	4,978 (180)	5,190 (175)	4,967 (170)	4,789 (175)
Chandrapur	2,555 (58)	2,971 (60)	2,911 (65)	3,505 (66)	3,957 (50)	4,077 (51)	4,179 (45)	4,189 (45)	4,470 (42)	5,554 (42)
Nagpur Division	70,459 (865)	69,384 (881)	75,706 (914)	75,714 (942)	68,197 (955)	68,978 (942)	64,892 (946)	66,564 (950)	69,414 (920)	69,788 (965)
Maharashtra State	7,87,379 (8255)	8,10,497 (8768)	8,58,780 (9090)	8,95,565 (9207)	9,05,255 (9472)	8,79,541 (9045)	8,95,822 (9186)	8,87,174 (9116)	9,27,098 (9570)	9,51,625 (9805)

Source: Statistical Abstract of Maharashtra State.

TABLE 8.62
Distribution of factory employment and working factories according to different employment size groups
in districts of Maharashtra 1970.

(Figures in the bracket indicate number of factories)

Districts	Employment size classes								
	1-9 (1)	10-19 (2)	20-49 (3)	50-99 (4)	100-499 (5)	500-999 (6)	1000-4999 (7)	5000 and above (8)	Total (9)
Greater Bombay	4661 (667)	20126 (1470)	43266 (1393)	44147 (639)	121061 (502)	56090 (80)	104134 (07)	95003 (15)	368470 (4935)
Thana	394 (64)	2430 (189)	8110 (277)	9880 (149)	30891 (136)	17458 (25)	27450 (14)	-	96601 (054)
Kolaba	91 (15)	265 (19)	890 (29)	680 (10)	2360 (10)	2410 (5)	-	-	6496 (86)
Ratnagiri	23 (5)	129 (10)	517 (17)	458 (8)	962 (5)	-	-	-	2009 (43)
Nasik	515 (45)	1222 (95)	2253 (74)	1017 (16)	2657 (14)	2456 (5)	8366 (5)	-	16268 (230)
Dhule	60 (8)	1407 (102)	1238 (40)	946 (15)	1641 (11)	-	3496 (2)	-	8700 (170)
Jalgaon	164 (22)	858 (61)	1921 (63)	1946 (25)	4214 (24)	1494 (2)	2177 (1)	-	12748 (190)
Bombay Division	9708 (824)	26411 (1946)	58177 (1895)	59014 (862)	163786 (782)	79936 (113)	223615 (107)	95003 (15)	711648 (6542)
Ahmednagar	80 (10)	225 (16)	2702 (75)	5910 (84)	8206 (42)	3195 (5)	-	-	20318 (232)
Poona	956 (155)	3585 (265)	7453 (242)	7070 (101)	21015 (101)	10702 (19)	23267 (14)	-	74012 (891)
Satara	41 (6)	241 (16)	814 (25)	774 (11)	1819 (6)	-	4409 (2)	-	8090 (66)
Sangli	140 (20)	475 (35)	1463 (50)	1068 (15)	680 (4)	1178 (2)	3880 (2)	-	8084 (134)
Sholapur	685 (92)	1781 (125)	2156 (67)	2385 (32)	4650 (26)	4578 (7)	10183 (4)	-	26136 (355)
Kolhapur	370 (52)	1947 (153)	3029 (118)	1628 (23)	5146 (15)	5445 (8)	1110 (1)	-	16673 (370)
Poona Division	2190 (355)	8254 (608)	17577 (585)	18855 (266)	39520 (194)	24896 (37)	42849 (23)	-	154121 (2046)
Aurangabad	90 (14)	540 (38)	970 (28)	1501 (21)	1847 (12)	532 (1)	-	-	5482 (114)
Parbhani	49 (6)	95 (7)	590 (17)	705 (10)	821 (6)	-	-	-	2258 (46)
Bhilsa	40 (7)	75 (6)	809 (6)	269 (4)	135 (1)	-	-	-	728 (24)
Handri	47 (7)	140 (11)	296 (9)	657 (9)	1212 (5)	-	3573 (1)	-	5912 (42)
Osmanabad	34 (6)	97 (7)	170 (5)	200 (5)	1264 (5)	-	-	-	1769 (26)
Ahmednagar Division	260 (40)	955 (69)	2235 (65)	3314 (47)	5279 (25)	552 (1)	3573 (1)	-	16146 (252)
Mulshani	87 (3)	126 (9)	222 (17)	1536 (19)	2676 (16)	-	-	-	4687 (64)
Akola	87 (14)	390 (29)	854 (29)	1808 (16)	1789 (11)	302 (1)	2478 (2)	-	7388 (102)
Ahmednagar	80 (12)	374 (26)	518 (16)	865 (12)	3891 (21)	-	1554 (1)	-	7082 (80)
Yavatmal	35 (6)	149 (10)	764 (25)	1014 (14)	2275 (16)	-	-	-	5237 (75)
Wardha	4 (1)	73 (5)	365 (11)	698 (9)	1005 (6)	-	4532 (3)	-	6637 (37)
Nagpur	826 (116)	1619 (127)	2355 (72)	2078 (31)	5998 (29)	3700 (5)	6096 (2)	3706 (1)	28574 (385)
Bhandara	408 (73)	309 (25)	1337 (38)	1555 (23)	302 (5)	-	-	-	4789 (174)
Chandrapur	46 (8)	159 (11)	407 (11)	410 (5)	1126 (5)	-	5406 (2)	-	5554 (42)
Nagpur Division	1513 (233)	3395 (252)	7122 (219)	9118 (129)	20742 (115)	4282 (6)	17830 (10)	3706 (1)	69708 (965)
Maharashtra State	2671 (1432)	39103 (2875)	85111 (2760)	90881 (1304)	229327 (1118)	109646 (157)	287865 (141)	100709 (16)	931623 (5005)

Source: Bureau of Economics and Statistics, Government of Maharashtra

TABLE 3.69
SALES AND SALES TAX IN GREATER BOMBAY AND MAHARASHTRA.
1968-69

Sr. No.	Item	Region	
		Greater Bombay	Maharashtra
1.	Total number of registered dealers	60,781	1,08,435
2.	Total sales turnover (Rs. in lacs)	4,54,131	6,42,639
3.	Export to other states and countries (Rs. in lacs)	1,22,375	1,36,968
4.	Sales tax payable (Rs. in lacs)	9,438	11,334
5.	Sales tax paid (Rs. in lacs)	8,128	10,645
6.	Turnover per dealer (Rs. in lacs)	7.47	5.93
7.	Export per dealer (Rs. in lacs)	2.01	1.26
8.	Sales tax payable per dealer (Rs. in lacs)	0.16	0.10
9.	Sales tax paid per dealer (Rs. in lacs)	0.13	0.10

Source : Sales Tax Survey - Maharashtra State (1968-69) --

Bureau of Economics and Statistics - Maharashtra State.

Note : 1) The survey figures are provisional.

2) The figures for number of registered dealers and sales tax paid are actual, all other figures are estimated from a sample of 5000 dealers (Sales Tax Survey).

TABLE S.70

FISH CATCH IN BOMBAY METROPOLITAN AREA.

1971-72

Centre	Number of Boats in Operation			Annual Fish Catch (Metric Tonnes)
	Mechanised	Non-Mechanised		
		Plank built	Canoe	
1. Greater Bombay	848	269	400	80,476
2. Waghivali	-	1	4	51
3. Uran	-	-	6	35
4. Mora	-	10	25	419
5. Karanja	46	22	32	3,384
TOTAL ...	894	302	467	84,365

Source : Department of Fisheries, Government of Maharashtra

Note : Fish catch at centres Panvel, Sheva and Gavan is negligible.

TABLE S.71

SALT PRODUCTION

1972.

<u>Sr. No.</u>	<u>Centre</u>	<u>Area (sq.kms.)</u>	<u>Annual Production (Metric Tonnes)</u>
1.	Greater Bombay	17.81	81,060
2.	New Bombay		
	a) Panvel	0.14	1,200
	b) Uran, Sheva, Karanja	19.97	1,49,553
	c) Sarsole - Shahabaj	8.78	40,300
	Sub total (New Bombay)	28.89	1,91,053
3.	Bhayandar - Rai (Outside Greater Bombay)	14.03	91,177
	Total in the area	89.62	5,54,343

Source : Salt Commissioner's Office, Bombay.

TABLE 8.72

DISTRIBUTION OF LAND UNDER PRINCIPAL USES IN 103 CITIES AND TOWNS OF INDIA.

(Area in acres)

Sr. No.	Population range	Number of cities and towns to which data relate	Population	Total area	Agricultural or undeveloped area	Developed area	Percent of developed area to total	Developed Area under Various Uses						
								Residential	Commercial	Industrial	Public & semi-public	Parks & playgrounds	Roads and streets	Others
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1.	10 lakh and above	5	1,02,90,996	14,47,467	58,088	1,06,579	74.0	59,921 (57.53)	3,608 (3.59)	6,705 (6.34)	18,445 (17.35)	6,561 (6.17)	17,577 (16.92)	13,524 (12.72)
2.	5 lakh to 10 lakh	4	28,94,349	1,01,523	46,763	54,762	53.9	21,067 (38.47)	1,581 (2.52)	3,147 (5.75)	5,516 (10.07)	2,698 (4.95)	4,887 (12.60)	16,066 (29.35)
3.	2 lakh to 5 lakh	8	22,78,577	78,372	24,259	54,113	69.0	26,469 (48.91)	1,953 (3.57)	3,275 (6.05)	6,892 (12.75)	1,325 (2.45)	6,514 (12.04)	7,703 (14.25)
4.	1 lakh to 2 lakh	18	24,90,685	1,25,051	53,919	71,132	56.9	39,594 (55.66)	1,947 (2.74)	3,782 (5.32)	6,944 (9.76)	1,782 (2.79)	8,662 (12.18)	5,378 (7.56)
5.	Class I	35	1,90,86,779	4,49,415	1,63,029	2,86,886	63.7	1,27,051 (44.36)	8,869 (3.10)	16,947 (5.92)	37,797 (13.20)	12,566 (4.43)	37,640 (13.32)	42,675 (14.90)
5.	50,000 to 1,00,000 (Class II)	24	16,61,170	81,579	40,568	40,811	50.1	22,672 (55.55)	1,258 (3.08)	1,832 (4.54)	3,391 (8.31)	945 (2.31)	4,604 (11.28)	6,089 (14.95)
6.	20,000 to 50,000 (Class III)	31	10,87,642	64,854	32,144	32,710	50.4	18,664 (57.06)	988 (3.02)	1,705 (5.21)	2,277 (6.95)	732 (2.24)	3,783 (11.57)	4,501 (13.76)
7.	Less than 20,000	13	1,63,937	27,407	20,561	6,446	23.5	3,458 (53.65)	173 (2.68)	448 (6.95)	532 (8.25)	101 (1.57)	691 (10.72)	1,043 (16.18)
8.	All Classes	103	2,20,01,528	6,25,055	2,56,702	3,66,553	58.8	1,71,043 (46.93)	11,288 (3.08)	20,950 (5.72)	43,977 (12.01)	14,204 (3.95)	46,720 (12.55)	54,306 (14.82)

Source : Land Use Patterns of India's Cities and Towns - Town & Country Planning Organisation
Published in Journal of Public Administration, July-Sept., 1968.

Note : Columns 9 to 15, figures in brackets indicate percentage to total.

GLOSSARY OF TERMS

1. Agarbati - Perfumed smokestick
2. APM - Agricultural Produce Market
3. Bal Wadi - Kindergarten
4. Barve Committee - Study Group on Greater Bombay, set up in 1958, under the Chairmanship of Shri S.G.Barve
5. B & C Department - Buildings and Communications Department
6. B.D.O. - Block Development Officer
7. B.E.S.T. - Bombay Electric Supply and Transport Undertaking
8. B.G. - Broad gauge, 1.68 M the usual gauge for main line railway track in India
9. Bhore Committee - Committee constituted by the Government of India in 1943 to determine standards for Health Services
10. Block - A unit in the Community Development Programme
11. B.M.C. - Bombay Municipal Corporation
12. Bombay Metropolitan Region (B.M.R.) - The region delineated by the State Government covering an area of about 3,965 sq. kms. around Bombay
13. BMRPA - Bombay Metropolitan Regional Planning Area
14. BMRPB - Bombay Metropolitan Regional Planning Board
15. B.P.T. - Bombay Port Trust
16. Busways - Road lines reserved for buses only.
17. CBD - Central Business District
18. CBNM - Central Battery Non-multiple Manual Telephone Exchange
19. CHC - Community Health Centre
20. Churchgate - Southern Terminus of Western Railway for commuter service
21. CPHERI - Central Public Health Engineering Research Institute
22. Crore - 10 million; 10,000,000
23. CWPRS - Central Water & Power Research Station

24. DGCA - Director General of Civil Aviation
25. D.W.T. - Dead Weight Tonne
26. EPZ - Export Processing Zone
27. ESIS - Employees' State Insurance Scheme
28. FSI - Floor Space Index
29. Gadgil Committee - Committee constituted by the State Government, in 1965, to suggest broad strategies for planning of Bombay-Panvel and Poona Regions
30. Gaathan - Village Community
31. GB - Greater Bombay
32. Ghat, Third Ghat - The hill ranges of Sahyadri along the Western Coast of India are known as Ghats and the same word is used for road and railways crossing over these hills. At present only two railroads pass through these Ghats; a third crossing, or Third Ghat, is proposed
33. GP - General Practitioner
34. HT - High Tension
35. HUDCO - Housing and Urban Development Corporation Ltd.
36. IAAI - International Airports Authority of India
37. ICS - Indian Civil Service
38. Is. - Island
39. IS:950/1970 - Indian Standard Specification serial number 950 formulated in 1970
40. ITI - Industrial Training Institute
41. Km., km., - Kilometre
42. K.P.H. - Kilometre per hour
43. Kutaha - Temporary
44. KV - Kilo Volts
45. Lakh, Lac - 0.1 million; 100,000
46. L.I.C. - Life Insurance Corporation of India
47. M - Metre
48. MAFCO - Maharashtra Agricultural Development and Fertilizer Promotion Corporation Ltd.
49. Mahila Mandal - Women's Centre
50. Max II - Main Automatic Telephone Exchange Type II

51.	Max III	-	Main Automatic Telephone Exchange Type III
52.	MB	-	Metropolitan Bombay, comprising Greater Bombay, New Bombay and Thana Town
53.	mgd	-	million gallons per day
54.	M.H.B.	-	Maharashtra Housing Board
55.	M.I.D.C.	-	Maharashtra Industrial Development Corporation
56.	Million	-	1,000,000
57.	M.O.T.	-	Marine Oil Terminal
58.	MRT	-	Mass Rapid Transit
59.	MRTP Act	-	Maharashtra Regional and Town Planning Act (1966)
60.	M.S.E.B.	-	Maharashtra State Electricity Board
61.	M.S.L.	-	Mean Sea Level
62.	M.S.R.T.C.	-	Maharashtra State Road Transport Corporation
63.	MTO (R)	-	Metropolitan Transport Organisation (Railways)
64.	MTP	-	Metropolitan Transport Project
65.	NA	-	Not Available
66.	NB	-	New Bombay
67.	N.E.	-	North East
68.	N.H.	-	National Highway
69.	OPD	-	Out Patients Department
70.	ORG	-	Operations Research Group, Baroda
71.	PCU	-	Passenger Car Units
72.	P & T	-	Post and Telegraph
73.	Pucca	-	Permanent
74.	RCC	-	Reinforced Cement Concrete
75.	Reporting Establishments	-	Establishments in the private sector employing more than 25 employees required to report to the Directorate of Employment. All public sector establishments regardless of their employment are also required to report.
76.	RL	-	Reduced Level
77.	Samaj Mandir	-	Community Centre
78.	Sarvajanik Pujas-	-	Community Religious Ceremonies
79.	S.E.	-	South East
80.	SICOM	-	State Industrial and Investment Corporation of Maharashtra, Ltd.

81. sq.m - square metre
82. Tahsil, Tehsil, Taluka - An administrative unit comprising a number of villages (the hierarchy is District, Tehsil, Village)
83. Tahsildar - A Revenue Officer at Tehsil level
84. TTC - Technical Training Centre
85. UHF - Ultra High Frequency
86. V.T. - Victoria Terminus, Central Railway terminus
87. Wilbur Smith Study - A traffic and transportation study (excluding mass transportation) carried out for Greater Bombay in 1962 by M/s Wilbur Smith and Associates
88. Zopadpatties - Slums