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India
Appraisal of the Madras Urban Development Project

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Urban Projects Department

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CURRENCY EQUIVALENTS
(As of May 15, 1976)

Currency Unit	=	Rupees (Rs)
US$1.00	=	Rs 9.0
Rs 1.00	=	US$0.11
Rs 1 lakh (10^5)	=	US$11,110
Rs 1 crore (10^7)	=	US$1.11 million

MEASURES AND EQUIVALENTS

1 meter	(m)	=	39.37 inches (in) or 3.28 ft
1 square meter	(m^2)	=	10.8 square feet (sq ft)
1 cubic meter	(m^3)	=	35.3 cubic feet (cu ft)
1 kilometer	(km)	=	0.62 mile (mi)
1 square kilometer	(km^2)	=	0.386 sq miles
1 hectare	(ha)	=	2.47 acres (ac) or 10,000 sq meters
1 liter	(l)	=	1.057 quarts liquid or 0.26 US gallon (gal) or 0.908 quart dry (qt)
1 liter per capita per day (lcd)		=	0.26 US gallon per capita per day (gcd)
1 cubic meter per second (m^3/sec)		=	86.4 million liters per day or 22 million US gallons per day
1 million liters per day (mld)		=	0.01 cubic meters per second

PRINCIPAL ABBREVIATIONS AND ACRONYMS

DHRW	Department of Highways and Rural Works
DSW	Department of Social Welfare
EWS	Economically Weaker Sections
GOI	Government of India
GTN	Government of Tamil Nadu
LIG	Lower Income Group
MC	Madras Corporation
MIG	Middle Income Group
MMA	Madras Metropolitan Area
MMDA	Madras Metropolitan Development Authority
MUA	Madras Urban Agglomeration
PTC	Pallavan Transport Corporation
SIDCO	Small Industries Development Corporation
SISI	Small Industry Services Institute
TIIC	Tamil Nadu Industrial Investment Corporation
TNHB	Tamil Nadu Housing Board
TNHDC	Tamil Nadu Handicrafts Development Corporation
TNSCB	Tamil Nadu Slum Clearance Board
TWAD	Tamil Nadu Water Supply and Drainage Board
UNDP	United Nations Development Program
WHO	World Health Organization

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APPRAISAL OF MADRAS URBAN DEVELOPMENT PROJECT

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SUMMARY AND CONCLUSIONS

i. IDA assistance is sought for an urban development project in Madras. Its main objective is to develop and promote low-cost solutions to Madras' problems in the sectors of shelter, employment, water supply, sewerage and transport, and particularly to make the investments responsive to the needs of the urban poor. To ensure replicability, the project will introduce full cost recovery for key investments for which costs have traditionally not been fully recovered. The project will also strengthen metropolitan planning and capital programming and budgeting. The investments proposed are aimed to directly benefit the poorer segments of the population in the Madras metropolitan area.

ii. Madras metroplitan area is characterized by low per capita incomes (US$95 in 1970-71), a large and rapidly increasing population (4.4 million, growing at 5.0% per annum), and serious deficiencies in important urban services with levels of services deteriorating. Per capita water supply averages less than 70 liters per day (lcd) but many domestic consumers, particularly in the poorest areas, receive less than 40 lcd. Comparable average figures for Bombay and Calcutta are 138 lcd and 145 lcd, respectively. The critical water supply situation was highlighted during the 1974/75 drought, when supplies dwindled to less than 10 lcd (water was rationed to 20 lcd once every three days). In transport, pedestrians and bicyclists account for close to half of all person trips but facilities for these low-cost transport modes have been neglected, and road investments have benefitted mainly motor vehicle traffic.

iii. The provision of serviced land and housing has not kept up with the need, particularly of low-income groups. Existing Government of Tamil Nadu programs in the housing sector are primarily aimed at middle-income groups. The slum population of Madras has consequently been increasing more rapidly than the total population and now accounts for more than 30% of the total, or about 1.2 million persons. Programs to alleviate the plight of the slum population have so far emphasized slum clearance and resettlement at high cost, rather than slum improvement. While the slum population is increasing by some 14,000 households annually, only about 3,000 resettlement units are being constructed each year.

iv. The project would provide: (a) sites and services, with about 13,500 serviced residential plots and about 21 ha of serviced land for small industry and commercial uses; (b) infrastructure improvements in 85 slums covering about 185 ha with a population of 23,000 households, plus provision of open plots in and around the slums for an additional 7,500 households; (c) work sheds, equipment, training and finance to generate about 4,000 jobs in small industry and about 5,000 jobs in cottage industry in the sites and

services and slum improvement areas; (d) training, equipment, and sheds to provide supplementary nutrition, health examinations, immunization, health and nutrition education, and functional literacy training in the sites and services and slum improvement areas; (e) rehabilitation of existing water supply and sewerage systems; (f) road and traffic improvements with emphasis on footpaths and cycle tracks; (g) replacement of 285 buses and construction of bus depots, bus terminals and passenger shelters; and (h) technical assistance, mainly to the Madras Metropolitan Development Authority.

v. Related key policy measures include: (a) the provision of security of tenure (freehold titles) to the inhabitants of the improved slums, and cost recovery through the sale of the land on a hire-purchase basis (Government of Tamil Nadu orders to this effect were issued in August 1976); (b) the imposition of a ceiling on expenditures for slum clearance; (c) the establishment of revolving funds for financing of future sites and services and slum improvement programs from all cost recoveries from such schemes under the proposed project; (d) the establishment of a permanent unit in the Madras Corporation to carry out improvement and construction of footpaths and cycle tracks; (e) raising of bus fares to reduce the deficit of Pallavan Transport Corporation (raised by 22% in March 1976); (f) staggering of working hours in Madras to improve bus fleet utilization (implemented during July and August 1976); and (g) abolition of the bus licensing system restricting the use of individual buses to particular routes (done in July 1976).

vi. Steps are also being taken to improve the finances particularly of Madras Corporation; a financial consultant was appointed by the Corporation in May 1976 to initiate the improvements, and the establishment of a Financial Management Department is under way. The Madras Metropolitan Development Authority is reorienting its activities from traditional land-use and physical planning to more comprehensive urban development planning emphasizing social and economic development; a two-year work program has been prepared and a reorganization of the Authority is under way.

vii. Project costs total US$52.0 million, including contingencies, of which land acquisition costs are US$ 1.9 million. Foreign exchange costs are US$8.0 million or 15% of project cost. Cost estimates are based mostly on final engineering designs and on recent bids for similar works and equipment.

viii. The project will be executed by existing Government of Tamil Nadu agencies in each sector. While the individual agencies will be responsible for the execution of their respective project components, the Madras Metropolitan Development Authority will be responsible for coordination, monitoring and evaluation.

ix. The proposed IDA Credit of US$24 million would finance 50% of total project cost net of (a) taxes and duties (US$2.9 million) and (b) expenditures on bus bodies (US$1.1 million) which will not be procured

through competitive bidding. The Credit would be made to the Government of India which would pass it on to the Government of Tamil Nadu on its standard terms and conditions. The balance of US$28 million would be provided by the Government of Tamil Nadu.

x. Contracts for supply of bus chassis and a portion of the equipment for water supply, with an estimated total value of US$5.0 million, will be let under international competitive bidding in accordance with IDA guidelines. Contracts for civil works, with an estimated total value of US$33.0 million, will be awarded after local competitive bidding. These works are small and scattered and would not be of interest to international contractors. Building materials for self-help construction, the remainder of equipment and materials for water supply, traffic engineering and control equipment and medical supplies, with a total estimated value of US$4.5 million, will be procured by competitive bidding under local procedures, acceptable to IDA, as the individual contracts would be too small for international competition, or would have high transportation charges. Bus bodies will be built by the bus company's own workshop, and the cost of the bodies (US$1.1 million) is excluded from IDA financing.

xi. The economic rate of return is estimated at about 21% on the average for those components of the project for which benefits could be quantified. For the remaining components, the project ensures that investments proposed are the least cost. Many vital steps are being taken under the proposed project to initiate development programs that are financially sustainable and that can be expanded to reach the majority of Madras' slum dwellers and poor. Estimates indicate that through this project the growth in the slum population would be halted during the project period, i.e. there would be no further increase in the total population living on unserviced land without security of tenure. There will be a continuing impact after the project period with a rapid reduction in the slum population through further sites and services and slum improvement schemes financed out of the revolving funds. All slum areas in Madras will be improved by 1985.

xii. The project is suitable for an IDA credit of US$24 million.

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APPRAISAL OF MADRAS URBAN DEVELOPMENT PROJECT

I. INTRODUCTION

1.01 The Government of India (GOI) is seeking IDA financing for a project to assist the Government of Tamil Nadu (GTN) to improve urban services and provide employment opportunities for the poor in Madras Metropolitan Area (MMA). This would be the second IDA credit for urban development in India. The first credit was made in 1973 to help finance the Calcutta Urban Development Project. A Bank loan was made in 1976 to the Bombay Metropolitan Region Development Authority to improve bus transport and metropolitan planning in Greater Bombay.

1.02 The proposed project was first suggested in 1973 by GOI and GTN and has subsequently been prepared by the Madras Metropolitan Development Authority (MMDA) assisted by state and local government agencies. During the same period, a water supply and sewerage project in Madras has also been under discussion and the proposed project now incorporates urgently required investments in this sector while a longer-term investment program is being prepared through a UNDP-financed study expected to be completed early in 1979.

1.03 This report is based on the findings of Messrs. S. Sandstrom, D. Cook, I. Sud, and A. Van Nimmen (IDA) and A. Bertaud, J. Cooper, and K. Huddart (consultants) who visited Madras in May 1976 to appraise the project.

II. BACKGROUND

A. Urban Development in India and Tamil Nadu

2.01 India's present urban population of 130 million, about 21% of the total population of 625 million, is expected to approach 300 million by the year 2000, representing annual rates of increase of 3%-3.5%. Some 4.3 million persons are now annually added to the urban population. Compared with an urban population growth rate of 5.5% for the world as a whole, the present Indian growth rate of 3.3% is low but the growth is impressive in absolute terms. The most rapid growth is taking place in approximately 133 medium-sized cities with populations between 100,000 and one million, which grew at an average rate of 6.6% annually between 1961-71. If present trends continue, by the year 2000 there would be 43 Indian cities with populations of more than one million compared with nine cities today.

2.02 A national urbanization policy to deal with rapid urban growth and to explicitly incorporate urban development into a broader economic development framework is still at an early stage of discussion and is largely based on physical concepts. Prime responsibility for the urban sector development

rests at the state level and many states, including Tamil Nadu, are making serious efforts to develop strategies for the sector. Local government institutions and planning mechanisms are generally weak. Inadequate resource mobilization at the local government level has resulted in serious deficiencies in the provision and maintenance of urban service facilities.

2.03 Tamil Nadu, with a population of about 45 million, is the third most densely populated state in India (after Kerala and West Bengal) and the second most urbanized state (30% urban population versus 31% in Maharashtra). Madras, the capital of Tamil Nadu, is the fourth largest city in India and the largest in the four-state Southern Region. It is about five times the size of Madurai, the second largest city in the state.

2.04 The economy of Tamil Nadu is characterized by a relatively small agricultural sector, accounting for about 39% of state income, and a relatively large manufacturing sector, accounting for about 20% of income. Trade is also relatively important, mainly reflecting the role of Madras as the commercial center of South India. Tamil Nadu lacks natural resources for its manufacturing sector. In agriculture, however, the state has the third highest total rice production of the Indian states and has achieved the highest rice yield per hectare, almost twice the national average. The manufacturing sector is characterized by a predominance of small establishments of recent origin, as compared to the leading states in the sector, Maharashtra and West Bengal. Manufactures of textiles, electrical machinery and transport equipment are of major importance. Average per capita income in the state is no higher than the national average.

2.05 Given its high urbanization rate, Tamil Nadu scores lower than expected in terms of per capita income. Yet, its record on social development is impressive. It has the second highest literacy rate among the states (40% in 1971 versus the Indian average of 29%), and its infant mortality rate of 55 per 1,000 live births in 1971 is less than half the national average.

B. Madras Metropolitan Area

Perspective

2.06 Madras has a long history. The port had a flourishing trade with the Roman Empire in the second century A.D. and Arab merchants visited settlements in the area during the 9th and 10th centuries. Marco Polo passed through in the late 13th century and the Portuguese settled there briefly in the early 16th century. The foundation of the present settlement is said to have been laid in 1639 when the site on which Fort St. George stands was acquired by the British East India Company. The name of Madras is, however, apparently derived from Madraspatnam, a village that existed prior to the settlement of the British (see Annex 1).

2.07 In 1901, the city of Madras had a population of about 550,000 which by 1941 had increased to some 880,000. The city had a good water supply system in 1941 and most of its area was sewered. It was still primarily an administrative and commercial center. Since independence, the city has grown rapidly and in 1971 covered an area of 129 km^2 with a population of about 2.5 million. The MMA, which covers about 1,170 km^2, had a 1971 population of 3.5 million, increasing at about 5.0% annually. The present MMA population is estimated at about 4.4 million to which over 200,000 are added annually.

Economy

2.08 Expansion of the manufacturing sector is a major reason behind the rapid population growth in Madras over the past 25 years. A large number of public sector undertakings have been located in Madras, including the Integral Coach Factory, Madras Refinery and Fertilizers, and the Heavy Vehicles Factory. The port of Madras has been expanded to an annual capacity of about 7.0 million tons of throughput (16 berths and capable of handling ships up to 100,000 tons and requiring 12.8 m draft). A fisheries port is being built to accommodate about 150 trawlers and 500 smaller boats. Many private sector companies have also been attracted to Madras (Ashok Leyland, Standard Motors, and the Simpson and T.V.S. Groups, for instance). Most major banks and stock companies of South India have located their head offices in Madras. Still, most employment is in smaller establishments to which GTN is giving particular attention and support. New manufacturing establishments are predominantly being located north and west of the city center, while the expansion of trade and commerce is taking place in the center itself and towards the south (see Map IBRD 12401).

2.09 Annual per capita income in the MMA in 1970-71 averaged Rs 855 (US$95) compared with the average of Rs 624 (US$69) for the State as a whole. It was, however, considerably less than the per capita income in many other metropolitan areas in India. About 56% of the total income is derived from the tertiary sector and 39% from the secondary sector. Unemployment statistics are unreliable but according to the 1971 census, the work force participation rate in the Madras area was only about 28%, versus 37% in Bombay and 33% in Calcutta.

Services

2.10 Madras suffers from serious deficiencies in the key service sectors. The physical conditions in the area lead to high infrastructure costs for water, sewerage and drainage. Additional investments are required not only to reduce the existing deficiencies but also to meet the increase in demand for services. As a further background to the proposed project, the problems in key service sectors are summarized below.

2.11 Water Supply and Sewerage. The total water supply presently available, mainly from the Red Hills Lake system is about 2.4 m^3/sec which is less

than half the needs. Per capita supply averages less than 70 liters per day (lcd) but, due to inadequate distribution, many domestic consumers, particularly in the poorest areas receive less than 40 lcd. Comparable figures for Bombay and Calcutta are 138 lcd and 145 lcd, respectively. The critical water supply situation was highlighted during the 1974/75 drought when supplies dwindled to less than 10 lcd (water was rationed to 20 lcd once in every three days). The present system is in poor condition due to a lack of replacement and maintenance and is deteriorating. Existing water sources are shown on Map IBRD 12407 and are described in more detail in Annex 6.

2.12 About 75% of the city area is sewered but no sewerage systems exist in the rest of the metropolitan area except for one municipality (Tiruvottiyur) which has a limited system under construction. Less than 15% of the total estimated sewage of 200 mld is presently treated at the Kodungaiyur Sewage Farm north of the city and the remainder is dumped into the ocean. Major proposals have been made since 1959 for sewering and treating the effluent from the entire city but only limited works are presently being carried out. Three additional sewage farms with a total treatment capacity of 95 mld are under construction and are expected to be completed over the next two years. Even with the completion of the new treatment works, only some 65% of the total present effluent flow from sewered areas will be treated.

2.13 A comprehensive study to review the sector issues and to prepare recommendations for physical, financial and management improvements and for system expansion was initiated in October 1976, with financing from UNDP and with WHO acting as executing agency. The proposed project includes urgently required schemes prepared by local agencies, and these schemes will be further reviewed by the UNDP/WHO consultants and IDA before detailed designs and contract documents are prepared. A Master Plan for water supply and sewerage through year 2001 will be available about September 1977 and feasibility studies for a first major project by January 1979.

2.14 Housing. The provision of serviced land and housing has not kept up with the need, particularly for low income groups. The existing GTN programs in the sector are primarily aimed at middle-income groups. The slum population of the MMA (population living on unserviced land without security of tenure) has been increasing more rapidly than the total population and now accounts for more than 30% of the total population of the area, or about 1.2 million persons. An extensive slum survey carried out in the city in 1970 identified about 1200 slums with a total population of about 740,000 persons and with an estimated additional 200,000 slum dwellers outside the city boundary in MMA.

2.15 In 1971, GTN established a Tamil Nadu Slum Clearance Board (TNSCB) with the task of clearing and improving all slums by 1977. The approach followed by TNSCB so far involves clearance of the slums and resettling the population in four-story tenements constructed on the cleared site. Only limited physical improvements in situ without resettlement have been made under a slum improvement program which was previously financed by GOI but since 1975 is financed by GTN. By the end of 1976, the improvement program had been largely phased out, with only Rs 30 lakhs (US$335,000) provided for

the entire fiscal year. The average cost per housing unit under the clearance program is Rs 10,000 (US$1,100) while the rent is only Rs 10 (US$1.1) per month. Considering maintenance and other overhead costs, the rents cover less than 10% of the cost. While the slum population is increasing by some 14,000 households annually, only about 3,000 resettlement units have been constructed annually. The approach has been far from successful. Focus on costly slum clearance instead of inexpensive improvement and a lack of any significant housing programs for the lowest-income families (below 50th percentile) have contributed to the continuing increase in the slum population.

2.16 Transport. Madras' transport system is characterized by its heavy reliance on walking, bicycling and bus travel. Pedestrian and bicycle trips each account for about 21% of all trips, buses for 42%, trains for 11% and cars and motorcycles for the remaining 5%. Motor vehicle congestion is not serious even during peak periods but adequate facilities for pedestrians and bicyclists are lacking. An extensive Traffic and Transportation Study, completed in 1974 by the GTN Directorate of Town and Country Planning, nevertheless proposed motor vehicle oriented investments in roads and equipment of Rs 148 crores (US$164 million) over a five-year period plus heavy investments in the rail system. Investments in transport of this magnitude are clearly not feasible given the overall resource constraints of MMA. Given the present trends for transportation, a major part of these investments can be deferred for many years and the project includes only the works necessary in the next three years.

C. Institutions

2.17 Local governments within MMA consist of Madras municipal corporation, four small municipalities, four townships and 20 panchayats. 1/ GTN exerts a dominating influence on MMA through MMDA, the local governments, its own departments and statutory bodies such as TNSCB and Tamil Nadu Housing Board (TNHB), which have major sector development responsibilities. Madras is also characterized by the predominance of voluntary agencies carrying out major social works programs, and the private sector plays an important role in providing health services and education. Close to half of all primary schools and the majority of the high schools in the city are private.

Madras Metropolitan Development Authority

2.18 MMDA is the agency responsible for land-use planning and control in MMA. It was initially set up in 1972 as an executive agency and subsequently in 1974 made into a statutory authority. It is charged with the responsibility for the development of master plans which govern all public and private developments in MMA. In addition, MMDA prepares and implements development plans for new towns in MMA.

1/ A panchayat is a local authority serving a predominantly rural area.

2.19 Although MMDA's functions so far have been focused primarily on physical planning and land-use control, it has, at GTN's direction more recently been attempting to perform the capital programming and budgeting functions for MMA. It has started to compile overall estimates of public investments in the key sectors and by different agencies, which would form a basis for deciding on a public investment strategy for MMA. The role of MMDA in investment planning is strictly of an advisory nature. It does not have any authority or control over the other GTN agencies, other than in its normal land-use control activities. However, most of the key GTN agencies involved in the development of MMA are represented on MMDA's governing board, which enables it to act as an effective inter-agency coordinating body. MMDA also acts as a Secretariat for the Center/State Review Committee which was set-up in October 1975 to review projects and schemes undertaken for the development of MMA. The preparation of the proposed project covering different sectors and agencies was also the responsibility of MMDA. A detailed description of MMDA's functions is given in paras 5.01-5.04.

III. THE PROJECT

A. Objectives

3.01 The main objective of the project is to develop and promote low-cost solutions to Madras' problems in the sectors of shelter, employment, water supply, sewerage and transport, and particularly to make the investments responsive to the needs of the urban poor. To ensure replicability, the project will introduce full cost recovery for key investments for which costs have traditionally not been fully recovered. The project will also strengthen metropolitan planning and capital programming and budgeting.

B. Main Features

3.02 To achieve the above objectives, the project comprises:

(a) Sites and Services: Serviced residential plots, core housing units (partially completed houses which can be completed and/or expanded in stages by the owners), self-help building materials, and community facilities for about 13,500 primarily low-income households (about 74,000 persons), and serviced land for commercial and industrial uses, at three sites covering a total area of 175 ha;

(b) Slum Improvement: Basic infrastructure services and community facilities in 85 slum areas covering an area of 185 ha with a population of 23,000 households (126,500 persons), with open plots to be developed for an additional 7,500 households (41,250 persons);

(c) Small-Scale Business: Serviced plots, work sheds, equipment, finance and training to create about 4,000 jobs in small-scale business activities and an additional 5,000 jobs in cottage industry in the sites and services and slum improvement project areas;

(d) Maternal and Child Health: Training, equipment and buildings to provide supplementary nutrition, health examinations and immunization for an estimated 17,000 children under the age of 6 years and some 7,000 expectant and nursing mothers, and health, nutrition and family planning education and functional literacy training for about 20,000 adult women from the beneficiary households under the sites and services and slum improvement components;

(e) Water Supply and Sewerage: Measures to rehabilitate the existing systems and to bring early relief to the poorest segments of the population, particularly those using public standpipes and those living in slum areas;

(f) Road and Traffic Improvements: Construction of a part of the Inner Ring Road; construction and improvement of footpaths, bicycle tracks, carriageways, pedestrian subways and river crossings; street lighting; and traffic engineering measures to improve circulation;

(g) Bus Transport: Replacement of overaged buses and construction of depots, terminals and passenger shelters; and

(h) Technical Assistance: Five advisers for two years and consultants' services to assist in development planning, capital programming, and project monitoring and evaluation.

3.03 The sites and services, slum improvement, small-scale business and maternal and child health components are mainly located to the west and north of the city center where they will have a major developmental impact on the whole area, with a total population of about one million, most of whom are low-income. Most high-income areas are located south of the city center. The water supply and sewerage component will, inter alia, help improve water supply and sanitation in most of the project areas. The road and traffic improvements cover a wide area and will benefit low-income groups, mainly pedestrians and cyclists, in most of MMA. The bus transport component will similarly benefit most of the low-income population, although not the poorest; the major objective of the component is, however, to reduce the future investment requirements of the bus company through appropriate policy measures and to improve its financial situation to minimize the present drain on the financial resources of GTN.

C. Detailed Description

Sites and Services

3.04 About 175 ha of land will be developed at three sites, Arumbakkam (34 ha), Villivakkam (53 ha) and Kodungaiyur (87 ha), located west and northwest of the city center (Map IBRD 12401). The component includes (see Annex 2 and Maps IBRD 12403, IBRD 12404, IBRD 12405):

(a) Residential Plots: preparation and servicing of about 13,470 plots of five different sizes (40, 46.5, 74.3, 139.4, and 223.0 m^2), with roads, drainage, and individual water supply and sewerage connections (about 75% of the plots are 46.5 m^2 or less);

(b) Core Housing Units: construction of about 9,760 core housing units, of which about 6,230 would have only completed shower and toilet facilities (sanitary core) costing US$145 each, 2,740 would have a sanitary core and common lateral walls with a thatched roof at a total cost of US$250, and 790 would have a sanitary core and two small completed rooms at a total cost of US$665; plot and core development options and their possible evolution are illustrated in Sketches 1-3;

(c) Commercial and Industrial Sites: preparation and servicing of about 9.5 ha of commercial and 11.4 ha of industrial land;

(d) Building Materials: materials for self-help completion of the core housing units;

(e) Community Facilities: construction on each of the three sites of two primary schools, one high (secondary) school, one clinic/health center and one community hall; and

(f) Trunk Infrastructure: construction of access roads, drainage channel (at Villivakkam), trunk water main (at Arumbakkam), water wells with over-head tanks (at Villivakkam and Kodungaiyur), trunk sewers (at Arumbakkam and Kodungaiyur), sewage oxidation pond (at Villivakkam), and pumping stations.

3.05 The layouts for the three sites have been designed to make full use of the employment potential of the sites. Areas have been set aside for business and commercial uses along the corridors which connect the sites with adjacent urban areas and small-scale industries are located closest to major transport arteries. The emphasis on strategic development of commercial and industrial areas, combined with differential land pricing within the project on the basis of the locational value of plots, permits the

40 m^2 plots with sanitary cores and self-help building materials to be sold at a price of only about US$220 each, with full cost recovery still being achieved for the three sites. The 40 m^2 plots (45% of the total) are affordable by households down to the 10th percentile of the MMA income distribution (see para 4.11).

Slum Improvement

3.06 The slum improvement component will provide security of tenure and basic infrastructure improvements in 85 slums with about 23,000 households and covering a total area of about 185 ha, all of which is publicly owned. Typical existing slum conditions are illustrated in Photos 1 and 2. The infrastructure improvements include (see Annex 3):

(a) new and improved roads, footpaths and drainage (storm and waste water), with vehicular access provided no more than 50 m from each hut and pedestrian access provided for each hut;

(b) water supply, with one public standpipe per 10 households;

(c) public latrines and washing facilities, with one toilet and one bath facility per 10 households; and

(d) community facilities: 10 primary schools, 3 high schools, plots for pre-schools (1 per 100 households, see para 3.13) and cottage industry centers (1 per 365 households, see para 3.11).

3.07 Infrastructure costs, excluding community facilties, average Rs 1,300 (US$145) per household. Since most of the slums are small and surrounded by built-up areas with schools and other community facilities which are available to them, only limited provision of such facilities is required under the project. Among the pressing needs of the slums are to provide appropriate employment opportunities and improvement of nutrition and health among children. Special attention has therefore been given to these aspects (see paras 3.10-3.13).

3.08 The densities of the slums vary substantially from less than 100 households per ha to more than 350 households per ha. In the low density slums, infrastructure designed in accordance with the above standards will be provided to allow for higher-density settlement on vacant land on the fringes of the slums. An estimated 7,500 open plots of 20 m^2 - 40 m^2 size will be delineated and sold in these areas, with no on-plot facilities. These plots are affordable by the poorest households in Madras. Furthermore, vacant land around major access points to the slums and in other locations with high commercial potential will be developed and sold at market prices for commercial and industrial purposes. Typical improvements are illustrated in Sketch 4 and 5 for a low density slum and a high density slum, respectively.

3.09 About two thirds of the slums, and the Villivakkam and Kodungaiyur sites, would obtain water from local wells to be provided under the project. The amount and quality of groundwater available in each area are adequate. All local distribution systems are to be built to allow connection to the central distribution system when sufficient water is available from central sources.

Small-Scale Business

3.10 About 120 plots will be provided with work sheds on about 4.0 ha of the 11.4 ha of land set aside for small-scale industry under the sites and services component. The remaining 7.4 ha will be sold without sheds to prospective entrepreneurs. Three types of work sheds, with floor areas of 56, 93 and 186 m^2, will be built. The smallest type (one third of the total) will also have a living area on an upper level. Loans will be provided for machinery and equipment. Local banks, which will locate branch offices on the three sites, are expected to provide working capital. The businesses are expected to employ a total of about 4,000 persons and to manufacture and/or repair such items as bicycle and automobile parts, electrical equipment, metal products, furniture, leather products, paper products and textile products. The average investment per job created is about US$800 (see Annex 4).

3.11 Training, equipment, and about 100 training-cum-work sheds will be provided to create about 5,000 jobs in the homes of the 44,000 households living in the sites and services and slum improvement project areas. About 50 persons will be trained at each training center for a period of about one year. After the training period, the training centers will be converted into production centers, each of which is expected to become financially viable. The production centers will be initially owned by Tamil Nadu Handicrafts Development Corporation (TNHDC), which will be responsible for their operation and management. After a period of 2-3 years, these centers would be converted into cooperatives of workers, if this is considered feasible. There has not been enough experience to date with this approach and it is difficult to predict whether in fact these cooperatives would be successful. TNHDC would continue to own and operate the centers if the experience with cooperatives is not favorable. The production will be based on raw materials such as palm leaf, cane, bamboo, and other fibers. The starting up of the centers has been phased over a two-year period from August 1977 on the basis of the availability of instructors. The average investment per job created is about US$225.

Maternal and Child Health

3.12 The component includes training, equipment, buildings and recurring expenditures during the three-year project period, to provide the following package of services to the households living in the sites and services and slum improvement areas:

(a) Supplementary Nutrition: the food supplement "Balahar" will be provided to children below the age of 6 years and to nursing mothers to fill the substantial protein and calorie requirement gap identified in surveys (Tamil Nadu Nutrition Study, carried out in 1970-1973);

(b) Health Examinations: regular health examinations, care and, in serious cases, referral services will be provided for nursing and expectant mothers and children below the age of 6 years;

(c) Immunization: children under the age of 6 years will be immunized against smallpox, diphtheria, tetanus, whooping cough, typhoid and polio, and expectant mothers will be immunized against tetanus;

(d) Nursery and Pre-School Education: nursery services will be provided for children under 3 years of age and pre-school education for children 3-5 years old; and

(e) Health and Nutrition Education and Functional Literacy Training: women in the age group 15-44 years will be educated on fundamental aspects of health, nutrition and family planning through house contacts, films, classes, etc., and will also be asked to participate in functional literacy classes.

3.13 The above services will be provided through pre-schools or "child welfare centers", each with a floor area of 41 m^2 and costing about US$1,100 including equipment. Each center will be staffed by a "Balasevika" with two helpers. The Balasevikas are to be trained under the project for about four months. Community workers are to discuss the program with each community, assess the acceptability of the program and assist in its implementation. Project costs are based on an estimated 50% acceptance rate (see Annex 5).

Water Supply and Sewerage

3.14 GTN estimates that investments of the order of Rs 150 crores (US$167 million) would be required in MMA over the next decade to ensure adequate services in the sector. IDA missions to Madras have over the past four years reviewed the problems of the sector and assisted GOI, GTN and UNDP/WHO to define and initiate the master plan and feasibility studies now under way (para 2.13). Major investments in the sector in MMA will not be possible prior to 1980-81, when the feasibility studies would be available. However, in view of the critical water supply and sewerage situation in MMA, the project would support a limited program of immediate upgrading and rehabilitation works which would bring early relief. The local government agencies have identified a number of possible alternative investments and proposed a package of immediate works for inclusion in the project. These include

improvements to water supply headworks and transmission systems, water treatment facilities, pumping stations, distribution and metering systems, rehabilitation of old mains and rehabilitation and upgrading of the existing sewage treatment plant (see Annex 6 and Map IBRD 12408 for location of these works). These proposals have been reviewed and on the basis of a preliminary assessment of the magnitude of investments which are likely to be required for the immediate works program, the implementation capacity of the executing agencies, and the overall financing constraints of the sector, the project includes an allocation of Rs 8.1 crores (US$9.0 million) in 1976 prices for these works. An investment of this magnitude, although very small in comparison with the needs of the sector, will nevertheless provide an early and badly needed relief to the population of MMA.

3.15 The UNDP/WHO consultants will make a further detailed technical and economic review of these proposals based on which detailed designs and tender documents will be prepared. The consultants' review is expected to be completed by March 31, 1977. Assurances were obtained during negotiations that (a) the final selection of works; (b) final engineering designs; and (c) implementation arrangements will be satisfactory to IDA.

Road and Traffic Improvements

3.16 The road and traffic improvement component is specifically designed to benefit pedestrians, cyclists and bus riders who undertake a major portion of all trips in the metropolitan area. The elements included in this component are (see Map IBRD 12402 and Annex 7):

(a) construction of about 12 km of the Inner Ring Road, between G.S.T. Road and Madras-Tiruvallur Road, designed as a 7.0 m wide two-lane single carriageway with a 2.0 m wide cycle track on each side;

(b) improvement of about 200 km of footpaths and about 50 km of cycle tracks, and street lighting at 24 intersections with high accident rates;

(c) construction of nine pedestrian subways (underground street crossings);

(d) grade separation at two road/rail intersections;

(e) improvement and construction of seven minor bridges for river and canal crossings;

(f) traffic engineering measures and carriageway improvements at selected road links and intersections; and

(g) establishment of three separate units for traffic engineering, planning and enforcement and provision of equipment such as street signs, road painting equipment,

guard rails, flashing beacons, traffic signals, weigh bridges, radar equipment, noise level detectors and smoke detection apparatus.

Bus Transport

3.17 The component includes (see Map IBRD 12401 and Annex 8):

(a) replacement of 285 overaged buses in the fleet of Pallavan Transport Corporation (PTC), over three years 1977/78 - 1979/80;

(b) construction of two major and one minor depot for bus repairs and servicing;

(c) construction of eight bus terminals; and

(d) construction of 400 passenger shelters.

3.18 The total bus procurement requirement over the three-year project period is estimated at about 550 buses of which 380 buses would be for replacement and 170 for augmentation. The project would meet the replacement needs of PTC which cannot be financed from internally generated funds. Fleet augmentation will be financed from borrowings outside the project. The augmentation program entails only a 3.5% annual increase in the size of the bus fleet, or about 55% of the anticipated 6.5% annual growth in total bus travel demand. The gap will be met through measures aimed at reducing demand during peak hours and improving fleet utilization, including the following:

(a) a system of staggered working hours was put into effect by GTN in the metropolitan area during July and August 1976; working hours in all government offices, schools and universities were changed to achieve a spreading of peak travel demand; and

(b) a system of bus licenses restricting the use of each bus to a particular route was abolished by GTN in August 1976 and the added flexibility allowed in the programming of the fleet is estimated to yield a 5% capacity increase.

3.19 The estimated replacement need of 380 buses is also based on an assumed average bus life of 12 years instead of 8 years as previously assumed by PTC. Cost statistics assembled by PTC show that by scheduling the buses according to age instead of, as presently, without consideration of age, the economic life is raised to about 12 years (old buses will be used less than new buses, mainly during peak hours and on short routes). The necessary rescheduling of buses was implemented during October 1976.

Technical Assistance

3.20 In order to develop particularly MMDA's capabilities in urban development planning (see MMDA's work program in Annex 13), the project includes the following technical assistance and related equipment:

(a) five advisers to MMDA for two years, in the following fields (see Annex 9 for draft job descriptions which were agreed on during negotiations):

(i) urban planner;

(ii) urban economist;

(iii) financial analyst - capital programming;

(iv) financial analyst - municipal finance; and

(v) small-scale business expert;

(b) short-term consultants' services to assist in project monitoring and evaluation by MMDA and in revising the accounting system of Madras Corporation;

(c) aerial photography and related equipment for the preparation of a long-term slum improvement program (see para 5.16); and

(d) training of staff.

IV. PROJECT COSTS, EXECUTION AND FINANCING

A. Cost Estimates

4.01 The total project cost is estimated at Rs 46.8 crores (US$52.0 million), with a foreign exchange component of Rs 7.2 crores (US$8.0 million) or about 15% of project cost. Land acquisition costs included are about Rs 1.7 crores (US$1.9 million). Cost estimates are detailed in Annex 2-9 for each component and are summarized below:

	Rs Crores			US$ Million			Percent Foreign Exchange	Percent of Total
	Local	Foreign	Total	Local	Foreign	Total		
A. Sites and Services								
1. Land & Infrastructure	3.7	0.7	4.4	4.1	0.8	4.9		
2. Housing core units	1.7	0.2	1.9	1.9	0.2	2.1		
3. Self-help building materials	0.5	-	0.5	0.6	-	0.6		
4. Community facilities	0.2	-	0.2	0.2	-	0.2		
Sub-total, A	6.1	0.9	7.0	6.8	1.0	7.8	13	15
B. Slum Improvement								
1. Infrastructure	3.7	0.5	4.2	4.1	0.6	4.7		
2. Community facilities	0.2	-	0.2	0.2	-	0.2		
Sub-total, B	3.9	0.5	4.4	4.3	0.6	4.9	12	9
C. Small-Scale Business								
1. Work sheds and machinery loans for small industry	1.2	0.2	1.4	1.4	0.2	1.6		
2. Training, equipment, and sheds for cottage industry	0.7	-	0.7	0.8	-	0.8		
Sub-total, C	1.9	0.2	2.1	2.2	0.2	2.4	8	5
D. Maternal & Child Health	0.6	-	0.6	0.7	-	0.7	-	1
E. Water Supply and Sewerage	6.7	1.4	8.1	7.4	1.6	9.0	18	17
F. Road and Traffic Improvements								
1. 12 km of Inner Ring Road	1.5	0.3	1.8	1.7	0.3	2.0		
2. 9 pedestrian subways and 250 km of footpaths and cycle tracks	1.8	0.3	2.1	2.0	0.3	2.3		
3. 2 grade separations	0.8	0.2	1.0	0.9	0.2	1.1		
4. City street improvement, minor bridges	1.1	0.2	1.3	1.2	0.3	1.5		
5. Traffic engineering, management and enforcement equipment	0.4	0.3	0.7	0.4	0.4	0.8		
Sub-total, F	5.6	1.3	6.9	6.2	1.5	7.7	19	15
G. Bus Transport								
1. 285 buses	3.5	0.3	3.8	3.9	0.3	4.2		
2. 3 depots, 8 terminals and 400 passenger shelters	1.3	0.2	1.5	1.4	0.3	1.7		
Sub-total, G	4.8	0.5	5.3	5.3	0.6	5.9	10	11
H. Technical Assistance								
1. Advisers to MMDA	0.1	0.3	0.4	0.1	0.3	0.4		
2. Consultants' services and aerial photography	0.2	0.1	0.3	0.3	0.1	0.4		
Sub-total, H	0.3	0.4	0.7	0.4	0.4	0.8	50	2
Sub-Total, A - H	29.9	5.2	35.1	33.3	5.9	39.2	15	75
I. Contingencies								
1. Physical	2.4	0.5	2.9	2.6	0.5	3.1		
2. Price	7.3	1.5	8.8	8.1	1.6	9.7		
Sub-total, I	9.7	2.0	11.7	10.7	2.1	12.8	16	25
TOTAL	39.6	7.2	46.8	44.0	8.0	52.0/1	15	100

/1 Of which an estimated total of US$2.9 million is in taxes and duties.

4.02 Cost estimates for the sites and services and roads components and for the minor civil works that are part of the bus component are based on final engineering designs. Estimates for the slum improvement component are based on preliminary engineering designs for representative slums. Final engineering designs for the slums are to be completed as implementation progresses. Estimates for the small-scale business and maternal and child health components are based on preliminary engineering designs for infrastructure and buildings and on recent cost experience in similar schemes in Madras. Estimates for the water supply and sewerage components are based on preliminary engineering designs which will be further reviewed and, if necessary, amended by the UNDP/WHO consultants (para 3.15). Estimates for bus chassis and bodies are based on recent bids and quotations by leading Indian and foreign manufacturers. Average man-month cost for consultants are estimated to be US$6,000 for foreign consultants and US$1,000 for local consultants.

4.03 All costs are expressed in March 1976 prices. Physical contingencies of 10% have been included for all items except for buses and for land. Price contingencies have been estimated at 8% in 1976 and 12% per year thereafter for civil works, and at 8% per year for equipment and supplies, in accordance with IDA guidelines. The base costs for all items except buses include 12.5% for the cost of engineering, supervision and administration by the implementing agencies.

4.04 There are no land acquisition problems expected in the project. Most of the land for sites and services and all land for slum improvement, which accounts for most of the land requirements, is government-owned. The remaining land required for sites and services, bus depots, bus terminals and the Inner Ring Road, has already been acquired. The project involves no relocation of families, except in slum improvement areas where less than 4% of the households will have to be relocated to make room for infrastructure facilities. To the limited extent that such relocation will be necessary, households will be resettled, as part of the project, in close proximity to their present locations.

B. Execution

4.05 The project will be executed by existing GTN agencies. Responsibilities are as follows:

	Project Component	Agency Responsible
A.	Sites and Services	Tamil Nadu Housing Board (TNHB)
B.	Slum Improvement	Tamil Nadu Slum Clearance Board (TNSCB)
C.	Small-Scale Business	
	- Small industry	Small Industries Development Corporation (SIDCO)
	- Cottage industry	Tamil Nadu Handicrafts Development Corporation (TNHDC)
D.	Maternal & Child Health	Department of Social Welfare (DSW)
E.	Water Supply and Sewerage	Tamil Nadu Water Supply & Drainage Board (TWAD) and Madras Corporation (MC)
F.	Roads and Traffic Improvements	
	- Inner Ring Road, pedestrian subways, grade separations, minor bridges	Department of Highways & Rural Works (DHRW)
	- Footpaths, cycle tracks and road improvements	Madras Corporation
	- Traffic Management	Police and DHRW
G.	Bus Transport	Metropolitan Wing of Pallavan Transport Corporation (PTC)
H.	Technical Assistance	Madras Metropolitan Development Authority (MMDA)

4.06 All agencies have the necessary capability to carry out their obligations under the project. The allocation of responsibilities between TWAD and Madras Corporation for implementing each element of the water supply and sewerage component will be determined on the basis of the review by the UNDP/WHO consultants (paras 3.14 - 3.15). MMDA will be responsible for coordination, monitoring and evaluation. Additional staff requirements for MMDA to carry out this function have been identified (see Annex 13) and were agreed to during negotiations. MMDA will also prepare quarterly progress

reports on the project for submission to IDA. Assurances were obtained from GTN during negotiations that MMDA will be designated as the representative of GTN for the purpose of coordinating and carrying out the project in a manner satisfactory to IDA.

4.07 Most of the project will be implemented over a three-year period, April 1, 1977 to March 31, 1980, while implementation of the water supply and sewerage component is expected to be completed by March 31, 1981. The Closing Date will be September 30, 1981. An implementation schedule is in Chart 2. Annex 10 contains a detailed schedule of initial key implementation actions.

C. Financing

4.08 The proposed IDA Credit of US$24.0 million (Rs 21.6 crores) will finance about 46% of total project cost, or 50% of the project cost less (a) taxes and duties (US$2.9 million) and (b) expenditures on bus bodies (US$1.1 million) which will not be procured through competitive bidding (see para 4.21). The Credit will be made available to GOI which will pass it on to GTN on its standard terms and conditions as part of Central assistance to States. The balance, US$28.0 million (Rs 25.2 crores), will be provided by GTN which will pass on the total project funds of US$52 million to the implementing agencies as shown in the following table (US$ million):

Project Component	Implementing Agency	Financing (US$ million) GTN Loans	GTN Grants	Direct GTN Expend. /a	Total	of which IDA Funds
A. Sites & Services	TNHB	-	10.0	0.4 /b	10.4	4.2
B. Slum Improvement	TNSCB	-	6.3	0.4 /c	6.7	3.0
C. Small-Scale Business	SIDCO	-	-	2.1	2.1	1.5
	TNHDC	-	0.6	0.5	1.1	0.2
D. Maternal & Child Health	DSW	-	-	0.9	0.9	0.2
E. Water Supply & Sewerage	TWAD/MC	6.2	6.2	-	12.4	5.2
F. Road & Traffic Improvements	DHRW	-	-	4.7	4.7	2.0
	MC	5.0 /d	-	-	5.0	2.0
	Police	-	-	0.4	0.4	0.2
G. Bus Transport	PTC	7.3	-	-	7.3	4.5
H. Technical Assistance	MMDA	-	1.0	-	1.0	1.0
TOTAL		18.5	24.1	9.4	52.0	24.0

/a Passed on as grants to implementing agencies other than GTN departments.
/b Schools: US$0.3 million (budgeted by Department of Education); health centers: US$0.05 million (Department of Health); community halls: US$0.01 million (Department of Social Welfare).
/c Schools: US$0.4 million.
/d Of which US$2.5 million to be passed on to DHRW for execution of selected works on behalf of MC.

4.09 The terms of the GTN loans will be as follows: to TWAD/MC (US$12.4 million, with the allocation between the two agencies to be determined), one-half of the amount as grant and one-half as loan at 11% and 20 years with 3 years grace; to MC (US$5.0 million), 11% and 20 years with 3 years grace; and to PTC (US$7.3 million), 10.5% and 15 years with 1 year grace. The different terms proposed for the different agencies correspond with current standard GTN practice. GTN has agreed to provide the project funds to TNHB and TNSCB on a grant basis to enable the two agencies to set up revolving funds from the cost recoveries (see paras 4.12 and 4.15) to finance continuing sites and services

and slum improvement programs. The Government expenditures for the small-scale business component would be passed on as loans to individual entrepreneurs by SIDCO and TNHDC, which will execute the component on behalf of GTN. The grant to TNHDC is for training expenditures.

D. Cost Recovery

4.10 Under the project, strong emphasis has been placed on cost recovery, particularly for the sites and services and slum improvement components, to ensure replicability and to allow the programs initiated through the project to be expanded to reach the majority of Madras' poor. This section deals with these two components, and with the small-scale business and the water supply and sewerage components. Concerning the roads and traffic improvements component, road user charges in the metropolitan area exceed expenditures on road construction, road maintenance and traffic management by a factor of three, so cost recovery presents no problems. Cost recovery for the bus component is dealt with on an institutional basis in the discussion of Pallavan Transport Corporation (see paras 5.11 - 5.13). The urgent need to raise additional municipal revenues to provide adequate services to the rapidly growing population of Madras and also to cover the cost of maintenance and operation of public facilities provided under the project is dealt with in the discussion of Madras Corporation (see paras 5.05 - 5.10).

Sites and Services Component

4.11 The cost of land, earthworks, roads, drainage, on-site water supply and sewerage, and core housing will be recovered by TNHB from the beneficiaries through direct plot sales with a minimum down payment of 10% and the balance to be paid over 12 to 20 years (depending on the plot type and the income of the purchaser) at 12% annual interest rate. A freehold title will be issued to the purchaser. Sale prices will be differentiated on the basis of the locational value of the plots with full cost recovery ensured for the component as a whole (see Annex 2). The cost of self-help building materials will be repaid on the same terms. The land, most of which is Government-owned, has been priced at its estimated market value without improvements. The cost of off-site or trunk water supply and sewerage infrastructure will be recovered through water and sewerage charges (see para 4.19). The following table shows the total number of plots to be sold at the three sites, the average sale prices, and the income levels reached:

Type of Plot	Plot size (m^2)	Total number of plots	Average sale price per plot incl. housing cores & building materials (Rs)	Monthly payment (Rs)	Target Income Levels Rs per Month	Target Income Levels Percentile
EWS - A	40	6,228	1,975	20	150-200	9-19
EWS - B	46.5	2,742	3,002	30	200-300	19-45
EWS - C /a	46.5	792	6,647	66	300-350	45-57
LIG - D /b	74.3	2,077	3,690	40	350-450	57-71
LIG - E /b	139.4	1,207	6,435	70	450-600	71-82
MIG - F /c	223	421	10,845	128	600-1,000	82-94

/a No self-help building materials.
/b No on-plot development; repayment period 15 years.
/c No on-plot development; repayment period 12 years.

Prime commercial land and small industry land will be sold at market value, estimated at at an average of Rs 90 (US$10) per m^2. Confirmation was obtained during negotiations that (a) settler selection criteria, including income levels, and (b) terms and conditions for plot sales will be satisfactory to IDA.

4.12 All revenues from plot and land sales will go into a revolving fund to be set up by TNHB. Annual contributions to the fund under this project are estimated at about Rs 10 million (US$1.1 million) from 1980 (Annex 2, Table 6). Assurances were obtained during negotiations that such a fund will be established by April 1, 1978 and maintained separately for financing sites and services schemes.

Slum Improvement

4.13 GTN has agreed to provide the slum dwellers with security of tenure as part of the improvement package by selling the improved and open plots to the inhabitants on hire-purchase basis, with freehold titles to be issued on completion of payments. GTN orders to this effect were issued in August 1976. Cost recovery for slum improvement will be achieved through (a) monthly payments over 20 years averaging Rs 8 (US$0.9) per plot; and (b) sale at market prices of vacant land in prime locations, mainly at access points to the slums, for commercial and industrial purposes (see Annex 3). Payments under (a) will vary with plot size and location and the indicated average would

apply to a typical 20 m^2 plot in a centrally located dense slum and to a typical 40 m^2 plot in a less dense slum on the fringe of the city. GTN has also specified a Rs 2 (US$0.2) monthly service charge per plot to cover the cost of operation and maintenance of public facilities. The average monthly payment totalling Rs 10 (US$1.11) amounts to about 5% of the average monthly household income in the slums and is equal to the rents presently paid for resettlement flats (para 2.15). Confirmation was obtained during negotiations that (a) freehold titles will be issued; and (b) monthly hire-purchase payments averaging Rs 8 per plot and a monthly service charge of Rs 2 per plot will be collected.

4.14 At terms of 12% annual interest rate, the hire-purchase payments would recover about 67% of the directly chargeable cost of slum improvement. Another 25% would be recovered through the sale of commercial and industrial land, giving a total recovery of about 90% of directly chargeable costs. Directly chargeable costs exclude the cost of community facilities and off-site infrastructure and amount to about 75% of total cost of the component. The opportunity cost of the land, which is publicly owned, would not be recovered, however. As cost recovery for slum improvement has not previously been attempted in Madras and in view of the present rent level in resettlement flats, the cost recovery factor of approximately 90% under the project is satisfactory and the maximum which is politically feasible over the short term. Agreement was reached during negotiations that, as part of the preparation of a long-term slum improvement program (see para 5.16), an assessment will be made of (a) actual expenditures incurred for improvement and for operation and maintenance and (b) the extent to which payments cover these expenditures. This assessment will be taken into account in the design of the long-term program.

4.15 All revenues from plot and land sales will go into a revolving fund to be set up by TNSCB. Annual contributions to the fund under this project are estimated at about Rs 4 million (US$0.4 million) in 1980. Assurances were obtained during negotiations that such a fund will be established by April 1, 1978 and maintained separately for financing slum improvement schemes.

4.16 Cost recovery is unsatisfactory under the present slum clearance and resettlement program and the program is not replicable on a larger scale (less than 10% of cost is recovered, para 2.15). However, due to the political volatility of the program and to commitments that have already been made for clearance, the program cannot be abolished at this stage. GTN has nevertheless agreed to shift the emphasis toward slum improvement, as exemplified by the proposed slum improvement component itself. Assurances were also obtained during negotiations that (a) the slum clearance program would be limited primarily to committed schemes, with any additional schemes to be taken up only in accordance with the long-term slum improvement program to be prepared (see para 5.16), and (b) annual expenditures on slum clearance during the project period April 1, 1977 to March 31, 1981 would be no higher than Rs 3.75 crores (US$4.2 million), the minimum amount consistent with existing commitments, most of which consist of schemes already under way. GTN has also initiated

a program to provide over the next two years a minimal number of water taps, public latrines and street lights in all slums not covered by the proposed project, with further improvements including tenure to be provided thereafter in accordance with the long-term slum improvement program. Total expenditures under this accelerated program are estimated at about Rs 2.5 crores (US$2.8 million). Consequently, whereas annual expenditures on slum improvement now represent less than 10% of TNSCB's total expenditures, the proportion would increase to about 50% during the project period and is expected to approach 100% during the early 1980's. Furthermore, GTN has agreed to undertake by December 31, 1977 an income survey of the households now living in the flats built for resettlement under the clearance program, to ascertain the levels to which the rents could reasonably be raised; confirmation of this was obtained during negotiations and agreement was also reached on terms of reference for the survey.

Small-Scale Business

4.17 Small Industry: The costs related to small industry, including (a) the cost of serviced land in the three sites and services areas at Rs 90 per m^2; (b) the cost of providing worksheds; and (c) loans for machinery will be recovered by SIDCO on behalf of GTN from the beneficiaries at 11% over 9 years. A 2.5% spread will allow SIDCO to cover its expenditures for administration and technical assistance, providing GTN with an effective interest rate of 8.5%. There is some risk inherent in this component to the extent that GTN may experience a somewhat higher default rate because of the very small size of enterprises to be supported. However, in keeping with GTN's policy to encourage the development of small-scale industries, it is believed that this risk is justified.

4.18 Cottage Industry: The cost of training and related materials will be borne by GTN and will not be recovered, while the cost of sheds and equipment will be recovered through sales from each production center/cooperative at 11% over 15 years, with payments starting after completion of the training.

Water Supply and Sewerage

4.19 As part of its property tax, Madras Corporation levies a water and drainage tax of 7% on annual rental values of property. Additional revenues are derived from water and sewerage connection fees and water meter rentals. Annual expenditures in the sector substantially exceed revenues, however, and no allowance is made for replacement. The failure to provide for adequate financing in the sector is the principal reason for its poor condition and the low standards of operation and maintenance. The UNDP/WHO study will make detailed recommendations for long term improvements but assurances were obtained at negotiations that Madras Corporation or any other agency assigned the responsibility for water supply and sewerage services in MMA as a result of the consultants' review will: (a) with effect from April 1, 1978, maintain water supply and sewerage accounts and funds related thereto separate from all other accounts and funds; and (b) with effect from April 1, 1979, impose specific water and sewerage charges and taxes to provide sufficient cash flows to meet annual expenditures, including debt service, and provide adequate working capital for these services.

E. Procurement and Disbursement

4.20 Procurement of bus chassis (estimated total value of US$3.9 million) and some of the water supply equipment and materials, such as pumps, water treatment equipment and steel pipes (estimated value of US$1.1 million) will be on the basis of international competitive bidding in accordance with IDA guidelines. Domestic manufacturers will be awarded a margin of preference of 15% or the applicable custom duties, whichever is lower.

4.21 Contracts for all civil works, with an estimated total value of US$33.0 million, for sites and services, slum improvement, water supply and sewerage, construction and improvement of roads, footpaths, cycle tracks and minor bridges, worksheds for small businesses, child welfare centers, bus depots, bus terminals and passenger shelters will be individually small and scattered. More than 200 individual contracts, ranging in value from US$10,000 to US$1.0 million, with the bulk of the contracts below US$100,000, will be awarded over the three-year project period. Although civil works contracts in the same area will be combined as far as practical, only two contracts are expected to have a value of about US$1.0 million each. Moreover, eight different agencies will be responsible for works in their respective sectors, and construction of several works will require implementation schedules that are carefully balanced locationally and over time. These works are not likely to attract any foreign contractors, particularly as the domestic contracting industry is well developed and mobilized, executing similar works in the metropolitan area. These civil works contracts, together with contracts totalling US$4.5 million for self-help building materials, the remainder of equipment and supplies for water supply and sewerage, traffic engineering and control equipment, and medical supplies will be procured under GTN procedures of local competitive bidding, acceptable to IDA. The materials and equipment contracts would be either of small sizes and unattractive to foreign suppliers, or unsuitable for international competitive bidding by reasons of high transportation cost. Bus bodies will be built by PTC's own workshop, and the cost of the bodies (about US$1.1 million) is excluded from IDA financing. The workshop, which has about 30 years experience of bus body construction, is highly competitive and produces about 400 bodies annually for PTC, as well as for other Indian bus companies. Advisers and consultants' services would be obtained on terms and conditions satisfactory to IDA.

4.22 A schedule of disbursements of the IDA Credit is given in Annex 11. Disbursements will be made as follows:

(a) 45% of expenditures for (i) civil works and (ii) goods and equipment procured through local competitive bidding;

(b) for expenditures on goods and equipment, including bus chassis, procured through international competitive bidding: 100% of the foreign expenditure if imported and 100% of the ex-factory cost if procured from local manufacturers;

(c) 100% of expenditures on loans made to small-scale businesses for machinery and equipment; and

(d) 100% of expenditures on technical assistance.

Any savings after project completion will be cancelled.

F. Accounts and Audit

4.23 Assurances were obtained during negotiations that each executing agency will maintain separate project accounts and that MMDA will compile overall project accounts. Assurances were also obtained that annual audits satisfactory to IDA will be made of the accounts and financial statements of the executing agencies other than the Government departments (DHRW, DSW and Police), and that the individual audited statements will be furnished to IDA not later than eight months after the close of the fiscal year. Audit of the accounts of Madras Corporation have been completed only through fiscal year 1973/74. GTN has agreed to take appropriate steps to bring the audits of the Corporation accounts up-to-date and to furnish outstanding and future audited statements to IDA as follows: (a) for 1974/75, by March 31, 1977; (b) for 1975/76, by July 31, 1977; (c) for 1976/77, by January 31, 1978; and (d) for 1977/78 and following years, within eight months of the close of the fiscal year. Confirmation thereof was obtained during negotiations. Assurances were also obtained that MMDA will prepare and submit to IDA quarterly progress reports on the project including monitoring and evaluation results.

G. Supervision

4.24 About 140 man-weeks of IDA supervision will be required over the project implementation period, with about 60 man-weeks during the first year. Key implementation actions on which the supervision should focus initially were agreed during negotiations and are listed in Annex 10.

V. ORGANIZATION, MANAGEMENT AND FINANCE

A. Madras Metropolitan Development Authority

5.01 MMDA was established as a statutory authority in 1974 pursuant to the Town and Country Planning Act of 1971 (amended). The governing board of MMDA has 21 members, most of whom are senior government officials from the agencies involved in the development of MMA. One of the members is appointed as a full-time member-secretary and is its chief executive officer. MMDA employs a staff of 270, of which 35 are qualified planners, architects and engineers. Its present organization is shown in Chart 3.

5.02 During its relatively brief existence, MMDA has established itself as a strong organization with a competent physical planning staff. However, with its responsibility for the preparation and implementation of the proposed project, MMDA has begun to make a necessary shift from traditional land use and physical planning to more comprehensive urban development planning emphasizing social and economic development as well. Agreement has been reached with MMDA and GTN that to complete this shift and to make MMDA a true development authority, its objectives and work program have to be specified and its staff has to be strengthened and reorganized. A new organizational structure has been outlined by MMDA and GTN; it is shown in Chart 4. A two-year work program for MMDA and the necessary key staff to carry it out is presented in Annex 13, on which agreement was reached during negotiations. The project includes the technical assistance required by MMDA to carry out the program (para 3.20). Major features of the work program and the new organization are summarized below.

5.03 The main objectives of MMDA will be to prepare economic, social and spatial development programs for the metropolitan area, and to initiate, monitor and evaluate their implementation. The programs are to aim at providing low-cost employment opportunities and urban services for the metropolitan population, with particular emphasis on its poorer segments, while considering overall resource mobilization constraints. Rolling five-year and annual capital budgets for the metropolitan area will also be prepared and proposed to the relevant state and local government bodies. For the present, MMDA's role is expected to be one of advising GTN on relative sectoral priorities, but after some experience has been gained from the metropolitan capital budgeting, GTN would consider giving MMDA the power to determine intersectoral investment allocations for MMA.

5.04 Three new departments are to be established within MMDA, for Development Planning, Capital Programming and Financial Management, and Community Development Programs. The present three Area Development Planning departments will be merged into one department and to the extent feasible, their routine work will be transferred to the various local governments. A separate department will be retained for monitoring and evaluating the proposed project.

B. Madras Corporation

5.05 Madras Corporation is constituted as an autonomous authority under the Madras City Municipal Corporation Act of 1919 as amended. It is normally governed by a Council consisting of 120 elected members, who elect a mayor from among themselves. The Council was, however, dissolved in 1974 by GTN who installed a Special Officer to represent the State. A commissioner appointed by GTN is the executive head of the Corporation. The primary functions of the Corporation are to provide infrastructure facilities and services like roads, water supply, sewerage, drainage, street lighting, conservancy, health facilities, elementary education, parks and playgrounds. Its functions also include licensing of buildings and industries and collection of local taxes.

5.06 The Corporation is organized into 14 central departments plus two separate district organizations (North and South). The district organizations are each headed by an Assistant Commissioner and handle all conservancy and maintenance activities in their respective geographical areas. Isolation of the responsiblity for maintenance activities area-wise and from the central departments has not proved satisfactory, mainly because of coordination problems and the lack of an overall assessment of priorities between areas and between maintenance and construction. This issue is for the water supply and sewerage sectors being reviewed by the UNDP/WHO consultants. Assurances were obtained during negotiations that the Corporation will review by December 31, 1977, in consultation with IDA, the organization of its road maintenance activities to ensure that uniform and satisfactory standards of maintenance are applied in Madras. Assurances were also obtained that a new traffic engineering unit will be established under the City Engineer by July 1, 1977 to be responsible for improvements and construction of footpaths and cycle tracks. The tasks of the unit are outlined in Annex 7, Appendix 1, on which agreement was reached during negotiations. Further information on the Corporation's responsibilities for implementing the roads component is in Annex 7.

Finances

5.07 The Corporation obtains its revenues from a variety of sources the most important of which is the property tax collections (about 50% of total revenues of Rs 214 million (US$24 million) in 1975/76). GTN provides minor grants for education, health, special programs, etc., which totalled Rs 16 million (US$2 million) in 1975/76. Capital expenditures (Rs 75 million (US$8 million) in 1975/76) are financed through loans and grants from GTN and loans from the Life Insurance Corporation of India. Until recently, the Corporation has consistently generated deficits on its current accounts and only in 1975/76 did it generate a small surplus. Deficits in the water supply, sewerage, and drainage and education accounts are particularly large and are increasing (Rs 13 million (US$1.4 million) in 1975/76). The Corporation does not make allowances for depreciation. The debt-service ratio is high and fluctuating (28% of self-generated revenues in 1973/74 and 15% in 1975/76). Over the last five years, self-generated revenues of the Corporation have increased by 12% annually in current terms but declined by 4% annually in real per capita terms (see Annex 12).

5.08 The finances of the Corporation have been a subject of continuing concern to GTN. In 1970, consultants (IBCON Pvt. Ltd.) were retained to examine the tax assessment and collection procedures and a high level government committee was appointed to review ways to enhance the Corporation's revenues. A number of specific suggestions have emerged, particularly with regard to assessment and collection procedures and related staff training, but none have yet been implemented. Also, the Corporation needs to revise its accounting procedures and institute proper financial management and control.

5.09 Agreement has been reached with GTN on a number of measures to improve the financial situation of the Corporation and in May 1976 GTN appointed a financial consultant to assist in their implementation:

(a) a Financial Management Department is being established in the Corporation and it is to be headed by a Financial Adviser;

(b) the accounting system of the Corporation is to be revised by April 1, 1978, to more accurately reflect the cost of the different services; and

(c) the key recommendations of the consultants and the Government committee for increasing the Corporation's revenues are to be reviewed and implemented after consultation with IDA.

5.10 Assurances were obtained during negotiations that the Financial Management Department will be established and the Financial Adviser appointed by July 1, 1977, and that the accounting system will be revised by April 1, 1978. Assurances were also obtained that starting with 1978/79 (a) the necessary steps will be taken to increase the Corporation's total self-generated revenues, excluding water supply and sewerage taxes and charges (para 4.19), by a minimum of 8% annually over the project period, over and above revenue increases achieved through the regular revision of property values, and (b) the debt service of the Corporation (excluding water supply and sewerage debts and revenues) in any one year will not exceed 20% of its self-generated revenues. By meeting these objectives, the Corporation would by the end of the project period be generating sufficient additional revenues to (a) cover the additional annual expenditures of about Rs 5 million (US$0.6 million) imposed on the Corporation through the proposed project (debt service for the road component, and maintenance and operating expenditures for the sites and services, slum improvement, and road components); and (b) expand services to meet an annual population growth of 3.5%.

C. Pallavan Transport Corporation

5.11 PTC is a GTN undertaking providing local and long distance bus transport. Its Board of Directors is appointed by GTN. In 1975, PTC was reorganized into three wings - the Metropolitan, District, and Express Wings - each under a separate Managing Director and with separate accounts. The Metropolitan Wing is solely responsible for bus services within the metropolitan area and will be responsible for implementing the proposed bus component.

5.12 The Metropolitan Wing of PTC is well run by a competent management. It has instituted effective systems of financial and management controls and has as a result achieved significant improvements in fleet utilization, fare collection and operating costs. Nevertheless, the annual operating deficit for the Metropolitan Wing, which in 1974/75 was less than 4% of operating revenues, jumped to about 12% in 1975/76 because bus fares were not increased until the end of the fiscal year.

5.13 In order to improve the Metropolitan Wing's financial situation, agreement has been reached with GTN on appropriate measures and their implementation has been initiated (paras 3.18-3.19): (a) bus fares were raised by an average of 22% in March 1976; (b) extensive staggering of working hours in the metropolitan area has been introduced since July/August 1976, to improve fleet utilization; (c) the licensing system restricting the use of buses to particular routes was abolished in July 1976, also to improve fleet utilization; and (d) rescheduling the use of buses according to age is being done to allow for replacement after 12 years instead of 8 years. It is estimated that the above measures will reduce the operating ratio 1/ from 112 in 1975/76 to 103 as early as 1976/77. Assurances were obtained during negotiations that thereafter the operating ratio will not exceed 99 for 1977/78, reducing progressively to 95 by 1980/81, which is equivalent to the following GTN objective being achieved by the end of the project period: the Metropolitan Wing shall be generating sufficient revenues to (a) cover operating expenditures; (b) service its debts; and (c) meet its normal replacement needs. Assurances were also obtained that a debt service coverage ratio 2/ of not less than 1.5 will be maintained starting April 1,1978. These targets would be achieved through a combination of operational improvements, cost reductions, and fare increases as necessary. Further information on PTC, its organization, operation and finances is in Annex 8.

D. Other Executing Agencies

5.14 The other executing agencies are discussed in detail in the annexes, together with the respective project component. Their staffing and organization have been reviewed and found generally satisfactory. One or more separate project execution units will be established by each executing agency. The Department of Highways and Rural Works will establish a traffic engineering unit to be responsible for the important development of appropriate traffic engineering measures in Madras, including traffic circulation and signaling. A traffic management unit will also be established by the Police. The tasks of the units are outlined in Annex 7, Appendix 1. Assurances were obtained during negotiations that the two units will be established by July 1, 1977.

E. Long-Term Improvement Programs for Madras' Poor

5.15 Many vital steps are being taken under the proposed project to initiate development programs that are financially sustainable and that can be expanded to reach the majority of Madras' slum dwellers and poor. Rough estimates indicate that through this project the growth in the slum population

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1/ The percentage of operating costs to operating revenue. Operating costs include depreciation but exclude interest, taxes on revenues, and appropriations.

2/ The ratio of net revenue (gross revenue less operating costs) to debt service costs.

will be halted during the project period (i.e. the present annual growth of about 11,000 households in the total population living on unserviced land without security of tenure will be eliminated); Chart 11 illustrates this graphically. There will be a continuing impact after the project period through future sites and services and slum improvement schemes financed from cost recoveries accruing to the two revolving funds (paras 4.12 and 4.15).

5.16 MMDA has been given the responsibility by GTN to ensure that this broad and long term view of the project and its potential impact is achieved and that necessary steps are taken to permit the sites and services and slum improvement programs to be expanded. An important element of MMDA's work program is to prepare by June 30, 1978, in cooperation with the Tamil Nadu Housing and Slum Clearance Boards, a program for improving all of Madras' slums; confirmation of this was obtained during negotiations. The program is viewed as an extension of the proposed project and would incorporate its key features. Agreement was reached on the terms of reference in Annex 13, Appendix 2 for preparing the program. Assurances were also obtained that GTN will provide to the revolving fund for slum improvement the additional funds required, over and above cost recoveries from beneficiaries, to improve by March 31, 1985 all slum areas in MMA in accordance with this program. It is estimated that this can be achieved without increasing the level of total expenditures by the Slum Clearance Board above the level expected during the project period. The Board would concentrate on improvements once the committed clearance schemes have been completed (para 4.16).

VI. JUSTIFICATION

6.01 The main objective of the project is to redirect a significant part of public investments in the key sectors of housing, employment, social support services, water supply and transport, to directly benefit the low-income population of the metropolitan area. The concept of full cost recovery for key investments has been introduced in the project. This in turn dictated low-cost design solutions affordable by the low-income beneficiaries.

6.02 The shelter component of the project will primarily serve the needs of the population between the 10th and the 45th percentile of income. The economic benefits of the sites and services component are based on the imputed rental value of the serviced residential plots and the market value of the industrial and commercial land provided. The costs include all costs of infrastructure, except the cost of schools and clinics (the benefits of which are not reflected in inputed rental values), net of taxes. On this basis, the economic rate of return for the housing component above is estimated at 12% and for the combined housing and commercial/industrial development at 15%.

6.03 The slum improvement component represents a major shift in government emphasis from its highly subsidized slum clearance/resettlement program to environmental improvement in situ at a fraction of the cost. The project

would directly benefit about 23,000 families at a cost of about US$145 per family as compared with US$1,100 per family required under the clearance/resettlement program. Security of tenure to be provided to the residents will enable the Government to institute a monthly charge to recover the cost of the project. Cost recovery will ensure that the program can be replicated. The measurement of economic benefits of slum improvement is based on the increase in rental value brought about by the provision of infrastructure and other services; the economic rate of return is estimated at 18%.

6.04 The small-scale business component will create at least 4,000 jobs at an investment of US$800 per job. In addition, about 5,000 jobs will be created in cottage industries in the slum areas employing people to be trained under the project. The average investment per job in cottage industry will be about US$225. It is not possible to quantify the economic benefits of the vocational training programs, but its effectiveness can be judged from the fact that a 15% increase in income of the beneficiaries would yield a rate of return of 12%. An increase in income of this magnitude is well within reasonable expectations. There is an element of risk in the component in that it would attempt to provide finance to very small-size businesses that are new and inexperienced. Emphasis has been given to training and follow-up as a part of this component, and it is believed that the risk involved is justified in view of its potential benefits.

6.05 The maternal and child health component will provide basic health and nutritional services to about 17,000 children and 7,000 nursing and expectant mothers in the sites and services and slum areas at an average annual cost, including the cost of nutrition supplements, of less than US$8 per capita. In addition, it will provide basic health education and functional literacy training to about 20,000 women in the age of 15-44 years at a cost of less than US$2.0 per capita. Under the project, these services will be closely integrated with the physical improvement in the slums and the vocational training and support services. The benefits of this component, although not quantifiable, will be substantial in terms of reduced morbidity, possibly reduced mortality, improved nutrition and increased productivity of working mothers.

6.06 The water supply and sewerage component will prevent a further deterioration in the already critical water supply situation in the metropolitan area pending the development of long-term proposals. Since the final selection of the works will be made after the studies now underway are completed, it is not possible to estimate at this stage the full benefits of the component. However, a preliminary assessment of the proposals indicates a return of at least 10% on all proposed investments.

6.07 The roads and traffic improvement component is specifically designed to benefit pedestrians, cyclists and bus riders who account for about 85% of all trips in the metropolitan area. The benefits of the pedestrian facilities are derived from a reduction in accidents and vehicle delays, giving the economic rate of return for the pedestrian subways varying from 11% to 18%. The

benefits of the Inner Ring Road were considered to be savings in road transport costs of all diverted traffic from their present routes along the radials. The economic rate of return for this component is estimated to be 43%. The Inner Ring Road would provide the additional benefits of developing the area by linking together important new areas of employment opportunities to present and future residential areas. The benefits of the road/rail grade separations and bridge widening are derived from the savings in operating costs and travel time of the road users (including commercial trucks, buses, cars, motorcycles and cyclists) resulting from the elimination of waiting time and improved speeds; the rate of return is estimated to be 12%. The rate of return for the six bridges proposed for replacement varies from 15% to over 50% depending on the estimate of the remaining life of the bridges; it is 26% assuming a median life of 3 years. It is not possible to compute the benefits of the minor improvement works proposed for the roads along the various orbital routes. These improvements will help development of the area away from the present radial trends. The justification of the bicycle tracks is based on the comparison with the alternative of widening the existing roads which is considerably more expensive. The standards adopted for the bicycle tracks conform to the minimum standards prescribed by the Indian Roads Congress. The average economic rate of return for the roads and traffic improvement component is estimated at about 28%.

6.08 The benefits of the bus component are derived from the savings in bus operating costs resulting from the replacement of the older buses, and from the reduction in congestion at the terminal facilities. The economic rate of return for the component is estimated at: 46% for bus replacement, 24% for depots, and 15% for terminals. It is not possible to quantify the benefits of providing passenger shelters which will improve the quality of bus service and thus make it more attractive to passengers.

6.09 The estimated weighted average economic rate of return for those components of the project for which benefits could be quantified, and which account for 55% of the project cost, is estimated to be about 21%.

VII. RECOMMENDATIONS

7.01 During negotiations, assurances were obtained on the following main points:

(a) with regard to the proposed water supply and sewerage component, that (i) the final selection of works; (ii) final engineering designs; and (iii) implementation arrangements will be satisfactory to IDA (para 3.15);

(b) that GTN will designate MMDA as the representative of GTN for the purpose of coordinating and carrying out the project in a manner satisfactory to IDA (para 4.06);

(c) with regard to the sites and services component, that (i) settler selection criteria and terms and conditions of plot sales will be satisfactory to IDA (para 4.11); and (ii) a revolving fund will be established by April 1, 1978 and maintained separately for financing sites and services schemes; (para 4.12);

(d) with regard to the slum improvement component, that (i) freehold titles will be issued; (ii) monthly hire-purchase payments averaging Rs 8 per plot and a monthly service charge of Rs 2 per plot will be collected; (iii) vacant land in prime locations will be sold at market prices; and (iv) a revolving fund will be established by April 1, 1978, and maintained separately for financing slum improvement schemes (paras 4.13 - 4.15);

(e) with regard to slum clearance, that (i) the clearance program would be limited primarily to committed schemes with any additional schemes taken up only in accordance with the slum improvement program, and (ii) expenditures on clearance during the project period will not exceed Rs 3.75 crores per year (para 4.16);

(f) that by December 31, 1977 an income survey will have been undertaken to ascertain the level to which rents in the resettlement flats could reasonably be raised (para 4.16);

(g) that Madras Corporation, or any other agency assigned the responsibility for water supply and sewerage services in MMA as a result of the consultants' review, will: (i) with effect from April 1, 1978, maintain water supply and sewerage accounts and funds related thereto separate from all other accounts and funds; and (ii) with effect from April 1, 1979, impose specific water and sewerage charges and taxes to provide sufficient cash flow to meet annual expenditures, including debt service, and provide adequate working capital for these services (para 4.19);

(h) that advisers and consultants' services will be obtained on terms and conditions satisfactory to IDA (para 4.21);

(i) with regard to accounts and audit, that (i) each executing agency will maintain separate project accounts and MMDA will compile overall project accounts, and (ii) annual audits satisfactory to IDA will be made of the accounts and financial statements of the executing agencies other than GTN departments and the audited statements will be forwarded to IDA within eight months after the close of

the fiscal year, with the audits of Madras Corporation being brought up to date according to an agreed schedule (para 4.23);

(j) that MMDA will prepare and submit to IDA quarterly progress reports satisfactory to IDA (para 4.23);

(k) that Madras Corporation (i) by December 31, 1977, in consultation with IDA, will review the organization of its road maintenance activities; and (ii) by July 1, 1977 will establish a traffic engineering unit for improvement and construction of footpaths and cycle tracks (para 5.06);

(l) that Madras Corporation (i) by July 1, 1977 will establish a Financial Management Department and appoint a Financial Adviser; (ii) will revise its accounting system by April 1, 1978; (iii) starting with 1978/79, will increase its revenues by at least 8% annually and (iv) will not exceed a debt-service ratio of 20% (para 5.10);

(m) that the operating ratio of PTC will not exceed 99 for 1977/78, reducing progressively to 95 for 1980/81, and that a debt service coverage ratio of not less than 1.5 will be maintained from 1977/78 (para 5.13);

(n) that by July 1, 1977 a traffic engineering unit will be established by the Department of Highways and Rural Works and a traffic management unit will be established by the Police (para 5.14);

(o) that by June 30, 1978, MMDA in cooperation with TNHB and TNSCB will prepare a program for improving all slums in MMA (para 5.16); and

(p) that GTN will provide to the revolving fund for slum improvement the additional funds required, over and above cost recoveries from beneficiaries, to improve by March 31, 1985 all slum areas in MMA (para 5.16).

7.02 During negotiations, agreement was obtained on:

(a) MMDA's work program, organization and staffing (para 5.02); and

(b) terms of reference for preparing a slum improvement program (para 5.16).

7.03 With the assurances received, the project is suitable for an IDA credit of US$24 million to GOI.

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Profile of Madras Metropolitan Area

A. Historical Perspective

1. The name of Madras is said to be derived from Madraspatnam, a village that existed prior to the settlement of the British. The foundation for the development of the present city was laid in 1639 when the site on which Fort St. George now stands was acquired by the British East India Company. Within a few years of the founding of the British settlement and construction of the fort, the new town which had grown up around it came to be known as Chennapatnam in honor of the father of the local chieftain. The name was later applied to the whole city.

2. The surroundings of this area covering nearly 67 square kilometers and containing within it 16 hamlets were constituted in 1798 as the city of Madras. The area of the city was subsequently enlarged from time to time. Between its founding and the close of the 18th century, the city was the scene of battles between the English, the French and Hyder Ali of Mysore. With British supremacy over the area firmly established by the latter part of the 19th century, the development of the city progressed faster. To facilitate trade, a harbor was built in 1896 to the east of George Town, which had emerged as the main business center. The principal roads and rail lines connected the harbor to the north, west and southern parts of the presidency and they still constitute the main transportation framework for the city. Physical growth of the city has occurred along these access corridors and today the city form approximates a semi-circle with extensions in five different directions.

B. Demography

Structure

3. The Madras Metropolitan Area extends over an area of about 1,166.8 square kilometers and is comprised of the city of Madras, four municipalities (Alandur, Pallavaram, Tambaram and Tiruvottiyur), four townships (Kattivakkam, Madhavaram, Ambattur and Avadi) and 20 panchayats (local authorities serving predominantly rural areas). The city of Madras is the core of the metropolitan area and is the center for all commercial and social activities as well as a living area for over 75% of the total population.

4. Three distinct areas may be identified within the metropolitan area. First, there is the city itself within the limits of Madras Corporation extending over 128.8 square kilometers. Next there are the urban centers and extensions contiguous to the city area, which combined with the city cover an area of 530.8 sq km and are referred to as the Madras Urban Agglomeration (MUA). Finally, there is the rural area with a number of small settlements which make up the remainder of the metropolitan area (see Map IBRD 12401). The demographic characteristics differ according to the definition of the area; those related to the Madras Urban Agglomeration and the city of Madras represent the characteristics of the urban component of the metropolitan area.

Population

5. The population of the Madras Metropolitan Area (MMA) was estimated at 3.48 million according to the 1971 census, of which 2.47 million were located in the city of Madras and 3.17 million in the MUA. The MUA is the fourth most populous metropolitan urban agglomeration in the country after Calcutta, Bombay and Delhi, but it recorded the highest growth rate in the last decade (Table 1). The major increases in the population of the area occurred in the thirty years between 1941 and 1971 (Table 2). The population of Madras city first passed the one million mark around 1943 and then doubled itself in a short span of twenty years. The rate of population growth for the city between 1961 and 1971 was 3.7% per year, while the growth in the MUA in this period averaged over 5% per year. This indicates an expansion of the population outside the city boundaries in the outlying urban areas which include the towns of Tiruvottiyur, Alandur and Pallavaram.

6. The population growth experienced by the area was highest between 1941 and 1951 and between 1961 and 1971 when population growth averaged over 5% per year. The growth between 1941 and 1951 may be attributed to the cessation of the Second World War and the industrial growth after the attainment of independence. The high growth in the 1960s may be attributed to shift in emphasis in the national plans towards industry and consequently the establishment of a number of industries within the suburban fringe of the city.

Migration

7. A substantial part of the growth in urban population in the metropolitan areas has been due to in-migration. Reliable statistics are not available on the quantum and characteristics of migration into the area, but based on the estimates for the natural increases in population, migration into the MUA between 1961 and 1971 has been about 520,000 of which 270,000 came into the city itself. These figures show that approximately 42% of the total population increase in the past decade has been due to migration.

8. Limited evidence is available on the sources of migration into the metropolitan area. It appears that a large portion of the migrants (40-50%) come to Madras from smaller cities in the state. A significant number

of migrants (28%) come from the districts of Chingleput, North Arcot and South Arcot adjoining the metropolitan area. Migrants from other states, particularly the states adjoining Tamil Nadu, account for about 20% of the total migrants.

Population Projections

9. Assuming that the trends in population growth experienced in the past decade have continued, the present population of the metropolitan area would be about 4.4 million, of which about 4.0 million could be expected within the urban agglomeration. With the same trends continuing in the next ten years, the population of the metropolitan areas would reach nearly 7 million in 1985. On the other hand, if the natural growth in population and the migration to the region can be reduced to 3.5% per year--which seems unlikely at this time--the population of the metropolitan area in 1985 would be over 6 million. Thus, even with smaller growth rates, at least 1.5 million people would be added to the metropolitan area over the next ten years.

C. Access to Basic Services

Water Supply and Sewerage

10. Of all the major Indian cities, Madras has the poorest availability of water. Per capita water supply at source is currently less than 70 liters per day (lcd) for combined domestic and industrial purposes, compared with 138 lcd in Calcutta and 145 lcd in Bombay. The distribution facilities are inadequate and as a result many domestic consumers, particularly the poorest, who have to rely on standpipes, receive less than 40 lcd. There are about 92,000 house connections, which would account for less than 20% of households in the city. It is estimated that private wells provide additional 35 million liters per day (mld) of water for domestic and industrial uses. The existing sources of water supply are limited and even with the major investments in the sector now underway, no relief can be expected before 1979-80.

11. Currently about 75% of Madras city is sewered, but the remainder of MMA outside the city boundary has no sewerage system. The capacity of the system is inadequate to handle the present levels of sewage flow. Consequently, some sewage gets diverted into water courses. The absence of an adequate system of storm water drainage contributes to the overloading of the sewer system, particularly during the monsoon period.

Housing

12. The housing situation in Madras, as in other major cities in the world, is far from satisfactory. Nearly one-third of the population of the city lives in slums under poor environmental conditions. According to the

1971 census, there were 446,610 occupied residential houses as against 586,289 households in the metropolitan area, indicating a deficit of about 140,000 houses. In addition, about 21% of the houses were classified as of "kutcha" (temporary) construction, which would require upgrading or replacement. With the expected population increases, an additional 30,000-35,000 houses would be required annually. Unless a major initiative is taken for increasing the housing stock which can be afforded by the majority of the population, slum settlements in Madras are likely to continue increasing.

Education

13. Primary education is the responsibility of the local bodies and secondary education is supported by the State Government. However, because of a lack of facilites, private schools are used by a large segment of the population. There were 589 primary and middle schools in the city in 1971, of which 234 were private. In addition, there are an estimated 500 "unrecognized" schools which have mushroomed all over the city, with a total enrollment of 50,000 to 75,000. There are 167 high schools in the city, the majority of which are private.

14. School enrollment levels in the metropolitan area are fairly satisfactory. It is estimated that 82% of the children in the age group 6-10, 50.7% in the age group 10-14 and 34% in the age group 15-17 are enrolled in schools. However, the main problem is with a lack of adequate facilities, for the lower income families.

D. Economic Base

Income

15. Per capita annual income in Madras city in 1970-71 is estimated at Rs 906 ($101) at current prices, and for the urban area as a whole it is estimated at Rs 855 ($95). This compares with the per capita income for Tamil Nadu State for 1970-71 at Rs 624 ($69) but is considerably lower than the income in Bombay at Rs 1,180 ($131) and even below the average for the predominantly agricultural state of Punjab at Rs 945 ($105). More recent data on income is not available, but if the metropolitan area incomes are assumed to follow the trend for the State as a whole, per capita income in 1974 for the area is estimated at Rs 1,300 ($144) in current prices, which represents a decline of 9.3% in constant prices over 1970.

16. Sectorwise breakdown of income estimates for Madras city and the metropolitan area are given in Table 3. It is noteworthy that the tertiary sector contributes 56.2% of the total income for the metropolitan area and 63.2% of the total income for the city, and the primary sector accounts for 5.2% of the income in the metropolitan area and 1.3% in the city.

Work Force

17. According to the 1971 census the Madras Urban Agglomeration had a working force of 897,517 persons of which 818,965 were males. Distribution of the workers in the three principal sectors was as follows:

	Total Workers	Percentage
Primary	35,950	4.0
Secondary	266,011	29.6
Tertiary	595,556	66.4
	897,517	100.00

18. The participation rate in the MUA was 28.4% compared to 36.8% for Greater Bombay and 32.5% for Calcutta Urban Agglomeration. On the basis of the participation rates in 1971, the present work force in the MUA is estimated at about 1,136,000. It is difficult to estimate the level of underemployment. On the basis of the statistics kept on the current register of employment, it is estimated that up to 15% of the work force may be termed unemployed or underemployed.

ANNEX 1
Table 1

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Comparative Population and Growth Rate in Metropolitan Urban Agglomerations

Ranking	City	Population in millions (1971)	Annual Growth Rate Percentage		
			1941-51	1951-61	1961-71
1.	Calcutta	7.04	2.5	2.2	1.8
2.	Greater Bombay	5.97	5.8	3.4	3.7
3.	Delhi	3.64	-	-	4.4
4.	Madras	3.17	5.2	2.3	5.0
5.	Hyderabad	1.80	-	-	3.5
6.	Ahemdabad	1.74	-	-	3.8
7.	Bangalore	1.65	-	-	3.7
8.	Kanpur	1.28	-	-	2.8
9.	Poona	1.14	-	-	3.8

Source: Compiled from Census of India Reports.

June 22, 1976.

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Growth of Population in India, Tamil Nadu, Madras Urban Agglomeration and Madras City - 1911-1971.

Year	Population (millions)				Relative Share (%)			Annual Growth (%) during decade		
		Tamil			Tamil Nadu	MUA	MC			
	India	Nadu	MUA	MC	India	Tamil Nadu	Tamil Nadu	Tamil Nadu	MUA	MC
1911	252	20.9	0.60	0.56	8.3	2.9	2.7	-	-	-
1921	251	21.6	0.63	0.58	8.6	2.9	2.7	0.4	0.4	0.4
1931	279	23.5	0.77	0.71	8.4	3.3	3.0	0.8	2.1	2.1
1941	319	26.3	0.93	0.86	8.2	3.5	3.3	1.7	1.9	1.9
1951	361	30.1	1.54	1.42	8.3	5.1	4.7	1.4	5.2	5.2
1961	439	33.7	1.94	1.73	7.7	5.8	5.1	1.7	2.4	2.0
1971	548	41.2	3.17	2.47	7.5	7.7	6.0	2.0	5.0	3.7

MVA - Madras Urban Agglomeration

MC - Madras City

Source: Compiled from Census of India Publications.

June 22, 1976.

ANNEX 1
Table 2

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Sectorwise Income for Madras City and Madras Urban Area at Current Prices 1970-71

(Rs in millions)

Sector (1)	Madras City Income (2)	Madras City % (3)	Madras Urban Area Income (4)	Madras Urban Area % (5)	Madras Metropolitan Area Income (6)	Madras Metropolitan Area % (7)
Primary	27.6	1.27	64.5	2.33	156.2	5.22
Secondary	773.4	35.58	1,082.0	39.05	1,152.6	38.51
Tertiary	1,372.9	63.15	1,624.4	58.62	1,684.4	56.27
All Sectors	2,173.9	100.00	2,770.9	100.00	2,993.2	100.00
Mid-year Population (in millions)	2.4		3.1		3.5	
Per Capita income (Rs)	906		894		855	

Source: Directorate of Statistics, Tamil Nadu.

June 22, 1976.

ANNEX 1
Table 3

ANNEX 2

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Sites and Services

1. This annex is organized as follows:

A. Design Population

2. In India, households are normally broken down into the following income groups:

		Rs/month
-	Economically Weak Section (EWS)	0 - 350
-	Low-Income Group (LIG)	350 - 600
-	Middle-Income Group (MIG)	600 - 1,500
-	High-Income Group (HIG)	1,500 +

In Madras, the EWS represents about 60% of the population and to establish appropriate project design standards, it is necessary to further subdivide these classifications. The following sub-categories have been selected:

Household Category	Income (Rs/month)	Percentile
EWS - S /a	up to 150	9
EWS - A	150 - 200	9 - 19
EWS - B	200 - 300	19 - 45
EWS - C	300 - 350	45 - 57
LIG - D	350 - 450	57 - 71
LIG - E	450 - 600	71 - 82
MIG - F	600 - 1,000	82 - 94

/a Most households below the 10th percentile live in slums on the fringe of the city. Their incomes are generally too low for sites and services with core housing, and open plot development in and near existing slums is more appropriate (see Annex 3).

3. The sites and services component aims to reach about the tenth percentile, i.e. those households earning Rs 150 per month, and in order to do this and provide individual services to each lot it has been necessary to provide small plots (down to 40 sq m) and differentially load some of the servicing costs on to industrial, commercial and middle-income lots. Two

thirds of all households accommodated by the sites and services component will belong to the income group below the 45th percentile. The balance will belong to higher income groups. This will provide variety, promote social interaction and the opportunity of differential pricing. Government housing projects in the past have not reached families earning less than Rs 300 per month (except for a few subsidized schemes).

4. It is anticipated that many of the EWS beneficiaries of the sites and services component will be drawn from the slums, where they presently have to live for a lack of any affordable alternatives. A brief analysis of the characteristics of these households is given in Annex 3, para 3.

B. Site Selection

5. The three sites selected (Arumbakkam, Villivakkam and Kodungaiyur) were chosen from among ten alternative sites on the periphery of the city in areas where slums have recently developed and where new industries and middle-income housing schemes have been located. The Inner Ring Road (see Annex 7) will tie two of the sites together and increase their accessibility to other economically active areas.

6. The criteria for site selection included:

(a) location in a 'pressure' area, i.e. an area where the demand from the design group is already identifiable;

(b) location close to employment opportunities;

(c) good transport linkages with the city center;

(d) location near high-income residential areas; and

(e) availability of trunk infrastructure.

7. The Arumbakkam site is located in the western part of the city 9 km from the city center and approximately 600 m from Poonamallee High Road. Water supply is available from the Madras Corporation mains and sewage will be collected at the western end of the site and pumped to the Kayembedu Sewage Farm approximately 1,500 m to the west. Electricity is available for domestic and light industrial use. The proposed Inner Ring Road will abut the site at its south west corner.

8. The Villivakkam site forms part of a former irrigation tank. It is located just beyond the city limits and lies at a distance of 11 km from the center of the city. The site abuts the industrial areas of Paoh, TVS and ICF, and there is a total industrial employment of 25,000 within 3 km. In

addition, the area abuts the Madras - Tiruvallor Road which leads to yet another industrial area, Ambattur, located 3 km to the west. The proposed Inner Ring Road will intersect the Madras-Tiruvallor Road along the western boundary of the site, further reinforcing the industrial and commercial potential of Villivakkam. Water supply will be obtained from four wells to be sunk on the site from where it will be pumped to a 0.9 million liter service reservoir. Sewage will be pumped and treated in stabilization ponds to be located next to the site. Approximately 1,000 lineal meters of open drainage culverts to the Otteri 'Nullah' (an open storm drain) will be required.

9. The Kodungaiyur site is located outside the city's northwestern boundary, approximately 10 km from the city center and not far from the Calcutta Trunk Road. In order to improve the accessibility of the site, approximately 1,200 lineal meters of access road will be required of which approximately 500 lineal meters would run north-south to connect the site with Vyasarpadi (the North Madras Neighborhood Scheme of Tamil Nadu Housing Board) and 700 lineal meters would be required to connect the site with developed areas to the west. Water supply will be obtained from ten wells to be sunk on the site where it will be pumped to two 0.9 million liter service reservoirs. Sewage will be pumped to Kodungaiyur Sewage Farm, which is close to the proposed site.

10. Including access road right-of-way, the three sites cover an area of about 175 ha and would have a population of approximately 74,000:

	Area (ha)	Design Population
Arumbakkam	34.2	13,700
Villivakkam	53.1	21,900
Kodungaiyur	87.3	38,400
Total	174.6	74,000

The overall gross density is approximately 423 persons per ha.

C. Site Layout and Land Use

11. The layouts for the three sites have been designed to make full use of their commercial and industrial employment potential. The amount of land allocated to industrial and commercial use has been determined by the opportunities offered by each individual site and therefore varies from one site to another.

12. The internal network of streets and pedestrian circulation has been connected to the network of adjacent residential settlements and transportation routes. Pedestrian corridors of high retail potential have

been defined linking the sites with existing or proposed focal points, i.e., railway station, bus stops, major transport arteries, employment areas, etc. The residential areas have been distributed on the site in a way to give a higher vehicular accessibility to the larger plots which will bear a greater part of the total infrastructure cost. Land will be differentially priced according to its accessibility.

13. Land use distribution for each site is shown in Table 1 and summarized below for all three sites:

		Area (m^2)	Percent of Total
A.	Marketable land (to which costs are allocated):		
1.	Residential	828,993	47.5
2.	Pre-schools and primary schools	43,547	2.5
3.	High schools	38,803	2.2
4.	Police stations, post offices and health and community centers	13,677	0.8
5.	Central commercial areas	76,700	4.4
6.	Local commercial areas	18,666	1.1
7.	Small industry	113,642	6.5
8.	Kalyanamandapam (social center)	3,944	0.2
	Sub-total	1,137,972	65.2
B.	Non-marketable land (to which no costs are allocated):		
9.	Parks, play fields and open space	138,164	7.9
10.	Cattle yards	8,696	0.5
11.	Street circulation and footpaths	382,753	21.9
12.	Access roads	18,700	1.1
13.	Stabilization pond	60,000	3.4
	Sub-total	608,313	34.8
	Total	1,746,285	100.0

D. Plot Size and Plot Development

14. There are five plot sizes which with varying degrees of on-plot development will provide a total of six options, i.e. one for each design income group:

Option/ Target Group	Plot size (m^2)	Number of plots	% of total	On-plot development
EWS - A	40.0	6,228	46.2	Sanitary core only
EWS - B	46.5	2,742	20.4	Sanitary core plus two side walls
EWS - C	46.5	792	5.9	Sanitary core plus two rooms
LIG - D	74.3	2,077	15.4	None
LIG - E	139.4	1,207	9.0	None
MIG - F	223.0	421	3.1	None
Total		13,467	100.0	

The plot distribution for each site is shown in Table 2.

15. For EWS households, two plot sizes and three different types of cores have been designed in order to accommodate the relatively wide range of incomes in this category. The options and their possible development are illustrated in Sketches 1-3. The designs of the plots are dictated by the ability to pay of the target population. It is assumed that payments of 10-20% of monthly income would be affordable by the lower to low-middle income groups.

16. Type EWS-A is a plot of 40 sq m (13′ x 33′) with a precast concrete sanitary core placed at the rear of the plot. Each core contains a water closet and a shower. Cores are grouped by units of four. It is envisaged that the purchaser will first set up a thatch and adobe hut of about 20 m^2 on the plot. Later, with the help of building materials provided under the project, this hut can be improved gradually and eventually become a house entirely built in durable materials. The monthly payment required for the plot and the superstructure is Rs 20 per month, which would be expected to attract households with incomes of Rs 150 - Rs 200 per month.

17. Type EWS-B is a plot of 46.5 m^2 (10′ x 50′). The superstructure includes a sanitary core (shower and w.c.), two 22 cm thick brick walls along the boundary line of the plot and a thatch roof between the two walls. The covered area is 21 m^2. The first steps to improve the house will be to build front and back walls and possibly to build a permanent roof. A shop facing the street can be added in front of the house. Several further development options are available, including horizontal and vertical extensions. The

monthly payment required for the plot and the superstructure is Rs 30 per month, which would be expected to attract households with incomes of Rs 200 - 300 per month.

18. Type EWS-C consists of a plot of 46.5 m^2 with a sanitary core and a superstructure including two rooms of 10.5 m^2 each. Plots are arranged in cluster form (see Sketch 1 and 3). The walls will be 22 cm thick constructed of bricks laid in cement mortar. The roof will be in precast concrete and the floor will consist of rammed earth with a cow dung finish. A shop or workshop can be added in front of the plot, and the walls and foundation have been designed to withstand a second floor. The monthly payment required is Rs 66 per month which could be afforded by a household with an income of Rs 300-350 per month.

19. Type LIG-D consists of a plot of 74.3 m^2 with electricity, water and sewerage connections, but without built-up sanitary cores. The monthly payment required for the plot is Rs 40. It is expected that the repayment of loans, including land and house construction, will amount to Rs 70 per month which could be afforded by a household with an income of Rs 350-450 per month.

20. Type LIG-E consists of a plot of 139.4 m^2 with electricity, water and sewerage connections, but without sanitary cores. The monthly payment required for the plot is Rs 70. Repayment of total loan including house construction will amount to approximately Rs 100 per month which could be afforded by a household with income of Rs 450-600 per month.

21. Type MIG-F consists of a plot of 223.0 m^2 with electricity, water and sewerage connections, but without sanitary core. The monthly payment required for the plot is Rs 128. Repayment of total loan including house construction will amount to approximately Rs 170 per month which could be afforded by a household with an income of Rs 600 - 1,000 per month.

E. Core Housing Details

Type EWS-A

22. Sanitary core consisting of w.c. and shower built at rear of lot:

	Quantity	Unit	Rate (Rs)	Cost (Rs)
Foundation	1.14	m^3	140	160
Concrete beam	0.16	m^3	140	23
22 cm base brick work	0.22	m^3	140	31
22 cm wall brick work	1.70	m^3	140	238
Doors and door furniture	2	No.	85	170
Plumbing	item			350
Plot surface water drainage	item			100
Sub-total				1,072
Design and supervision 12-1/2%				134
Sub-total				1,206
Water connection				100
Total				1,306

Type EWS-B

23. Sanitary core, two side walls and thatch roof:

	Quantity	Unit	Rate (Rs)	Cost (Rs)
Foundation	1.15	m^3	140	161
Concrete beam	0.33	m^3	140	46
22 cm base brick work	0.67	m^3	140	94
22 cm wall brick work	3.86	m^3	140	540
Door and door furniture	1	No.	85	85
Roof (thatch on bamboo piles)	26	m^2	20	520
Plumbing	item			350
Plot surface water drainage	item			100
Sub-total				1,896
Design and supervision 12-1/2%				237
Sub-total				2,133
Water connection				100
Total				2,233

Type EWS-C

24. Sanitary core and shell for two rooms:

	Quantity	Unit	Rate (Rs)	Cost (Rs)
Sanitary core	1	No.	1,072	1,072
Boundary walls and foundation	item			3,095
Roof	21	m^2	51	1,077
Sub-total				5,244
Design and supervision 12-1/2%				656
Sub-total				5,900
Water connection				100
Total				6,000

Self-Help Construction

25. A large amount of self-help construction is expected to take place on plots of Type EWS-A and B. On Plot A, a temporary shelter will first be erected by the allottee himself at a maximum cost of Rs 800 (depending on the amount of salvaged material brought with the allottee). This temporary shelter will be built in thatch and mud and will be similar to the ones found in slums in surrounding areas. This construction is entirely self-help. At a later stage, the allottee would build brick walls and a roof, either made of asbestos cement sheets, tiles or light prefabricated concrete elements. This construction is likely to be executed through assisted self-help, i.e. a professional mason may be responsible for the overall design and construction and be assisted by members of the household working as laborers. Plots of Type EWS-B can be inhabited immediately with an initial investment of approximately Rs 50. The different stages of construction are described in Sketch 2. Building materials and prefabricated elements will be available on each site through a cooperative store operated by TNHB. The building loans themselves will be given in the form of building materials.

F. On-Site Infrastructure

26. The adopted design criteria have been accepted by the Tamil Nadu Water Supply and Drainage Board and Madras Corporation. They are:

Water Supply

27.	Per capita demand	135 lcd
	Small industry demand	100,000 liters/ha/day
	Peak-flow factor	2.5
	Residential pressure	8 m
	Overhead tank capacity	One third of average daily flow with low water level set at 12 m above ground level
	Average family size	5.5

All materials will conform to the appropriate Indian Standard Specifications (ISS). Individual lot connections will be available.

28. The total demand for water supply at Arumbakkam, which will rely on the municipal water supply, is estimated at about 1.5 mld. The present available municipal water supplies of 200 mld are already inadequate to meet the total needs of MMA (see Annex 6). However, the water requirements of the sites and services project are less than 1% of the available supplies and will be met in the short-term by a reallocation of water from some of the relatively better-off areas. In the long-term, additional water to be made available as a part of the project, and anticipated future GTN investments in the sector, will help improve the situation.

Sewerage

29. The sewers will be designed for a minimum velocity of 0.6 m per second. Each lot will be provided with a sewer connection.

Drainage

30. Stoneware or concrete pipes are to be used with partial or complete concrete surround when the depth to invert exceeds 2.5 m. Manholes will be provided at intervals not exceeding 45 m.

Roads

31. Bus and main routes will have 7-meter carriageways consisting of 1" thick bitumen macadam surfacing laid on two layers of broken stone with a completed thickness of 4" and 2-3/4", with 6" of gravel as base. Minor roads 5 m wide and less will not have a bituminous macadam surface. Footpaths will consist of rolled gravel. Earth drains will be provided on either side of the carriageways.

Street Lighting and Electrity

32. Street lights will be provided at 30 meter centers along with name boards, street trees and dust bins. Electricity connections to individual houses will be available from the Tamil Nadu Electricity Board grid network.

G. Off-Site Infrastructure

33. The details of the off-site infrastructure for the three sites are as follows (excluding design and supervision charges and contingencies):

	----(Rs Lakhs)----	
Arumbakkam		
(a) Access Road		
Land acquisition (0.72 ha)	0.45	
Formation and drainage	1.84	2.29
(b) Sewerage		
1,500 linear meters of 300 mm dia rising main	3.00	
Pumping station 6 meters to invert	7.20	10.20
(c) Water Supply		
1,000 linear meters of 250 mm dia main	2.75	
Sump, overhead tank, pumps and standby diesel engine	7.50	10.25
Sub-total, Arumbakkam		22.74
Villivakkam		
(a) Sewerage		
Pumping station & rising main	9.30	
Stabilization pond	7.10	16.40
(b) Water Supply		
4 wells with pumps, standby diesel engines, rising mains, overhead tank (0.912 million liters storage)	10.05	10.05
(c) Drainage		
Surface-water drainage 1,000 linear meters of open culvert to Otteri Nullah	3.00	3.00
Sub-total, Villivakkam		29.45

Kodungaiyur

(a) Access Road		
Land acquisition (1.15 ha)	0.50	
Formation and drainage	1.86	2.36
(b) Sewerage		
Pumping station	13.67	
Rising main	4.85	18.52
(c) Water Supply		
10 wells with pumps, standby diesel engines, rising mains, 2 overhead tanks with 0.912 million liters storage each)	23.20	23.20
Sub-total, Kodungaiyur		44.08
Total		96.27

34. The cost of access roads and off-site drainage (Rs 7.65 lakhs) would be charged to site development and recovered through land sales. The cost of off-site water supply and sewerage (Rs 88.62 lakhs) would not be charged to site development but recovered through user charges and taxes.

H. Community Facilities

35. The following design standards have been adopted:

(a) Schools

One primary school of 300 pupils for a population of 3,000
One secondary (high) school of 300 pupils for a population of 10,000

(b) Clinics and Community Halls

One unit of each type to be provided for a population of 15,000

36. The facilities will be provided, maintained and staffed by public and private voluntary agencies as follows:

	Arumbakkam		Villivakkam		Kodungaiyur	
	Public	Private	Public	Private	Public	Private
Primary schools	2	2	2	4	2	6
High schools	1		1		1	1
Clinics	1		1		1	1
Community halls	1		1		1	1

Only the publicly provided facilities are included in the project.

I. Cost Estimates and Land Pricing

37. The total cost of the component is Rs 9.3 crores (including physical and price contingencies), as detailed in Table 3. Unit cost indicators on an area, per capita, and per plot basis are given in Table 4. All costs for land acquisition, earthworks, on-site infrastructure, access roads and drainage would be charged to site development, as indicated in Table 3, yielding total chargeable costs and average development cost of land as follows (including physical contingencies):

	Total Chargeable cost (Rs lakhs)	Marketable land (m^2)	Average development cost (Rs/m^2)
Arumbakkam	66.03	232,521	28.4
Villivakkam	118.04	330,256	35.7
Kodungaiyur	177.71	575,195	30.9
Total	361.78	1,137,972	31.8

38. Since the cost differences between the sites are caused by physical on-site conditions and not by different locational advantages, the average cost will be applied to all sites. The actual sale price will, however, vary with the type of plot and its location within each site. Part of the surplus realized particularly from sale of prime commercial and industrial land, selling at about Rs 90 per m^2, will be utilized to reduce the price of EWS plots to an average of only about Rs 1 per m^2. Average sale prices by type of plot and land use and total sale values are indicated in Table 5. An overall surplus would be realized which would be used to cover defaults, and the remainder put back in the revolving fund.

J. Financial Analysis

39. The cost of each type of residential plot with on-plot development, and the income groups reached, would be as follows:

Plot Type	Cost (Rs)				Monthly Payment (Rs)	Income Group Reached (Rs/month)
	Plot	Core	Material	Total		
EWS - A	40	1,435	500	1,975	20	150 - 200
EWS - B	47	2,455	500	3,002	30	200 - 300
EWS - C	47	6,600	-	6,647	66	300 - 350
LIG - D	3,690	-	-	3,690	40	350 - 450
LIG - E	6,435	-	-	6,435	70	450 - 600
MIG - F	10,845	-	-	10,845	128	600 - 1,000

The terms are 10% down and the balance at 12% annual interest rate over 20 years (EWS), 15 years (LIG) and 12 years (MIG). The commercial land will be sold at the market price of Rs 45 to Rs 85 per m^2 depending on the location. The industrial land will be sold by SIDCO (Annex 4).

40. All revenues will go into a revolving fund to be used for future sites and services schemes. Table 6 gives the cash flow estimate for the fund.

K. Tamil Nadu Housing Board

41. The sites and services component would be implemented by TNHB. The TNHB was established as a statutory body in April 1961 to undertake housing programs in the entire state. The Board is comprised of 10 members nominated by GTN, a majority of whom are officials from the various government departments. TNHB has its headquarters in Madras and maintains a number of regional units all over the State. It has a large compliment of well qualified engineers and support staff for administration and accounting. The technical wing is headed by a Chief Engineer, who has three Executive Engineers under him each in charge of one of three circles. In addition, there are separate wings under the Chief Engineer for design, planning, and architecture, and a special cell which handles all HUDCO financial schemes (see Chart 7).

42. Since its inception, TNHB has completed over 25,000 housing units under the various schemes and in addition has developed over 50,000 housing sites. More than half of the activities of the Board have been concentrated in Madras and its surroundings. Table 7 indicates the progress of the various TNHB schemes up to the end of 1975. A large portion of the houses constructed by the Board up to now has been directed at the upper-income and middle-income families, which constitute less than 25% of all families in Madras. However,

in the last two or three years, TNHB has started to devote a greater part of its activities to the needs of the EWS. Even so, it is believed that its lowest cost schemes (e.g. the EWS Scheme and the Special Low Cost Housing Schemes) are beyond the reach of over 50% of the city's population.

43. The various schemes of TNHB are financed by loans from Government and public sector agencies, such as HUDCO, Life Insurance Corporation, and to a limited extent from banks and public borrowings. The terms and conditions of the loans vary for the different schemes and for the different sources. A statement showing capital expenditures and sources of funds for the last 8 years is given in Table 8. Each individual housing scheme is expected to be financially viable; the sale price must cover all development and supervision costs and finance charges. Sale of the completed units is on the same terms and conditions as obtained by TNHB and a service charge is added for administrative costs. The collection record has been outstanding with very few defaults.

L. Economic Evaluation

44. The sites and services component is expected to have substantial influence on GTN's approach to urban shelter and infrastructure for lower-income groups. It would demonstrate the feasibility of undertaking self-help housing which can be afforded by the low-income population. The project would shift the attention of the authorities responsible for housing from their present emphasis on middle-income and upper-income housing towards the needs of this population group. The creation of the revolving fund would ensure that the approach of sites and services would be adopted over the longer-term.

45. The measurement of the economic benefits is based upon the estimate of imputed rental value for the dwellings to be constructed. A comparison with rental values elsewhere in the metropolitan area with similar service conditions as in the three sites included in the project indicates monthly rents of Rs 90 for the 40-50 m^2 plot with two rooms constructed by self-help; Rs 120 for the 75 m^2 plots with two rooms[1/]. For the larger plots, the actual payments made by the purchasers of the plots are assumed to represent the benefits derived as these payments would indicate the willingness to pay. For lots designated for commercial and industrial uses, benefits have been computed at the market value of Rs 90 per m^2.

46. Costs considered in the economic analysis include site preparation, core construction, on-site infrastructure, an allocated share of off-site infrastructure, materials for self-help house construction, imputed value of self-help labor (assumed at 50% of market wages), project administration and

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1/ See "Space and Shelter for Urban Population: A Report on Madras City", prepared by the School of Architecture and Planning, Madras (undated).

physical contingencies. Land was priced at the market value prior to development, which was considered to reflect opportunity cost. On this basis, the internal economic rate of return of the sites and services component as a whole is estimated at 15%. The rate of return for the housing component alone (excluding all other marketable land and the associated development costs) is estimated at 12%. A reduction in the rental value of the houses by 20% or an increase in project cost by 20% would still give an acceptable rate of return of 10% for the total project and 8% for the housing component alone.

ANNEX 2
Table 1

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MADRAS URBAN DEVELOPMENT PROJECT

Land Use Distribution by Site

	Arumbakkam		Villivakkam		Kodungaiyur		Total	
	Area (m^2)	%	Area (m^2)	%	Area (m^2)	%	Area (m^2)	%
A. Marketable Land (to which costs are allocated)								
1. Residential	154,621	45.2	244,670	46.1	429,702	49.2	828,993	47.5
2. Pre-schools & Primary schools	10,600	3.1	13,400	2.5	19,547	2.2	43,547	2.5
3. High schools	7,200	2.1	13,300	2.5	18,303	2.1	38,803	2.2
4. Police stations, post offices, health and community centers	3,200	0.9	1,886	0.4	8,591	1.0	13,677	0.8
5. Central commercial areas	30,700	9.0	8,000	1.5	38,000	4.4	76,700	4.4
6. Local commercial areas	3,200	0.9	2,900	0.5	12,566	1.4	18,666	1.1
7. Small industry	22,000	6.4	45,100	8.5	46,542	5.3	113,642	6.5
8. Kalyanamandapam	1,000	0.3	1,000	0.2	1,944	0.2	3,944	0.2
Sub-total, A	232,521	68.0	330,256	62.2	575,195	65.9	1,137,972	65.2
B. Non-Marketable Land (to which costs are not allocated)								
9. Parks, play fields and open space	25,879	7.6	34,394	6.5	77,891	8.9	138,164	7.9
10. Cattle yards	2,400	0.7	2,700	0.5	3,596	0.4	8,696	0.5
11. Street circulation and footpaths	74,000	21.6	103,735	19.5	205,018	23.5	382,753	21.9
12. Access roads	7,200	2.1	-	-	11,500	1.3	18,700	1.1
13. Stabilization pond	-	-	60,000	11.3	-	-	60,000	3.4
Sub-total, B	109,479	32.0	200,829	37.8	298,005	34.1	608,313	34.8
Total	342,000	100.0	531,085	100.0	873,200	100.0	1,746,285	100.0

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Table 2

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Residential Plot Distribution by Site

Plot Type	Plot Area (m^2)	Number of Plots							
		Arumbakkam		Villivakkam		Kodungaiyur		Total	
		No.	%	No.	%	No.	%	No.	%
EWS-A	40.0	1,145	46	1,933	48	3,150	45	6,228	46
EWS-B	46.5	506	20	820	20	1,416	20	2,742	20
EWS-C	46.5	198	8	198	5	396	6	792	6
LIG-D	74.3	344	14	603	15	1,130	16	2,077	15
LIG-E	139.4	210	8	350	9	647	9	1,207	9
MIG-F	223.0	96	4	120	3	205	3	421	3
Total		2,499	100	4,024	100	6,944	100	13,467	100

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ANNEX 2
Table 3

MADRAS URBAN DEVELOPMENT PROJECT

Detailed Cost Estimates - Sites and Services Component
(Rs Lakhs)

	Arumbakkam	Villivakkam	Kodungaiyur	Total
A. Land Acquisition*	21.38	6.33	38.24	65.95
B. Earthworks*	1.00	35.00	13.00	49.00
C. On-Site Infrastructure *				
1. Roads	4.63	6.70	14.05	25.38
2. Drainage	2.73	4.32	9.48	16.53
3. Street lighting and electricity	6.45	10.75	20.85	38.05
4. Water supply	8.50	13.20	21.00	42.70
5. Sewerage	9.70	16.25	29.62	55.57
6. Landscaping, trees	0.78	1.05	2.34	4.17
Sub-Total, C	32.79	52.27	97.34	182.40
D. On-Plot Development *				
1. Type A cores (@ Rs 1,172)	13.42	22.65	36.92	72.99
2. Type B cores (@ Rs 1,996)	10.10	16.37	28.26	54.73
3. Type C cores (@ Rs 5,344)	10.58	10.58	21.16	42.32
4. Self-help building materials	8.26	13.76	22.83	44.85
Sub-Total, D	42.36	63.36	109.17	214.89
E. Off-Site Infrastructure				
1. Access roads*	2.29	-	2.36	4.65
2. Drainage*	-	3.00	-	3.00
3. Water supply**	10.25	10.05	23.20	43.50
4. Sewerage**	10.20	16.40	18.52	45.12
Sub-Total, E	22.74	29.45	44.08	96.27
F. Community Facilities				
1. Primary schools (2 per site)	2.67	2.67	2.67	8.01
2. High schools (1 per site)	3.11	3.11	3.11	9.33
3. Clinic and community hall (1 per site)	1.09	1.09	1.09	3.27
Sub-Total, F	6.87	6.87	6.87	20.61
Sub-Total, A-F	127.14	193.28	308.70	629.12
G. Design and Supervision (12.5% on all items except A)	13.22	23.37	33.81	70.40
Sub-Total, A-G	140.36	216.65	342.51	699.52
H. Physical Contingencies (10% on all items except A and D-4)	11.07	19.66	28.14	58.87
Sub-Total, A-H	151.43	236.31	370.65	758.39
I. Price Contingencies (see para. 4.03)	32.77	57.95	83.77	174.49
TOTAL	184.20	294.26	454.42	932.88

* To be recovered through plot and land sales.
** To be recovered through specific user charges and taxes.

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MADRAS URBAN DEVELOPMENT PROJECT

Summary Unit Costs for Sites and Services

Component	Estimated Cost (1976 Prices) /1		Cost per Gross Hectare		Cost per Marketable Hectare /2		Cost per Capita /3		Cost per Plot /4	
	Rs m	US$'000	Rs'000	US$	Rs'000	US$	Rs	US$	Rs	US$
A. Land	6.60	735	37.7	4,190	57.9	6,433	65.0	7.2	356.8	39.6
B. Site Preparation	6.05	675	34.6	3,841	53.1	5,897	59.5	6.6	327.0	36.3
C. On-Site Infrastructure, of which:	22.10	2,455	126.3	14,032	193.9	21,540	217.5	24.2	1,194.6	132.7
- Roads	3.15	350	18.0	2,000	27.6	3,070	31.0	3.5	170.2	18.9
- Drainage	2.05	230	11.7	1,302	18.0	1,998	20.2	2.3	110.8	12.3
- Lighting	4.70	520	26.9	2,984	41.2	4,581	46.2	5.1	254.1	28.2
- Water Supply	5.30	590	30.3	3,365	46.5	5,166	52.2	5.8	286.5	31.8
- Sewerage	6.90	765	39.4	4,381	60.5	6,725	67.9	7.5	373.0	41.5
D. On-Plot Development, of which:	26.65	2,960	152.3	16,921	233.8	25,975	262.3	29.1	1,440.5	160.0
- Core Units	21.10	2,345	120.6	13,397	185.1	20,565	207.7	23.1	1,140.5	126.7
- Self-Help Building Materials	5.55	615	31.7	3,524	48.7	5,410	54.6	6.0	300.0	33.3
E. Off-Site Infrastructure, of which:	11.95	1,330	68.3	7,587	104.8	11,647	117.6	13.1	645.9	71.7
- Access Roads	.60	70	3.4	381	5.3	585	5.9	.7	32.4	3.6
- Drainage	.35	40	2.0	222	3.1	341	3.4	.4	18.9	2.1
- Water Supply	5.40	600	30.9	3,429	47.4	5,263	53.2	5.9	291.9	32.4
- Sewerage	5.60	620	32.0	3,555	49.1	5,458	55.1	6.1	302.7	33.6
F. Community Facilities, of which:	2.55	285	14.6	1,619	22.4	2,485	25.1	2.8	137.8	15.3
- Schools	2.15	240	12.3	1,365	18.9	2,095	21.2	2.4	116.2	12.9
- Clinics, Community Halls	.40	45	2.3	254	3.5	390	3.9	.4	21.6	2.4
TOTAL	75.90	8,440	433.8	48,190	665.9	73,977	747.0	83.0	4,102.6	455.6

/1 Includes design and supervision costs and physical contingencies.
/2 Includes all land for residential, commercial, industrial and institutional use (114 ha).
/3 Cost attributable to the residential area (83 ha) divided by the population served (74,000).
/4 Cost attributable to the residential area divided by number of plots (13,470).

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Table 4

ANNEX 2
Table 5

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MADRAS URBAN DEVELOPMENT PROJECT

Plot Sale Prices

Type of Plot/ Land Use	Average Price (Rs/m^2)	Total Area To be Sold (m^2)	Total Sale Value (Rs lakhs)
EWS-A	1	248.310	2.48
EWS-B	1	127,420	1.27
EWS-C	1	36,804	0.37
LIG-D	45	154,321	69.45
LIG-E	45	168,256	75.71
MIG-F	45	93,883	42.25
Community facilities	30	96,027	28.81
Central commercial	85	76,700	65.20
Local commercial	45	18,666	8.40
Small industry	90	113,642	102.28
Kalyanamandapam (social center)	90	3,944	3.55
TOTAL	35	1,137,972	399.77

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MADRAS URBAN DEVELOPMENT PROJECT

Cash Flow Projections for the Revolving Funds Established Under the Sites and Services Component
(Rs lakhs, by Calendar Year)

	1977	1978	1979	1980	1981	1982	1983	1984	1985
Revenues /1									
Project funds	166.0	316.0	333.0	85.0	-	-	-	-	-
Sale of Residential Plots:									
Downpayments	-	19.1	24.0	13.2	2.2	1.6	-	-	-
Monthly payments	-	12.1	39.4	63.0	72.8	75.2	76.2	76.2	76.2
Sale of Commercial Land:									
Downpayments	-	5.3	5.8	6.4	1.2	1.3	-	-	-
Monthly payments	-	1.9	5.8	10.1	12.7	13.6	14.1	14.1	14.1
Sale of Industrial Land: /2									
Downpayments	-	4.9	9.4	10.3	1.6	1.8	-	-	-
Monthly payments	-	1.7	6.8	13.7	18.0	19.2	19.8	19.8	19.8
Interest /3	-	-	1.1	2.3	2.8	2.7	2.8	2.7	2.7
Sub-total	166.0	361.0	425.3	204.0	111.3	115.4	112.9	112.8	112.8
Less Defaults (5% of monthly payments)	-	0.8	2.6	4.3	5.2	5.4	5.5	5.5	5.5
Total Revenues	166.0	360.2	422.7	199.7	106.1	110.0	107.4	107.3	107.3
Expenditures /4									
Construction works and building materials (under the proposed project only)	165.6	315.4	332.3	86.7	-	-	-	-	-
Total Expenditures	165.6	315.4	332.3	86.7	-	-	-	-	-
Annual Surplus	0.4	44.8	90.4	113.0	106.1	110.0	107.4	107.3	107.3

/1 Sale patterns and prices are estimated as follows:

	1978	1979	1980	1981	1982
Pattern					
Residential	35%	40%	20%	3%	2%
Commercial	30%	30%	30%	5%	5%
Industrial	20%	35%	35%	5%	5%
Price escalation over 1976 base	1.19	1.31	1.44	1.58	1.74

/2 Terms are 20% down and the balance at 12% over 10 years.
/3 It is assumed that the fund is interest bearing at 5% per year and that interest is earned on the surplus in each year for six months before it is utilized for new construction.
/4 Administrative costs are capitalized and charged to construction.

ANNEX 2
Table 7

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MADRAS URBAN DEVELOPMENT PROJECT

Major Schemes of Tamil Nadu Housing Board 1/

(completed up to 12/31/75)

Name of Scheme	Number of Units Completed		
	Madras	Other	Total
Land acquisition & development 2/	40,871	9,454	50,325
Economically weaker section Housing Scheme	843	3,115	3,958
Low Income Group Housing Scheme	3,947	2,496	6,443
Middle Income Group Housing Scheme	3,842	535	4,377
T.N. Government Rental Housing Scheme	2,113	5,644	7,757
Special Low Cost Housing Scheme	994	1,500	2,494
Total Housing Units	11,739	13,290	25,029

1/ Not including about 10,000 slum clearance tenements constructed before 1971 when the Slum Clearance Board took over this scheme.

2/ Indicates number of plots up to 1974.

SOURCE: Tamil Nadu Housing Board

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MADRAS URBAN DEVELOPMENT PROJECT

Capital Receipts and Expenditures of Tamil Nadu Housing Board
(Rs lakhs)

Year	Receipts								Expenditures			
	Loans and Advances from Government	Loan from HUDCO	Public Loan	Fixed Deposit	Loan from L.I.C.	Loan from Banks	Sale of Plots & Buildings	Miscellaneous	Total	Repayment of loan to all sources	Works Expenditures	Stores Tools and Plants	Total
1968-69	326	-	110	-	-	-	129	-	565	36	399	17	452
1969-70	248	-	220	-	-	8	163	-	639	81	527	(-) 97	511
1970-71	335	-	110	-	-	-	223	-	668	84	665	(-) 55	694
1971-72	205	92	110	28	-	100	114	56	705	122	723	(-) 48	796
1972-73	306	97	110	13	100	50	158	68	902	187	707	(-) 2	892
1973-74	789	103	110	91	-	176	214	14	1,497	489	861	(-) 195	1,155
1974-75	202	209	242	72	-	-	259	-	984	156	1,147	105	1,408
1975-76 (estimate)	353	450	262	50	-	-	272	-	1,387	223	1,258	23	1,504

Source: Tamil Nadu Housing Board

ANNEX 2
Table 8

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Slum Improvement

1. It is estimated that in 1971 about 940,000 people were living in slum areas 1/ in the Madras Urban Agglomeration (MUA). The slums are not confined to specific areas but scattered throughout the city. The slums are not large, averaging some 130 huts per slum, with the largest having about 2,000 huts. In addition, it is estimated that there are approximately 10,000 pavement dwellers mostly located in Georgetown (the Central Business District) and in the harbor area. No reliable data exists on the growth of the slums but it is estimated that the growth is on the order of 14,000 households per annum. Estimates for 1961 and 1971 and tentative projections for 1981 and 1991, indicate the following situation in the MUA, unless suitable measures are taken:

	1961	1971	1981	1991
Total population (000)	1,940	3,170	4,920	7,280
Annual growth rate		5%	4.5%	4%
Slum population (000)	462	940	1,680	2,610
Annual growth rate		7.4%	6.0%	4.5%
Slum population, in percent of total population	24%	30%	34%	36%

2. Even with the conservative growth assumptions used above, it is apparent that major steps would have to be taken to reverse the trend, as proposed under the project.

3. An analysis of income levels and general characteristics of the slum population indicates the following major household types:

(a) Type 1 households are predominatly located in slums on the periphery of the city and work or seek work in industries located in the western and northern parts of the urban area. These households frequently try to augment their incomes by providing services to neighboring higher income families. They typically live in thatch huts of about 18 m^2 each, in

1/ A slum area is defined as an unserviced area with population settlements without tenure.

relatively low density settlements. They have practically no access to urban services; water supply is obtained from shallow wells with handpumps mostly shared by about 50 households each. Many of the settlements are in constant danger of flooding during the rainy season as the area has no overall surface drainage system. Each household has access to a sheltered bathing area usually undrained and shared by several other households. Usually, no FOLs ("flush out latrines") are available. Whether squatting on public or private land, these households have no security of tenure. About half of them own their own structures and therefore are not paying any rent at all. The other half are each paying about Rs 10 per month to the owner of the hut.

(b) Type 2 households are generally located in dense slums in the immediate periphery of the urban center and have or seek employment in the city. The level of urban services is somewhat higher than for Type 1, but the high density of the settlements makes physical improvement difficult. These households frequently aspire to a better environment, but the present formal housing market does not offer any possibility given their incomes which are between Rs 200 and Rs 350 per month. They might be willing to move their place of residence farther from their job location and commute to the city center with the extra time and expense being offset by the quality of urban environment and the security of tenure which will be available to them in a sites and services project.

(c) Type 3 households are new migrants who are likely to be more concerned with finding employment than housing. For them, site location and surrounding employment opportunities are particularly important.

Selection of Slums for Improvement

4. The slum improvement component of the project is concentrated in areas which are developing fastest, i.e. the northern and western parts of Madras. A total of 85 slums covering a total area of 185 ha with a present population of about 23,000 households will be improved (see Map IBRD 12401). Two other major components of the project, the Inner Ring Road and the three sites and services schemes, are also located in these areas.

Potential for Improvement of Various Slums

5. Among the slums selected for improvement, some have reached saturation density and size, because the land they occupy is limited by fixed boundaries which do not permit them to expand any more. Other slums are still in the development process and are growing by encroaching on agricultural or unused adjacent land. In the high density slums the scope of possible action is

somewhat limited by the lack of space. Their most pressing problems are drainage, water supply and lack of social services. Low density slums are usually clustered in small settlements on land formerly used for agriculture and in addition to lack of urban services, they have a problem of accessibility. They also often face a severe flooding problem which can only be solved by draining an area much larger than the site they presently occupy. Very often small, low density slums are separated from each other by tracks of unused land which are likely to be occupied by new slums in the future. This empty land between settlements provides opportunities for the creation of social services and employment and can be allocated in a controlled way for new settlers whose income and expectations are below those envisaged for the sites and services component of the project.

6. The improvement program proposed takes into account the different improvement possibilities created by the various densities. In the dense slums, the program will emphasize improved water supply, drainage and social services, whilst in the low density slums, it will also include better accessibility and integration with the surrounding urban fabric together with the provision of new partially serviced plots on the space available within the slum area and on the adjoining open space. Small industry and artisan areas will be created where suitable site locations can be found. Typical improvement schemes are illustrated in Sketch 4 for a low density slum and in Sketch 5 for a high density slum.

Proposed Improvements

7. In high density slums, the improvements would consist of:

(a) public latrines (flush toilets), drained to septic tanks located in places accessible by truck;

(b) public standpipes for water supply;

(c) paving of footpaths; and

(d) improvements to waste water and surface water drainage.

8. Similar improvements would be provided in low density slums, but in addition the following steps would be taken:

(a) vacant and publicly owned land in and around the slums would be identified and an overall development plan would be prepared, often incorporating several small slums located close to each other, and giving particular attention to the possibility of reinforcing commercial and industrial development;

(b) open residential plots would be developed and sold to new-comers on the same terms as the improved occupied plots; and

(c) commercial and industrial land would be developed and auctioned off, to stimulate employment creation and to assist in recovering the cost.

9. Security of tenure will be ensured through the provision of freehold titles. This will stimulate further self-help improvements and reduce defaults on payments.

10. The project will also support employment generation and social programs as part of the improvements, through the small-scale business component (Annex 4) and the maternal and child health component (Annex 5).

Service Levels

11. The following service levels have been adopted:

(a) one flush toilet per 10 households;

(b) one bathing facility per 10 households;

(c) one standpipe per 10 households;

(d) vehicular access will be provided to septic tanks serving centrally located toilets and bathrooms;

(e) vehicular access will be provided to within 50 m of each hut;

(f) paved pedestrian access will be provided to each hut;

(g) one street light will be provided per 40 m of vehicular roads and footpaths; and

(h) one primary school per 3,000 persons, and one secondary (high) school per 10,000 persons; the actual number of schools to be provided will be determined considering the extent to which schools in the surrounding areas can meet the demand.

12. Assuming a water consumption of 30 lcd in the improved slum areas, some 5 mld of additional water supply would be required. It is estimated that about 50% of the slums would be served from wells and the remaining will be connected to the municipal system. The present available municipal

supplies of 200 mld are already inadequate to meet the overall water demand in MMA (see Annex 6). However, the water to be made available in the slum areas represents only about 2% of the total available supplies which will be accommodated by reallocation of water from some of the relatively better supplied users. The problem would be eased somewhat with the additional water which will be available as a result of the proposed water supply system improvements included in the project.

Cost Estimates

13. The cost estimates are based on plans and engineering designs for typical slums. A description of four typical slums (two low density and two high density) is given in Tables 1 to 4 together with detailed cost estimates for the proposed improvements. Table 5 contains detailed cost estimates for the component as a whole, summarized below on a per capita and per unit basis, excluding contingencies but including design and supervision charges (further unit cost estimates are shown in Table 6):

		Quantity	Unit	Rate (Rs)	Total Cost (Rs lakhs)
(a)	Provision of roads, footpaths, surface water drainage, street lighting, water taps, centrally located toilets and washing facilities	23,000	House-hold	1,300	299.0
(b)	Provision of services to new/ open plots (in low density slums)	7,500	House-hold	1,040	78.0
(c)	Provision of services to commercial and industrial land	166,600	m^2	24	40.0
(d)	Primary schools (project includes 10 out of a requirement of 20) /a	10	School	125,000	12.5
(e)	High schools (project includes 3 out of a requirement of 5) /b	3	School	350,000	10.5
		TOTAL			440.0

/a In existing slums, 62.7% of the children attend primary school nearby and therefore the need is for approximately 14 new schools. Six new schools are required in new/open plot areas.

/b In existing slums, 3 new schools are required. Two new schools are required in new/open plot areas.

Financial Analysis

14. Monthly hire-purchase payments averaging Rs 8 per residential plot will be collected, plus a service charge of Rs 2 per month per plot. Hire-purchase payments will be made over 20 years. Commercial and industrial land will be auctioned off at prices expected to average Rs 60 per m^2.

15. All revenues will go into a revolving fund to be used for future slum improvement schemes. Table 7 gives the cash flow estimate for the fund.

Tamil Nadu Slum Clearance Board

16. The slum improvement component will be implemented by TNSCB. The TNSCB was established in 1971 as a statutory body to take over all slum improvement and clearance/resettlement activities in the city of Madras. Until then, this work was the responsibility of the Tamil Nadu Housing Board. The Board is comprised of a Chairman appointed by GTN and 23 members, of which eight are senior government officials. Under its Act, TNSCB has wide powers for clearance, relocation and improvement of slum areas in Madras.

17. TNSCB is organized into two functional branches (Chart 8). The Engineering Branch, headed by a Chief Engineer, is responsible for planning, design and execution of all works. The functions of revenue collection, accounting, administration and statistics are under a separate branch headed by a Secretary. The Chief Engineer is assisted by a Superintending Engineer, an Executive Engineer responsible for design and planning, and one Executive Engineer for each of the six divisions into which the city has been divided for the purpose of implementation of schemes.

18. Although TNSCB has been assigned the responsibility of both slum improvement and clearance/resettlement, up to now its main emphasis has been on the latter. Under the clearance/resettlement program, it has cleared a number of slums and has constructed multi-story flats in their place to accommodate the residents of the cleared slums.

19. The slum clearance program has been almost entirely financed from grants. Each flat costs about Rs 10,000 (US$1,100). The monthly rent of about Rs 10 (US$1.10), which has been prescribed as a ceiling by GTN, merely covers about 10% of the cost of flats, assuming an interest rate of 12%. Expenditures of TNSCB on slum clearance and improvement over the past five years are shown in Table 8. In spite of heavy expenditures, the impact of the program on the slum population in Madras has been insignificant.

20. For the execution of the slum improvement schemes proposed under the project, TNSCB will establish three separate divisions which will be responsible exclusively for the execution of these schemes. Each division

will be headed by an executive engineer. The design and surveys for the improvement works will be carried out by a separate planning unit in the Planning Cell.

Economic Evaluation

21. The slum improvement component would generate a wide range of benefits, including improvements in living conditions of some 23,000 families currently living in slum areas of Madras. Improvements in the physical environment, including provision of water supply, communal toilets, paved footpaths and removal of stagnant surface water during the rainy season, will have a direct effect on the health of the residents. Experience in other cities has shown that security of tenure to be provided to the residents covered by the project will encourage them to make investments in the improvement of their dwellings. Training and social support programs (see Annex 4 and 5) provided as complementary inputs to slum improvement will improve the economic and social well-being of the slum dwellers.

22. The economic benefits of slum improvement are measured by the possible increases in rental values of the property which would take place as a result of the improvement. While this approach must be subject to several qualifications, since certain benefits such as those which are health-related may be only very imperfectly reflected in property values, it does provide a useful indicator of the minimum economic value of the project.

23. A comparison of land values in low-income areas elsewhere in the city which have access to basic infrastructure facilities indicates that an average rental value of Rs 25 per month for a 15 m^2 dwelling can be expected after improvement. 1/ The commercial land to be developed in the vicinity of the slums as a part of the improvement program has been valued at its estimated market value of Rs 60 per m^2 (two thirds of the value under the sites and services component). The economic rate of return using these assumptions is calculated to be 18%. A 20% increase in project cost would reduce the rate of return to 14% and a 20% reduction in benefits would result in a rate of return of 13%.

1/ See "Space and Shelter for Urban Population: A Report on Madras City," prepared by the School of Architecture and Planning, Madras (undated).

ANNEX 3
Table 1

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Typical Slum Improvement Scheme I

Summary Description

Name of Slum	:	Somasundra Bharathi Nagar
Locality	:	Vijaya Gardens, Division No. 114
Area	:	0.95 hectare
No. of households in the slum	:	162
Density	:	170 households/hectare
Type of Slum	:	Low density
No. of additional open plots to be provided	:	Nil
Total of households at saturation	:	162
Average size of plots	:	20 m^2
Total base cost of proposed improvements	:	Rs 186,320
Cost/household	:	Rs 1,150

Provision of Public Facilities

	Required	Existing	Proposed
Bath and F.O.L./1	17	5	12
Public water tap	15	-	15
Street light	17	17	-
Pre-School	1	-	1
Cottage industry shed	1	-	1

Detailed Cost Estimates

Description	Quantity	Rate (Rs)		Total Cost (Rs)
Construction of bath and F.O.L.	12 sets	3,050	per set	36,600
Septic tank for bath and F.O.L.	1 No.	6,350	each	6,350
Laying of water main	685 meters	63.52	per meter	43,510
Construction of 12'0" diameter public well	1 No.	31,860	each	31,860
Construction of pump room and overhead tank including pump	1 No.	5,760	each	5,760
Public water taps	15 Nos.	510	each	7,650
Formation of roads, bitumen surface	1,858 m^2	18.24	per m^2	33,890
Sub-total				105,620
Design and supervision				20,700
Total				186,320

/1 Flush out latrine

ANNEX 3
Table 2

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Typical Slum Improvement Scheme II

Summary Description

Name of Slum	:	Naduvankari -M.G.R. Colony
Locality	:	Annanagar, Division No. 61
Area	:	1.42 hectare
No. of households in the slum	:	164
Density	:	116 households/hectare
Type of slum	:	Low Density
No. of additional open plots to be provided	:	54
Total no. of households at saturation	:	218
Average size of plots	:	20 m^2
Total base cost of proposed improvements	:	Rs 266,415
Cost/household	:	Rs 1,222

Provision of Public Facilities

	Required	Existing	Proposed
Bath and F.O.L./1	22	-	22
Public water tap	23	-	23
Street light	20	-	20
Pre-School	2	-	2
Cottage industry shed	1	-	1

Detailed Cost Estimates

Description	Quantity	Rate (Rs)		Total Cost (Rs)
Construction of bath and F.O.L.	22 sets	3,050	per set	67,100
Septic tank for bath and F.O.L.	--	Will be connected to sewer main nearby		0
Laying of water main	700 meters	63.52	per meter	44,465
Public water taps	23 Nos.	510	each	11,730
Formation of roads, bitumen surface	3,000 m^2	18.24	per m^2	54,720
Pavement of footpaths	780 m^2	21.08	per m^2	16,400
Street lights	20 Nos.	2,120	each	42,400
Sub-total				236,815
Design and supervision				29,600
Total				266,415

/1 Flush out latrine.

ANNEX 3
Table 3

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Typical Slum Improvement Scheme III

Summary Description

Name of Slum	: Seeranipuran & Dharmapuram
Locality	: Kodambakkam High Road, Division No. 102
Area	: 2.45 hectare
No. of households in the slum	: 412
Density	: 290 households/hectare
Type of slum	: High Density
No. of additional open plots to be provided	: Nil
Total no. of households at saturation	: 412
Average size of plots	: 20 m^2
Total base cost of proposed improvements	: Rs 778,237
Cost/household	: Rs 1,093

Provision of Public Facilities

	Required	Existing	Proposed
Bath and F.O.L./1	72	18	54
Public water tap	70	8	62
Street light	26	26	-
Pre-Schools	6	-	6
Cottage industry shed	1	-	1

Detailed Cost Estimates

Description	Quantity	Rate (Rs)		Total Cost(Rs)
Construction of bath and F.O.L.	54 sets	3,050	per set	164,700
Septic tank for bath and F.O.L.	-	Will be connected to sewer main nearby		0
Laying of water main	1,000 lineal meters	63.52	per meter	63,520
Construction of public well	3 Nos.	31,860	each	95,580
Construction of pump room and overhead tank including pump	3 Nos.	5,760	each	17,280
Public water taps	62 Nos.	510	each	31,620
Formation of roads, bitumen surface	2,880 m^2	18.24	per m^2	52,530
Pavement of footpaths	9,800 m^2	21.08	per m^2	206,630
Storm water drain	220 lineal meters	272.30	per m^2	59,905
Sub-total				691,765
Design and supervision				86,470
Total				778,235

/1 Flush out latrine.

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Typical Slum Improvement Scheme IV

Summary Description

Name	: Mangammal Thottam and Sivagami Ammal Nagar
Locality	: Arunachaleswar Koil Street Division No. 22
Area	: 1.5 hectare
No. of households in slum	: 500
Density	: 333 households/hectare
Type of slum	: High Density
No. of additional open plots to be provided	: 30
Total no. of households at saturation	: 530
Average size of plot proposed	: 20 m^2 in slum area and 40 m^2 in new area
Total base cost	: Rs 561,066
Cost/household	: Rs 1,060

Provision of Public Facilities

	Required	Existing	Proposed
Bath and F.O.L./1	50	14	50
Public water tap	50	(to be improved)	50
Street light	30	-	20
Pre-School	6	-	6
Cottage industry shed	1	-	1

Detailed Cost Estimates

Description	Quantity	Rate (Rs)		Total Cost
Construction of bath and F.O.L.	50 sets	3,050	per set	152,500
Septic tank for bath and F.O.L.	-	Will be connected to sewer main nearby		0
Laying of water main	900 meters	63.52	per m	57,168
Construction of 12'0" diameter public well	3 Nos.	31,860	each	95,580
Construction of pump room and overhead tank	3 Nos.	5,760	each	17,280
Public water taps	50 Nos.	510	each	25,500
Formation of roads, bitumen surface	2,300 m^2	18.24	m^2	41,952
Pavement of footpaths	2,600 m^2	21.08	m^2	54,808
Street lighting	20 Nos.	2,120	each	42,400
Laying of sewer line	279.22 meters	26.10	per m	7,288
Relocation of huts	50 Nos.	85	each	4,250
Sub-total				498,726
Design and supervision				62,340
Total				561,066

/1 Flush out latrine.

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Cost Estimates for the Slum Improvement Component

	Rs lakhs	US$ '000	% of Total
A. Sewerage			
1. Communal toilets and baths (2,350 sets)	71.67	796	18
2. Septic tanks (25)	1.66	18	0
3. Sewer mains (7,300 m)	1.90	21	1
Sub-total, A	75.23	835	19
B. Water Supply			
1. Public water taps (2,600)	13.26	147	3
2. Wells (180)	58.17	646	15
3. Water pumps plus tanks (180)	10.52	117	3
4. Water mains (86 km)	54.43	605	14
Sub-total, B	136.38	1,515	35
C. Roads and Drainage			
1. Roads and footpaths (660 km)	120.22	1,336	31
2. Street lights (1,050)	22.12	246	6
3. Drainage	15.62	174	4
Sub-total, C	157.96	1,756	41
D. Relocation (1,300 huts)	1.11	12	0
E. Schools			
1. Primary schools (10)	11.10	123	3
2. Secondary schools (3)	9.35	104	2
Sub-total, E	20.45	227	5
Sub-total, A - E	391.13	4,345	100
F. Design and Supervision (12.5%)	48.87	543	
Sub-total	440.00	4,888	
G. Contingencies			
1. Physical (10%)	44.00	489	
2. Price (see para 4.03)	122.00	1,355	
Sub-total, G	166.00	1,844	
TOTAL	606.00	6,732	

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MADRAS URBAN DEVELOPMENT PROJECT

Summary Unit Costs for Slum Improvement

Component	Estimated Cost (1976 Prices)/1		Cost per Hectare/2		Cost per Dwelling/3		Cost per Capita/4	
	Rs m	US$ m	Rs	US$	Rs	US$	Rs	US$
Sewerage	9.30	1.05	50,300	5,700	305	33.9	55.5	6.3
Water Supply	16.90	1.90	91,400	10,300	554	61.6	100.9	11.3
Roads and Footpaths	16.40	1.95	88,600	10,500	538	59.7	97.9	11.6
Drainage	1.95	0.25	10,500	1,400	64	7.1	11.6	1.5
Schools	2.55	0.30	13,800	1,600	84	9.3	15.2	1.8
TOTAL	47.10	5.45	254,600	29,500	1,545	171.6	281.1	32.5

/1 Including design and supervision costs and physical contingencies.
/2 Cost divided by total area covered (185 ha).
/3 Cost divided by all existing dwellings (23,000) and the new open plots to be developed (7,500).
/4 Cost divided by total population (167,750).

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MADRAS URBAN DEVELOPMENT PROJECT

Cash Flow Projections for the Revolving Fund Established under the Slum Improvement Component
(Rs lakhs, by Calendar Year)

	1977	1978	1979	1980	1981	1982	1983	1984	1985
Revenues									
Project funds	80.0	200.0	219.0	76.0	-	-	-	-	-
Sale of improved and open plots 1/:									
Monthly payments	2.4	9.8	21.1	28.3	29.3	29.3	29.3	29.3	29.3
Sale of commercial and industrial land 2/:									
Downpayments	4.0	8.8	9.6	2.9	-	-	-	-	-
Monthly payments	1.4	5.9	12.4	16.8	17.9	17.9	17.9	17.9	17.9
Service charges	0.6	2.5	5.3	7.1	7.3	7.3	7.3	7.3	7.3
Interest 3/	-	0.2	0.6	1.0	1.1	1.1	1.1	1.1	1.1
Sub-total	88.4	227.2	268.0	132.1	55.6	55.6	55.6	55.6	55.6
Less defaults (7% of monthly payments)	0.2	1.3	2.7	3.7	3.8	3.8	3.8	3.8	3.8
Total revenues	88.2	225.9	265.3	128.4	51.8	51.8	51.8	51.8	51.8
Expenditures 4/									
Construction works (under the proposed project only)	79.5	198.6	219.3	77.6	-	-	-	-	-
Operation and maintenance	1.0	2.6	5.5	7.2	7.3	7.3	7.3	7.3	7.3
Total expenditures	80.5	201.2	224.8	84.8	7.3	7.3	7.3	7.3	7.3
Annual Surplus	7.7	24.7	40.5	43.6	44.5	44.5	44.5	44.5	44.5

1/ A total of 30,500 plots are to be improved and provided, of which 5,000 in 1977, 10,500 in 1978, 13,000 in 1979, and 2,000 in 1980.

2/ 166,000 m^2 to be sold at Rs 60 per m^2 on terms of 20% down and the balance at 12% over 10 years. The sale pattern is: 30,000 m^2 in 1977, 60,000 m^2 in 1978, 60,000 m^2 in 1979, and 16,000 m^2 in 1980. Price escalation over mid-1976 base are estimated at 10% per year.

3/ It is assumed that the fund is interest bearing at 5% per year and that interest is earned on the total surplus in each year for six months before it is utilized for new construction works.

4/ Administrative costs are capitalized and charged to construction.

ANNEX 3
Table 7

ANNEX 3
Table 8

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Capital Expenditures on Slum Clearance and Improvement Schemes of Tamil Nadu Slum Clearance Board
(Rs lakhs)

Year	Slum Clearance Schemes	Environmental Improvement Schemes	Total
1971/72	360.3	-	360.3
1972/73	452.8	95.6 /1	548.4
1973/74	315.9	104.0 /1	419.9
1974/75	387.9	113.1 /1	501.0
1975/76 (Revised Budget)	315.0	30.0	345.0
TOTAL	1,831.9	342.7	2,174.6

/1 Centrally sponsored schemes.

Source: Tamil Nadu Slum Clearance Board

June 23, 1976

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Small-Scale Business

1. The small-scale business component has two main elements:

(a) small industry development as part of the sites and services schemes at Arumbakkam, Villivakkam and Kodungaiyur, to be implemented by the Small Industries Development Corporation (SIDCO) (see Section A, paras 2-16); and

(b) cottage industry development as part of the sites and services and slum improvement schemes, to be implemented by the Tamil Nadu Handicrafts Development Corporation (TNHDC) (see Section B, paras 17-29).

A. Small Industry

2. The 11.4 ha of industrial land developed under the sites and services component by TNHB will be turned over to SIDCO. SIDCO will sell most of the land (about 65%) to entrepreneurs without on-plot development. On about 35% of the land (4.0 ha), SIDCO will build 120 work sheds for sale to individual entrepreneurs on a hire-purchase basis. SIDCO will also extend loans to these 120 entrepreneurs for the purchase of necessary machinery. Work sheds and loans are to be provided as part of the project. Working capital will be provided by banks which have agreed to locate branch offices on the sites.

Types of Industries

3. SIDCO and the Small Industry Services Institute (SISI) have assessed the market for industrial land at the three locations and also the suitability of various industries, considering their employment potential. SIDCO maintains on file all applications received for establishment of different types of small-scale industries. These applications have been analyzed by SIDCO and SISI to determine the types of industries which are likely to locate on the sites and their needs for assistance. These are listed in Table 1. Most of them are expected to be light engineering workshops producing for larger industries in the vicinity.

Work Sheds and Plots

4. Three types of work sheds will be built:

(a) Type A, with 186 m^2 floor area (2,000 ft^2) and costing Rs 70,000 (US$7,800) each;

(b) Type B, with 93 m^2 floor area (1,000 ft^2) and costing Rs 35,000 (US$3,900) each; and

(c) Type C (residence-cum-work shed), with 56 m^2 work area on the ground floor and a 56 m^2 residence on a second floor, and costing Rs 21,300 (US$2,400) each.

5. There will be a total of 40 sheds of each type. Their allocation to the three sites is shown in Table 2. The plot size will vary with the type of industry and their storage and expansion requirements. The average plot coverage would, however, be about 33%. Land use by site is also shown in Table 2. Electric connections for the sheds will be provided by the Tamil Nadu Electricity Board following its normal practice. The entrepreneurs will be responsible for all electricity charges.

Machinery and Working Capital

6. The cost of the required machinery is estimated to average Rs 200,000 for businesses acquiring Type A sheds, Rs 100,000 for those acquiring Type B sheds and Rs 25,000 in the case of residence-cum-work sheds. Cost estimates are shown in Table 3 for machinery required by a general engineering and a light mechanical engineering workshop of the size that would occupy work sheds of Type C and Type B, respectively. The project would include loans to entrepreneurs. About 70% of the entrepreneurs are expected to seek and obtain machinery loans under the project. The others are expected to obtain financing from other sources, including local banks. Several local banks have expressed their willingness to make the complementary financing available. SIDCO will assist the entrepreneurs to obtain the necessary financing. The entrepreneurs themselves will provide about 10% down payment for machinery and sheds.

7. Working capital requirements which would be met by local banks, is estimated to average Rs 100,000, Rs 50,000 and Rs 7,000 respectively for the three business sizes.

Employment

8. The following table summarizes the investment requirements and also shows the number of employees and the cost of job creation:

	Type A (186 m^2)	Type B (93 m^2)	Type C (residence-cum-work shed)
Land cost (Rs 90/m^2), Rs	50,220	25,110	15,120
Cost of work shed, Rs	70,000	35,000	15,000/c
Cost of machinery, Rs	200,000	100,000	25,000
Working capital, Rs	100,000	50,000	7,000
Total Cost, Rs	420,220	210,110	62,120
Total Discounted Investment, Rs /a	436,880	218,440	64,690
Number of employees /b	61	34	5
Investment per employee, Rs	7,160	6,420	12,940
Investment per employee, US$	795	715	1,435

/a Investments required over 15 years discounted to present value. Assume 12-year life of machinery and 20-year life for buildings, and discount rate of 12%.

/b All investment calculations based on a 15-year cycle. Hence each job is for 15 years.

/c Excluding the cost of the residence.

The average investment per employee is about Rs 7,200 (US$800) and the total number of jobs would be about 4,000.

Project Cost

9. Total cost of the component would be:

		Rs lakhs
A.	Work sheds	50.3
B.	Machinery loans	88.2
	Sub-total	138.5
C.	Design and supervision (12.5% on civil works)	6.3
	Sub-total	144.8
D.	Physical contingencies (10% on civil works)	5.7
	Sub-total	150.5
E.	Price contingencies (see para 4.03)	37.9
	Total	188.4

Selection of Entrepreneurs and Training

10. SIDCO has several applications on file from prospective entrepreneurs who have asked for assistance in setting up small industries. It has screened these applications jointly with SISI and prepared a list of qualified applicants. These would be invited to set up industries in the project area. In addition, applications are being invited by SIDCO from new entrepreneurs by advertising in the press and directly contacting prospective persons. So far, about 300 applications have been received for the 120 work sheds. The applications will be processed keeping in view the technical qualifications and previous experience of the candidate, his financial position and repaying capacity, and his ability to carry out the project. Preference will be given to persons who are prepared to stay in the area and willing to recruit labor from the project area. The selected candidate will be given assistance by SIDCO in the preparation of feasibility studies and in selecting the machinery and for obtaining working capital through local banks. If the entrepreneurs require field training (in-plant training), this will be arranged through other SIDCO-assisted industrial units in Madras. Business management and financial management training will be provided as necesary through the Madras Productivity Council and other suitable institutions.

Extension Services

11. The extension services for the industrial establishments after they are set up will be provided by SIDCO through the Manager, Development Services, and his staff. The entrepreneur will be given assistance where required, in procuring raw materials, in marketing his products, in selecting suitable labor and in maintenance and replacement of machinery and any other facilities to run the unit efficiently. The Manager of Development Services is a technical man who has under him sufficient staff and will therefore be in a position to provide the extension services effectively.

Small Industries Development Corporation

12. SIDCO is a Government-owned registered company created to provide financial and technical assistance to promote and develop small-scale industries 1/ throughout the State. The Director of Industries and Commerce of the State Government is the ex-officio Chairman and Managing Director of SIDCO. He is assisted by a General Manager and a financial and technical managerial team (see Chart 9). SIDCO has a network of branch offices and a total staff of around 500 of which about 150 are assigned to the Madras area. SIDCO's staff is well experienced and competent to meet a variety of needs for assistance of small industries.

13. Under its programs of assistance, SIDCO provides technical, consulting and marketing services to small-scale entrepreneurs; procures and distributes essential raw materials and import requirements; and makes available machinery and work sheds on a hire-purchase basis. Following

1/ Industries with total investment in plant and machinery of less than Rs 10 lakhs (or Rs 15 lakhs for ancillaries).

an initial stimulus, SIDCO's programs continued to expand and up to 1976 finance had been provided for raw materials to the value of Rs 25 crores, machinery costing Rs 5.3 crores and work sheds costing Rs 3.75 crores. In addition, since 1975 it has obtained financing from Tamil Nadu Industrial Investment Corporation (TIIC) 1/ for hire-purchase machinery to the order of Rs 7.5 crores for small entrepreneurs. The scale of SIDCO's activities over the past five years in these areas is summarized in Table 4. SIDCO estimates that as result of the finance provided for the purchase of machinery and construction of work sheds about 20,000 jobs have been provided. In addition, SIDCO is responsible (in Tamil Nadu) for administration of the central scheme to reduce unemployment and SIDCO estimates that a further 20,000 jobs have been created under these programs.

14. SIDCO stopped directly financing the purchase of machinery in April 1974 when a consortium scheme was introduced with the TIIC under which proposals are jointly appraised by staff of both Corporations but financed entirely by the TIIC which has refinancing facilities with IDBI and provides longer-term, lower interest rate loans than were previously available. However, with the funds provided under the project, SIDCO will be able to finance the worksheds and machinery directly, while continuing its association with TIIC for the remainder of the program.

15. As of March 31, 1976, loans outstanding for sale of hire-purchase machinery and construction and hire-purchase of work sheds amounted to Rs 4.45 crores and inventories amounted to a further Rs 2.45 crores. These assets were financed primarily from unsecured long term government loans. The income statement and balance sheets for the past five years and the projections for 1976/77 are shown in Tables 5 and 6. In the first three years of operation, SIDCO was able to run at a modest profit and show a return of 8.9% to 13.6% on Equity Capital. Because of a general economic slump, SIDCO has experienced a reduced demand for raw materials (particularly steel) and, as result, suffered a net loss on general operations of about Rs 20 lakhs in FY 1975 and again in FY 1976. However, SIDCO anticipates some improvement in economic activity during FY 1977 and expects to break even financially by reducing the present high level of inventories.

16. The financing of machinery and worksheds included in the project represents less than 10% of SIDCO's activities. It will follow its normal appraisal procedures for project selection and financing, which have been developed over the past five years. These procedures are considered to be acceptable. The cost of the serviced land, worksheds and machinery will be recovered by SIDCO on behalf of GTN at an interest of 11.0% over 9 years. Of this, SIDCO will retain 2.5% to cover the cost of administration and technical support services. These charges, although considerably higher than the 0.5-1.0% spread presently used by TIIC/SIDCO schemes, may not be

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1/ TIIC has benefitted from financing from the Industrial Development Bank of India (IDBI), which received a $25 million IDA credit (No. 356-IN) and a $40 million Bank Loan (No. 1260-IN) in support of its activities in the small-scale industry sector.

adequate to cover all costs. There has not been sufficient experience with financing of the very small-size industries as proposed in this project. SIDCO will continue to cover any shortfall, which will be minor, from its activities in the supply of raw materials and from its investments.

B. Cottage Industry

17. Cottage industries will be promoted in the sites and services and slum improvement project areas. About 5,000 jobs would be generated for close to 10% of the labor force resident in these areas. One hundred training centers would be set up at the rate of one center per about 350 households. At each center about 50 persons would be trained in selected trades for about one year. After the training the centers would be converted into production units which would also serve the households in the area who produce at home.

18. The initial investment will be for (a) construction of sheds, (b) tools and equipment, (c) salaries of instructors, and (d) raw materials required during the training period. Working capital would also be provided at the start of production. Profitability analysis has been carried out for the different types of production centers by TNHDC, which has been undertaking similar schemes for the past three years (see para 23).

19. After a study of the local and export market and after considering the skills and traditions of the target population, five categories of handicrafts have been selected for training and production:

	Cottage Industry	Articles to be produced
(a)	Palm leaf products	Fans, mats, baskets, lamp shades, etc.
(b)	Cane products	Trays, lamp shades, chairs, etc.
(c)	Bamboo products	Hand bags, flower vases, mats, hangers, etc.
(d)	Papier Mache products	Masks, dolls, god heads, etc.
(e)	Fibrous products	Decorative items

20. During the training period, the trainees would be provided a stipend of Rs 50 per month. After the training period, when the center goes into production, each trained worker will earn not less than Rs 4 per day, according to his productive capacity. Further, he can train his family members to help him, and this adds to his family's earnings. Each center is expected to be fully profitable when it starts production. The production centers will be

initially owned by TNHDC, who will be responsible for their operation and management. After a period of time (2-3 years), these centers would be converted into cooperatives of workers, if this is considered feasible. There has not been enough experience to date with this approach and it is difficult to predict whether in fact these cooperatives would be successful. TNHDC would continue to own and operate the centers if the experience with cooperatives is not favorable. The progress in training the population in the necessary skills, market developments, and financial results would be closely monitored and the program adjusted if necessary. It is expected that linkages would develop between the small industries described earlier and the cottage industries, and selected training-cum-production centers might be used for training in more industrial activities such as certain types of assembly work which can be performed at home.

Cost Estimates

21. The costs incurred by one palm leaf products center prior to production start are shown in detail in Table 7. The costs incurred by each type of center are summarized below (Rs):

		Palm Leaf Products	Cane Products	Bamboo Products	Papier Mache Products	Fibrous Products
A.	Shed	21,000	31,200	31,200	21,000	26,200
B.	Training, equipment	48,500	54,000	43,000	43,500	51,500
C.	Raw materials	8,500	35,000	20,000	25,000	22,500
D.	Staff salaries	7,860	7,860	7,860	7,860	7,860
	Total	85,860	128,060	102,060	97,360	108,060
	Per trainee	1,715	2,560	2,040	1,945	2,160

22. Project costs include the cost of sheds, training, and equipment as shown above, under the assumption that the same number (20) of centers will be set up for each type of proudct. Total cost is:

	Rs lakhs
Sheds	26.12
Training and equipment	48.10
Sub-total	74.22
Physical contingencies (10% on sheds)	2.61
Price contingencies (see para 4.03)	19.36
Total	96.19

Tamil Nadu Handicrafts Development Corporation

23. The implementation of the cottage industries component will be the responsibility of TNHDC, which is a public limited company established

in 1973. Its authorized share capital is Rs 50 lakhs, consisting of 50,000 shares of Rs 100 each. The share capital issued to Government is Rs 30 lakhs comprising the value of the buildings and stocks transferred from time to time. Twenty-five per cent of the authorized share capital is being subscribed to by the artisans. For its working capital, TNHDC gets open-cash credit from Canara Bank, Indian Bank and Vijaya Bank on hypothication of stocks. Government also has given a medium-term loan of Rs 50 lakhs during 1974-75.

24. The activities of the Corporation can be broadly classified into four categories:

(a) sales and marketing;

(b) training;

(c) production; and

(d) general development.

Sales and Marketing

25. On its establishment, TNHDC took over 15 sales emporia from the Department of Industries and Commerce and the former Handicrafts Marketing Society. During the last two years, four new emporia were started, one each in Bombay and Bangalore and two at Madras, and the New Delhi emporium was upgraded. By the end of 1977, TNHDC will have 20 emporia, 16 within and 4 outside the State. The sales of TNHDC in 1974/75 were Rs 133 lakhs, which increased to 162 lakhs in 1975/76.

26. TNHDC is making rapid strides in export. In 1975-76, it exported handicrafts worth Rs 7 lakhs. In 1976-77, it is expected to export more than Rs 25 lakhs worth of handicrafts. Apart from sales through the emporia and export, exhibitions are conducted from time to time in big cities. Handicrafts of Tamil Nadu are also being sold in other State capitals through their emporia on a reciprocal basis.

Training Centers

27. In 1974, TNHDC took over nine training centers, three training-cum-production centers, one production center and one design center from the Directorate of Industries and Commerce. During the last one and a half years, the Corporation has started three new training centers at Nachiarkoil, Tanjore and Madras. Thus, TNHDC now has 12 training centers and 3 training and production centers. Apart from this, since 1975-76 TNHDC has run three master-craftsmen training centers. The total number of young boys and girls from artisan families trained in 1975-76 was 174. The trainees belong mostly to scheduled castes and backward classes. The training period ranges between six months and three years, and the trainees are absorbed in the production centers on completion of training.

Production

28. As mentioned above, three training-cum-production centers and one production center were taken over from the Directorate of Industries and Commerce in 1974. Subsequently, TNHDC started three production centers in Mahabalipuram, Kumbakonam and Madurai and ten production centers in the premises of the training centers taken over from the Government. The training and production units include almost all the crafts of Tamil Nadu, e.g. palm leaf, cane, fiber, sheet metal, bronze, wood carving, lacquered toys, rosewood tables, stone sculpture and bell metal.

General Development

29. About 50% of the handicrafts sold by THNDC are bought directly from the artisans. The remaining are bought through their cooperative societies or are made in the production centers. TNHDC helps the artisans by giving them raw materials, helping them to get loans and giving them advice regarding design and process improvement. During 1975-76, scarce raw materials worth Rs 1 lakh were distributed to artisans, and 20 artisans received loans to establish their own shops.

ANNEX 4
Table 1

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Types of Small-Scale Industries Expected to Locate on the Project Sites

1. Aluminum and Stainless Steel Vessels
2. Automobile Parts
3. Bakelite Products
4. Bicycle Parts
5. Canning of Food*
6. Cartons and Boxes
7. Decorated Crockery
8. Electrical Goods
9. Envelopes*
10. Furniture
11. Glassware
12. Grills and Gates
13. Jobwork Engineering
14. Knitted products
15. Leather Products*
16. Line and Half-Tone Blocks
17. Machine Shop
18. Metal Boxes
19. Optical Instruments
20. Optical Frames*
21. Paper Cones*
22. Paper Capacitors*
23. Plastic and Rigid PVC Items
24. Printing and Book Binding*
25. Photo Processing
26. Radio Assembly
27. Rubber Products
28. Scientific Instruments
29. Slide and Cinema Projectors
30. Springs, Pins, Bolts and Nuts
31. Sports Goods
32. Suitcases, Bags*
33. Tailoring and Garments*
34. Tablets*
35. Textile Parts
36. Toys*
37. Umbrella Frames
38. Wood Working
39. Wire Products
40. Zip Fasteners

*Suitable for Residence-cum-worksheds.

ANNEX 4
Table 2

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Number of Work Sheds, Floor Area and Land Area, by Site

	Arumbakkam	Villivakkam	Kodungaiyur	Total
Number of sheds:				
Type A (186 m^2)	8	16	16	40
Type B (93 m^2)	8	16	16	40
Type C (56 m^2)	8	16	16	40
Total	24	48	48	120
Total floor area (m^2):				
Type A	1,488	2,976	2,976	7,440
Type B	744	1,488	1,488	3,720
Type C	448	896	896	2,240
Total	2,680	5,360	5,360	13,400
Total land area (m^2):				
Type A	4,464	8,928	8,928	22,320
B	2,232	4,464	4,464	11,160
C	1,344	2,688	2,688	6,720
Total	8,040	16,080	16,080	40,200

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Typical Machinery Required by Engineering Workshops

(a) General Engineering (cycle hubs, axles, etc.)

		Cost (Rs)
1.	Lath 6½'	15,000
2.	Drilling machine 1"	1,700
3.	Bench Grinder ½ HP	950
4.	Arc Welding set, 300 Amp/ 440 Volts/3 phase	3,850
5.	Tools	2,000
6.	Electric Motor 2 HP, 3 phase	1,300
7.	Electric Motor 1 HP, 3 phase	1,200
		26,000

(b) Light Mechanical Engineering

1.	Lathe with accessories	34,145
2.	Power Hacksaw - 9" capacity	10,970
3.	Shaping machine	30,750
4.	Drilling machine	10,745
5.	Bench grinder	1,250
6.	Blexible shaft grinder	2,700
7.	Lathe - extra heavy duty	31,480
8.	Milling machines	46,210
9.	Welding transformer	7,600
		175,850

ANNEX 4
Table 4

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Achievements of SIDCO Under Various Schemes

	1972	1973	1974	1975	1976
Raw Material Distributed (Rs lakhs)	317	417	576	726	366
Hire-Purchase Scheme					
No. of Persons Assisted	154	401	569	277*	351*
Value (Rs lakhs)	76	173	233	338*	457*
Worksheds					
Value (Rs Lakhs)	N/A	N/A	32	57	70

*Includes joint SIDCO/TIIC Appraisal Scheme financing.

Source: SIDCO

ANNEX 4
Table 5

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Small Industries Development Corporation

Income Statements for Years Ending March 31, 1972-77

(Rs Lakhs)

		1972	1973	1974	1975	1976 Revised Estimate	1977 Budget
		Actual					
A.	Income from Sales, Interest & Charges	384	430	591	733	493	429
B.	Expenditures						
	- Salaries & Other Expenses	13	23	25	33	34	35
	- Interest on Loans	8	8	29	58	58	59
	- Cost of Raw Materials	347	379	522	662	422	334
	Total	368	410	576	753	514	428
C.	Profit (Loss)	16	20	15	(20)	(21)	1
D.	Provision for Taxes	9	12	9	-	-	-
E.	Profit after Tax	7	8	6	(20)	(21)	1
	% of Administrative Expenditure to Interest and Other Receipts	3.02	4.60	3.78	4.27	7.08	8.02
	Profit as % of Equity Capital (Rs 60 lakhs)	10.90	13.60	8.90	-	-	1.33

ANNEX 4
Table 6

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Small Industries Development Corporation
Comparative Summarized Balance Sheets for Years Ending March 31
(Rs lakhs)

	1972	1973	1974	1975	1976 Revised Estimate	1977 Projected
	Actual					
ASSETS AND OUTLAY						
Net Fixed Assets	7	9	8	10	9	14
Investments	-	5	5	14	14	14
Loans and Advances /1	66	79	102	113	122	132
Current Assets /2	185	253	594	888	690	667
Less Current Liabilities	55	86	178	256	136	112
	130	167	416	632	554	555
Total Assets and Outlay	203	260	531	769	699	715
LIABILITIES AND SURPLUSES						
Loans:						
Secured Loans	-	-	30	123	50	76
Unsecured Loans	138	190	426	591	615	589
Sub-Total Loans	138	190	456	714	665	665
Share Capital - Fully Paid Up	60	60	60	60	60	75
Reserves and Surpluses	5	10	15	(5)	(26)	(25)
Sub-Total Equity	65	70	75	55	34	50
Total Liabilities and Surpluses	203	260	531	769	699	715
RATIOS						
Long-Term Loans						
Loans from GTN	65	131	224	344	367	347
6% Public Loan 1983	55	55	55	55	55	55
Loans from TIIC	-	-	-	-	100	100
	120	186	280	399	522	502
Debt: Equity Ratio	1.8:1	2.7:1	3.7:1	7.3:1	15.3:1	10:1

Source: SIDCO/Mission estimates

/1 Estimated for FY 1976 and FY 77.
/2 Includes loans for construction and purchase of worksheds and machinery.

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Costs Incurred by One Palm Leaf Products Center Prior to Production Start (One Year)

		Cost (Rs)
A.	Shed (1,600 ft^2)	21,000
B.	Training, equipment, etc.	
	1. Hand tools and equipment for 50 trainees, dying vats, moulds, frames, etc.	12,000
	2. Furniture	3,000
	3. Instructor's pay	3,500
	4. Stipends, Rs 50 per months per trainee	30,000
	Sub-total, B	48,500
C.	Raw materials (recurring)	
	Leaves, straws, dyes, chemicals, etc.	8,500
D.	Staff salaries (recurring)	
	1. Pay of two skilled workers	6,600
	2. Pay of one Junior Assistant and other staff (in charge of five centers; proportionate cost)	1,260
	Sub-total, D	7,860
	Total	85,860

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Maternal and Child Health

A. Background

1. A serious health problem in India today is the group of early childhood diseases called the 'pneumonia-diarrhea complex'. The low level of nutrition of a large segment of the population is a contributing factor to the problem. The prevalence of diseases and the undernourished state of young children result in a high level of infant mortality and morbidity.

2. In the slums of Madras, as in other slums, the problem is worsened by unsanitary conditions, lack of utilities and services, and low levels of income. In 1973, the infant mortality rate for Madras was 72 per 1,000 population. Although much lower than the rate for all India (120 per 1,000), it was the highest rate of the regions in Tamil Nadu. One out of every four deaths which occurred in health institutions in Madras during 1970 was due to parasitic and infective diseases. Within this group, gastro-enterisis and colitis accounted for the largest number of deaths. The age group of one year and under contained the highest percentage of all deaths. Twenty-five percent of hospital deaths was due to prenatal morbidity.

3. Improvements in environmental sanitation and increased nutrition play a more important role in effecting mortality reduction than curative health inputs. The rapid growth of population in India over the last four decades has resulted in unsanitary living conditions, especially in urban areas, for over 30% of the population. Improvements in health levels as measured by the increase in medically trained personnel and the number of hospital beds have not had the desired effect in the reduction of infant mortality.

4. The daily caloric intake in India is about 20% below the minimum daily allowance recommended by the Indian Council of Medical Research 1/. It is estimated that over 65% of the Indian population have an inadequate protein intake. Children, pregnant women and lactating mothers appear to be worse off nutritionally than other sections of the population. Their lower nutrition input seems to result from cultural feeding practices which tend to favor the

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1/ IBRD: Economic Situation and Prospects of India, May 1974, page 39.

adult male. The Government of India (GOI) has recognized the seriousness of the problem of undernutrition, especially as it affects infants, children and pregnant and nursing mothers. As a result, children and women of child bearing age are considered as the target group for 'nutrition intervention'.

5. In the Madras slums, 57% of the adult population are in the labor force, out of which 48% are employed. Most of those employed do not have a regular source of income and their earnings vary from month to month. The average monthly income of a household was Rs 164 in 1971. The monthly per capita income of the slum dweller is less than half of the average per capita income for the city. This is insufficient to afford the balanced diet which is necessary for the maintenance of good health; a per capita income of Rs 40 (1972 prices) has been estimated as the minimum required to provide adequate nutrition. Women and children are affected most by this shortfall.

6. The Government of Tamil Nadu (GTN) has for a long time been involved in attempts to alleviate the nutritional problems. A study 1/ carried out during 1970-73 found, inter alia that the answer to improved nutrition among target groups involved food delivery systems, appropriate nutrition education of family elders who are decision makers, and a supply and proper identification of supplementary food for infants.

B. The Approach

7. The GOI has accorded children's programs high priority in its Fifth Five Year Plan. A National Children's Board has been set up to effect the "Resolution on National Policy for Children". The GOI has sanctioned the Integrated Child Development Services Scheme which is being introduced on an experimental basis. Thirty experimental projects were introduced in various parts of the country to deal in an integrated manner with all aspects of child care: health, nutrition, preschool education, and the care and nutritional education of mothers and women of child bearing age. The maternal and child health component of the proposed project follows the same approach. The following services are to be provided:

(a) Supplementary nutrition

(b) Health examination

(c) Immunization

1/ Tamil Nadu Nutrition Study. Report of the US Agency for International Development.

(d) Nursery and Pre-school Education

(e) Health and Nutrition Education and Functional Literacy Training, including family planning advise.

UNICEF is advising in the setting up of these services and will also assist in monitoring and evaluation. Cost estimates are in Table 1 with per capita costs shown in Table 2.

8. The target group to be reached in this component is estimated at 40,000 women (15-44 years), of which about 14,000 are estimated to be expectant or nursing mothers; and 34,000 young children (0-5 years). These are the women of child-bearing age and the pre-schoolers in the 85 slums which have been chosen for improvement and in the sites and services areas at Arumbakkan, Villivakkam and Kodungaiyur. It is estimated that under the project it would be possible to reach about 50% of the target population. Many of the slums are too small to form cohesive communities where successful implementation would be feasible.

Supplementary Nutrition

9. Surveys in the state of Tamil Nadu have shown that the nutritionally "at risk" population are those households spending less than Rs 300 per month. The greatest proportion of under-nutrition exists among members of these households. 1/ Consequently the majority of households in the Madras slums can be considered nutritionally "at risk".

10. The supplementary nutrition proposed in this component is expected to cover the protein-calorie deficiency for children and mothers, which is estimated to be 33% of the total requirement. The food supplement proposed is Balahar (see Table 3 for composition and cost). It will be given to children below 6 years of age and lactating and expectant mothers. This service is expected to reach 17,000 children and 7,000 expectant and nursing mothers.

Health Examinations and Referral Service

11. The delivery of health services in Madras is inadequate. In 1971 there were 16 hospitals with a total bed strength of 8,100 beds. In addition, there are 51 maternity and child welfare centers with a total bed strength of 379 beds.

12. The provision of child health and maternal care is proposed in the child welfare centers provided within this component. One medical officer, two public health nurses and four auxiliary nurses will service the infants, pre-school children and pregnant and lactating mothers. Referral service to other health institutions are to be undertaken when necessary.

1/ Tamil Nadu Nutrition Study, Vol. 11 Section D Part II. "A Study of Feeding Programs in Tamil Nadu" - Report to the US Agency for International Development.

Immunization

13. The infant mortality rate in Madras for 1973 was 72 per 1,000. The main causes of death are malnutrition, typhoid, diarrhea/dysentry, and cholera. In the project area, it is proposed to offer immunization of all children under 6 years of age against polio, smallpox, diphtheria, whooping cough and tetanus. All expectant and nursing mothers will also be immunized against tetanus.

Nursery and Pre-school Education

14. Pre-school education will be one of the major activities of the child welfare centers. Nursery services for infants below three years will also be attached to each school. Non-formal pre-school education aimed at developing desirable attitudes, values and behavior patterns will be the medium through which children will be prepared for further education. All child development services will be catered for as part of the pre-school program. The Balasevikas who will take charge of these centers will be trained under the project.

Nutrition and Health Education and Functional Literacy Training

15. The nutrition, health and family planning education program proposed in the project will cater to women of child-bearing age. The objectives of the program are:

(i) to promote an awareness of the concept of better nutrition;

(ii) to promote an understanding of the special nutritional needs of pregnant and nursing mothers;

(iii) to promote an understanding of the health implications of hygiene, sanitation, immunization and other public health measures; and

(iv) to generate awareness among women on the need for family planning and the family planning services available to them.

16. Most adult female slum dwellers in Madras are illiterate (70%). The program will aim at bringing the illiterate women of child-bearing age up to the level of education which will allow them to make better use of the material presented in the Nutrition and Health Education Program. An estimated 20,000 women will benefit from this component.

C. Implementation

17. The component is to be implemented by the Department of Social Welfare (DSW). DSW is a department of GTN responsible mainly for family and child welfare in the State. It was initially set up in 1947 as the Women's Welfare Department and adopted its present name in 1972. Its directorate will be responsible for implementing the maternal and child health component of the proposed project. A similar program has been under implementation by DSW in Tamil Nadu on a small scale since 1975.

18. A separate unit being set up within DSW and headed by an Assistant Director with a staff of about 15 professionals, including doctors and nurses, will be responsible for implementation. UNICEF is advising on project preparation and will assist in the implementation, particularly in monitoring and evaluation. Community workers are to discuss the program with each community, assess the acceptability of the program and assist the community during its implementation. The program will utilize mass media and other modes of publicity through house contacts, demonstrations, projection of films, etc. to elicit community response to the program. Based on the estimate of the acceptance rate of about 50%, the project costs include 50% of the costs of the costs shown in Table 1.

19. A continuous monitoring and evaluation of the program will be carried out by the implementing authorities to ascertain the direct and indirect impact of the project. The staff of the child welfare centers will maintain information on infant and child mortality, incidence of infectious diseases among children and mothers, and improvements in the nutritional status of the children. Monitoring of these variables over time would give a better insight into the duration of nutrition intervention necessary to achieve the desired objectives.

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Detailed Cost Estimates for Maternal and Child Health Component
(Rs '000)

	1977/78	1978/79	1979/80	1980/81	Total[1] 1977/78-1979/80
A. BUILDINGS					
Non-Recurring:					
1. 400 Child Welfare Centers (Pre-school)	1,065	1,330	1,595	-	3,990
B. SUPPLEMENTARY NUTRITION; NURSERY AND PRE-SCHOOL EDUCATION					
Non-Recurring:					
1. Equipment and Furniture	160	265	370	-	795
2. Training	85	105	125	-	315
Sub-Total, B1-B2	245	370	495		1,110
Recurring:					
3. Center Staff Salaries and Expenses	95	390	740	1,035	1,225
4. Feed Expenditures	250	1,050	1,995	2,795	3,295
5. Non-Feed Expenditures	45	185	345	505	575
Sub-Total, B3-B5	390	1,625	3,080	4,335	5,095
Sub-Total, B	635	1,995	3,575	4,335	6,205
C. HEALTH EXAMINATIONS; IMMUNIZATIONS; HEALTH AND NUTRITION EDUCATION					
Non-Recurring:					
1. Equipment	20	20	20	-	60
2. Mobile Clinics (3)	135	135	135	-	405
3. Vans (3)	65	65	65	-	195
Sub-Total, C1-C3	220	220	220		660
Recurring:					
4. Medical and Supervisory Staff Salaries	135	275	410	410	820
5. Health and Nutrition Education Expenditures	25	55	85	95	165
6. Medicine	60	125	185	200	370
7. Vehicle Running Costs	20	40	60	65	120
Sub-Total, C4-C7	240	495	740	770	1,475
Sub-Total, C	460	715	960	770	2,135
D. FUNCTIONAL LITERACY TRAINING					
Recurring:					
1. Teaching Material	65	160	230	230	455
E. ADMINISTRATION					
Recurring:					
1. Staff Salaries, Stationery, Equipment	75	140	205	205	420
Sub-Total, A-E	2,300	4,340	6,565	5,540	13,205
F. CONTINGENCIES					
1. Physical (10% on A.1)					400
2. Price (see para 4.03)					3,380
Sub-Total, F					3,780
TOTAL					16,985
of which: Non-Recurring					7,520
Recurring					9,465

[1] Cost estimates for a 100% acceptance rate. The project provides for 50% of these costs assuming the acceptance rate will be 50%.

ANNEX 5
Table 2

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Average Unit Cost of Maternal and Child Health Program

Item	Beneficiaries	Estimated Cost /1 (Rs '000)	Annual Cost per Beneficiaries /2 Rs	US$
Welfare Centers	34,000 Children (0-5 years) + 40,000 women (15-44 years)	5,525 (N)	3.5 /3	0.4 /3
Supplementary Nutrition and Pre-school Education	34,000 Children + 14,000 Nursing mothers	1,270 (N)	8.8	1.0
		6,410 (R)	44.5	4.9
			53.3	5.9
Health Examination and Referrals	34,000 Children + 14,000 Nursing and Expectant mothers	830 (N)	5.8	0.6
		1,850 (R)	12.8	1.4
			18.6	2.0
Functional Literacy and Health/Nutrition Education	40,000 Adult Women (15-44 years)	570 (R)	15.6 /4	1.7 /4

/1 Cost over the 3-year project period including all contingencies, price escalation, administratie costs and the costs of food supplements, medicine, vaccines, etc.

/2 Cost incurred annually for five years for a child and for the duration of pregnancy and nursing for the mother.

/3 Assume 20-year life of welfare centers.

/4 Cost incurred only once and not annually.

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Vitamin and Mineral Mixes for Balahar

Component	Price - Rs	Balahar Formula g/mt.	Balahar Formula Rs/mt
Thiamine Mononitrate	500/kg	3.0	1.50
Riboflavin	700/kg	4.0	2.80
Pyridoxine HCl	500/kg	3.0	1.50
Niacin	120/kg	50.0	6.00
Ca-D-Pantothenate	260/kg	30.0	7.80
Folacin	1200/kg	0.34	0.40
Vitamin B_{12}	70/g	0.034	2.38
Vitamin A - 500,000 IU/g	421/kg	26.0	10.90
Vitamin D	-	-	-
a-Tocopherol - 33%	300/kg	-	-
Ascorbic acid	80/kg	100	8.00
Per Metric Ton		216.3	41.28
Calcium Carbonate	1.30/kg	4.00	5.20
Calcium Phosphate	5.50/kg	-	-
Ferrous Sulfate	1.10/kg	-	-
Zinc Sulfate	9.50/kg	-	-
Per Metric Ton		4.00	5.20
Vitamins + Minerals Rs per mt.			46.48

SOURCE: Tamil Nadu Nutrition Study - General Report 1968-73.

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Water Supply and Sewerage

A. Background

1. Madras has a long history of inadequate water supplies and insufficient sewerage systems. Although the systems were reasonably satisfactory in the 1930s and 1940s, failure by the responsible authorities in the past 30 years to plan for and provide new water sources, water distribution and sewerage systems and to adequately train engineering and financial staffs has left the Madras Metropolitan Area (MMA) with probably one of the poorest systems of any major urban area in the world. Incidence of intestinal and parasitic disease is high and there have been consistent outbreaks of cholera and typhoid. Prevalence of waterborne diseases is mainly due to in-adequate sanitary conditions caused by the lack of safe and ample water and unsatisfactory waste water disposal systems.

Water Supply

2. The Madras City water supply system was first developed in the late 19th century, but planning for and investment in the service, including training, over the past 25-30 years, has not been adequate. As a result, standards of operation and maintenance have declined. The water supply availability at source is currently less than 70 lcd for combined domestic and industrial purposes, 1/ but due to inadequate distribution, many domestic consumers particularly those in the poorest areas receive less than 40 lcd. The critical water supply situation of Madras was highlighted in 1974/75, when as a result of a severe drought, water supplies were rationed to about 20 liters per capita once in every three days. Fortunately many people were able to supplement this meagre supply from dug wells.

3. The total water supply available to Madras City is at present about 2.4 m^3/sec. which is less than half of its requirement. The main source, providing about 2 m^3/sec, for Madras is the Red Hills - Cholavaram Lakes system some 11 to 32 km to the north-west of the City (Map IBRD 12407). The transmission system to the City from the Red Hills lake are operated and maintained by the Madras Corporation. This transmission system with a

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1/ Comparable data for other large Indian cities are: Calcutta 145 lcd, and Bombay 138 lcd.

nominal carrying capacity of 2.9 m^3/sec, is in very poor condition and will need early renovation or replacement. In addition to these sources, there are a number of small natural reservoirs or tanks, used for local supplies, in addition to wells, which are estimated to yield about 0.3 m^3/sec.

4. The water treatment plant at Kilpauk, which receives the lakes' water, has a rated capacity of 3 m^3/sec, comprising 2 m^3/sec of rapid gravity mechanical filters and 1 m^3/sec of slow sand filters. However, the plant has long operated below this rating because (a) the water availability from Red Hills varies from a minimum of 1.2 m^3/sec to 2.8 m^3/sec; and (b) plant operation and maintenance is not satisfactory. Experience with the performance of slow sand filters has not been entirely satisfactory due to the high organic content of Red Hills' water and high algae growth. The operation and maintenance of the slow sand filters needs to be investigated to determine whether they need replacement, or improvements can be achieved by other operational measures.

5. The main water distribution system was designed in 1911 for a 1961 population of 0.7 million, which was exceeded by 1931. Insufficient storage, pumping capacity and deterioration in mains have led to unequal supplies between areas, drop in pressures, limited supply hours and poor quality water at ends of the system. The Madras Corporation in 1954 began remedial measures by introducing a zoned distribution system. The city was divided into 13 zones, and each zone was fed directly by a trunk main utilizing the existing trunk mains wherever feasible. However, these measures are still incomplete and the design criteria and proposed capacities have been overtaken by demand from a current population of about 3 million. The zonal system introduced by these modifications does form a suitable base for improvements but a detailed network analysis is urgently required to ensure rational extensions and development.

6. There are about 92,000 house connections of which almost 10,000 are metered. The meters are in disrepair and is the subject of general complaints from consumers. A 1974 leak detection study in two selected areas of the city revealed surprisingly little leakage from the mains, but substantial leakage was revealed in house connections. Control of these losses is made more difficult by the absence or non-functioning of bulk meters at the Kilpauk treatment works and in the individual zones. It is believed, however, that leakage from the sytem on the whole is likely to be higher, and a detailed survey of leakage detection is necessary.

Sewerage Systems

7. MMA, being located on a flat coastal plain, with high water table, has a basic drainage problem. Sewers can only be laid at shallow depths to minimize costs and a number of pumping stations are necessary to lift sewage to treatment and disposal sites.

8. The present sewer system, planned, constructed and operated by MC, was commenced in 1910 as a "separate" system i.e. storm drainage was designed as an independent system. The city was divided into three areas for collection purposes and all the effluent pumped from these areas to a single sea outfall. Following construction of these works over half a century ago, little has been done except to add certain residential area collectors to the system. By the mid-1950s the outfall was severely choked and many of the city's water or drainage channels including the River Cooum had become open sewers. A sewage farm was developed in 1957 to take about 0.3 m^3/sec of the effluent or about 15% of the total present sewage flow. In 1959, a scheme for rezoning the city into five areas for a 1991 design population of 2.7 million was commenced, but little investment took place. The largest expenditures were incurred in cleaning up the Cooum River by preventing sewage from entering this river. The 1971 census showed a population of almost 2.5 million, which has necessitated a complete review of the sewerage system design criteria. This was done by Madras Corporation engineers in the period 1972-74 and limited works on rezoning including construction of three sewage treatment plants with a total capacity of 1.1 m^3/sec have commenced.

9. Currently about 75% of Madras City is sewered, but in MMA, outside the city boundary, no systems exist. There is an urgent need for studies to define the requisite systems for MMA, including Madras City and to prepare a realistic phased program for implementation. However, shortage of funds for water supply as well as sewerage improvements may prove to be the principal constraint to early and substantial improvements. It is therefore essential that studies under way for the water supply and sewerage sector clearly define least-cost and high-benefit solutions for the sector.

B. Organization and Finances of the Sector

10. GTN has recognized for some time the need to rationalize the organization and management of the sector, both in the State and in MMA. The formation of TWAD in 1971 was a first step (see para 13) but further improvements in MMA will be based on the report of the UNDP/WHO consultants (see para 22) expected in March 1977.

11. Responsibility for organization and mangement of the sector in MMA is fragmented. In addition to MC and the TWAD, at least seven GTN departments or agencies and eight local authorities share the responsibility for provision of water supply and sewerage. The local authorities are responsible, within their resective areas of jurisdication, for the operation and maintenance of distribution systems, ground water supplies and sewerage systems. The development of water sources (principally wells and irrigation tanks) is currently divided between the Irrigation Branch of the Public Works Department (PWD),

the Ground Water Directorate and TWAD. These water sources are shared between irrigation, industrial and potable water supply users. However, other government agencies also develop wells for specific projects, e.g. housing schemes by the TNHB. Facilities for the transmission and treatment of potable water supplies are designed and constructed by the TWAD and handed over to the local authorities on completion. Design and construction of distribution systems within the city are executed by the MC, but in other areas, the TWAD designs and constructs the distribution systems and hands them over to the local authorities for operation and maintenance. The existing principal water sources for Madras and the proposed Veeranam source (see para 18) are currently controlled by the PWD because these are also used for irrigation. Sewerage organization and management is subject to similar fragmentation. There is insufficient coordination among these institutions, although recently MMDA has been attempting to coordinate the efforts for future development planning. There is a lack of suitably qualified staff in the existing agencies to design and implement major schemes and there is an urgent need for training of the existing staff.

12. Of the local authorities, the MC is the best organized for the sector in MMA, having water supply and sewerage departments serving the city area, each under an engineer of the rank of a Superintending Engineer and supervised by the Municipal Commissioner (see Chart 5). The Water Works Department has a staff of 4 Executive Engineers and 15 Assistant Engineers, and the Drainage Department is staffed by 2 Executive Engineers and 11 Assistant Engineers. These departments are capable of undertaking small schemes related to distribution works but are not presently equipped to execute any major schemes.

13. The TWAD, formed in 1971, was the first State Board for the sector in India. It is primarily a planning, design and construction agency for the sector and does not have adequate powers to either regulate the performance of other statutory water supply and sewerage undertakings or to operate and maintain systems. Nevertheless, it has enabled GTN to focus more specifically on the sector's development needs since its formation, and it should have a most useful role as the cooperating agency for the UNDP/WHO studies which are to make recommendations for improving the water supply and sewerage systems in Madras.

14. The TWAD and MC will be responsible for construction supervision only if the project components and their past performance indicates a capability and capacity to meet the proposed commitment. However, during the construction period the sector reorganization should take place, and any new authority(ies) should be capable of satisfactory project execution.

Finances

15. In addition to addressing the problems of organization and management of the sector, the UNDP/WHO consultants are required to review the performance of the sector and recommend improvements in the fiscal operations, including

preparation of long-term forecasts for the sector in MMA, and to provide the necessary first stage reforms to support long-term investments. The need for the consultants' work is demonstrated by the fact that annual expenditures on the sector have exceeded revenues for many years. Deficits have been financed by either general property tax of MC or GTN revenues. No authority has adopted a policy of requiring these services to generate adequate funds for operations, maintenance and debt service, nor to provide funds for replacement or expansion. The latter have been financed by GTN loans, bearing interest rates in the range of 6-8% for periods of up to 20 years.

16. MC levies a water and drainage tax at 7% on the annual rental values of property. This tax is consolidated as part of the annual property tax levy by the Corporation. The 7% level bears no relationship to expenditures on these services nor does the supplementary yield from water charges based on metered water consumption. While water connection fees and meter rentals are charged, except for a connection fee, no specific charges are levied for sewerage.

17. This failure to deal with the financial aspects of the sector satisfactorily is the principal reason for its poor condition and low standards of operation and maintenance. It is not necessary for IDA to address the problem specifically as part of this project, because the UNDP/WHO study will provide detailed proposals for reform by June 30, 1977 and GTN, assisted by the consultants should have substantially completed the implementation of reform proposals by May 31, 1978. Assurances were obtained at negotiations that MC and any other agency assigned responsibility for water supply and sewerage services in MMA as a result of the consultants' review, will (a) with effect from April 1, 1978, maintain water supply and sewerage accounts and funds related thereto separate from all other accounts and funds; and (b) with effect from April 1, 1979, impose specific water and sewerage charges and taxes sufficient to provide adequate cash flows to meet the annual expenditures including debt service and provision of working capital for these services.

C. Future Prospects for Water Supply

18. In the mid-1950s the GTN Public Health Engineering Department (PHED) (now TWAD) began investigating additional sources to supplement the already inadequate Red Hills Lake system (para 3). Various alternatives were considered including the use of the Krishna-Pennar rivers system originating in Andhra Pradesh some 650 km north of Madras. In 1959, PHED drew up a feasibility study for a 2.1 m^3/sec pumped, treated water supply using the Veeranam Irrigation Tank as a source, some 220 km south of Madras. This source, TWAD claimed, could provide at least 5 m^3/sec and should be developed in two stages through 1960-70, each to bring about 2.1 m^3/sec of treated water to Madras. The proposed treatment works would be about 30 km from the Veeranam Tank (and 190 km from Madras). After many delays, a contract was let in 1971 to a local contractor to work in collaboration with

a foreign firm producing pre-stressed reinforced concrete pipes. When the IDA mission visited the works in 1973, it was clear that the contractors would be unable to complete the scheme by 1975 at the estimated cost. Quality control in the manufacturing process, the logistics of pipe delivery, and probably certain design characteristics had never been satisfactorily determined, and the mission had serious doubts about the viability of the entire scheme. By end-1975 the contractor had stopped work and TWAD was considering trying to complete the works by its own labor in collaboration with the foreign pipe manufacturer. At that time, out of a total pipe requirement of 36,700 pipes (each 5.3 m long and 1.65 m in diameter) only 10,600 had been manufactured, 22 km laid and 2 km tested. Cost overruns will probably exceed 100% of the 1971 estimate and completion of this first stage would be unlikely before 1979, even if the design and construction should prove sound. The 2.1 m^2/sec treatment works (190 km south of Madras) was completed in 1974 and has never been tested or used.

19. One of the first tasks of the engineering consultant for the UNDP/WHO Master Plan Study (para 22) is to review the design and construction of the Veeranam scheme, and advise on its suitability. To date TWAD has invested over Rs 20 crores (US$22.2 million equivalent) in the scheme and GTN needs to know as early as possible whether the scheme should be continued. The pipes already manufactured could have alternate uses, but GTN still has no prospect of early relief for the serious water shortage in MMA. The consultant is required to advise on the optimum water sources development as part of the Master Plan, but this information would not be available until about end-1977. Development of a new source would probably take at least a further 4-6 years, given the likely distances involved in transmission.

Other Water Resources for MMA

20. Because of a shortage of adequate local water sources for Madras, the GTN will probably have to make substantial investments to ensure long-term supplies. Irrigation schemes on the periphery of Madras use substantial quantities of water. A UNDP Groundwater Irrigation Report of 1969 indicated the presence of considerable quantities of groundwater to the west of MMA, but this is currently allocated to agriculture. Reallocation of a small percentage of this water to MMA could relieve urgent supply problems, but for this a political decision would be needed. The UNDP Survey also revealed availability of about 1 m^3/sec groundwater immediately north of MMA. The Groundwater Directorate immediately developed this source and has been using it since 1969 to supply the oil refinery and industrial complexes north of MMA. None of this water is available for the Madras City distribution system and cannot be redistributed without major investments. The Prime Minister has recently intervened to encourage neighboring states to make available water from the Krishna-Pennar rivers in Andhra Pradesh (para 18), and the UNDP/WHO consultant will examine the feasibility of using this major source.

21. Shallow wells with shallow impoundments (tanks) within MMA remain the only other local source, particularly in the rural areas outside the MC boundary. The extent to which water supply from these sources can be expanded without causing any serious salinity problems remains to be investigated by the UNDP/WHO consultants.

UNDP/WHO Preinvestment Studies

22. In order to develop sound long-term solutions to the already critical water supply and sewerage situation in MMA, the GOI approached UNDP in February 1975 for financing an in-depth study of the sector and to prepare a Master Plan. WHO agreed to act as executing agency and with IDA and GTN assistance prepared the project documents which were approved by GOI. Although funds were allocated by UNDP for work to commence in October 1975, procedural delays prevented engagement of consultants by WHO until September 1976. The consultants initiated work only in late October 1976.

23. The immediate objectives of the study are to:

(i) provide within three months recommendations to facilitate early rehabilitation of existing systems of water supply and sewerage in MMA, to optimize their use and to eliminate or minimize the existing hazards to public health;

(ii) identify and recommend within four months, and design within 15 months immediate works to alleviate the current potable water shortage and to improve the sewerage system;

(iii) review within three months the design and proposed construction methods and report on the potential water supply output of the proposed Veeranam Scheme Stage II;

(iv) recommend a program of training of all levels of sector staff;

(v) determine the financial conditions of the institutions responsible for the water supply and sewerage systems in MMA; and

(vi) recommend management, technical, organizational and financial improvements in the agency or agencies recommended to be responsible for development and operation of the metropolitan area water supply and sewerage systems.

24. The longer term objectives are:

(i) improve sanitary and environmental conditions in the City of Madras as a step towards the improvement of public health and socio-economic conditions in the State of Tamil Nadu;

(ii) provide the basic pattern for institutional reform and long-term planning of the water supply and sewerage sector;

(iii) strengthen the necessary basic management, organization, administrative and financial systems;

(iv) provide the information necessary in the form of a Master Plan for the planning and phased development of potable water resources and sewerage systems for the MMA through the year 2000; and

(v) initiate feasibility studies for provision of adequate potable water supplies and sewerage systems in the MMA through an appropriate design period.

25. For the engineering studies, WHO has employed the firm of Engineering-Science, Inc. (USA) with local affiliates. For organization, management and finance, the firm of Fergusons (India) has been selected. They will employ foreign experts as necessary. The timetable for the consultants' activities is given in Table 1. IDA will receive all draft and final reports and participate in periodic review meetings arranged by WHO.

D. Project Description and Cost Estimates

26. Major investments in the water supply and sewerage sector in MMA will not be possible prior to 1980-81, when the feasibility studies are to be completed. In the interim period, however, it is possible to undertake programs aimed at immediate improvements in the system by, inter alia, improved availability of supplies from existing sources, a more equitable distribution of available supplies, a reduction in leakage, and rehabilitation of some of the existing systems. Over the next three years (1977-80), the project would support such investments. TWAD has identified several works totalling about Rs 22 crores (US$24.5 million) which it feels would bring about early relief, particularly for water supply, to the metropolitan area. Of these, it has proposed the following works for inclusion in the immediate works program over the next three years (also see Map IBRD 12408):

(a) Third Conduit from Red Hills Lake to Kilpauk Water Works;

(b) At Kilpauk Water Works:

(i) rapid gravity filters (1 m^3/sec) to replace slow sand filters; and

(ii) third pumping main (66") to Kilpauk Shaft;

(c) Additional pumps and other headworks at Nungambakkam and Pallipattu;

(d) Additional underground tank and pump house at Robinson Park;

(e) New trunk main for zone 6-A;

(f) Extension of distribution system in zone 8-B;

(g) Rehabilitation of old mains in the system; and

(h) Sewerage works including rehabilitation of Kodungaiyur Sewage Farm, upgrading of pumping stations, and rehabilitation of mains.

27. On the basis of preliminary designs, TWAD has estimated the total cost of these works to be Rs 8.1 crores (US$9.0 million), excluding contingencies. However, in view of the limited capability of the TWAD Board in designing water works, GTN has asked the UNDP/WHO consultants to review these proposals and submit any necessary additional proposals by March 31, 1977. The consultants are required to ensure that: (a) the investments proposed are the least cost and economically justified and propose alternatives as necessary; (b) the designs of the various components are technically acceptable; and (c) the proposed short-term package is consistent with the longer-term solutions, which are likely to evolve. On the basis of this review, the consultants will prepare final designs and tender documents by December 31, 1977 (see Table 1). A follow-up IDA mission will visit Madras in April/May 1977 to finalize the project components, by which time the organization and management consultants would have completed their review of the institutional issues.

28. On the basis of a preliminary assessment of the magnitude of investments which are likely to be required for the immediate works program, the implementation capacity of TWAD and MC, and the overall financial constraints of the sector, the project includes an allocation of Rs 9 crores (US$10.0 million), including physical contingencies, for water supply and sewerage. Price contingencies for the three-year implementation period are estimated to be Rs 2.25 crores (US$2.5 million). A number of possible works have already been identified and no difficulty is anticipated in selecting the most urgent works with sufficiently high rates of return (at least 10%) within this allocation.

ANNEX 6
Table 1

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Timetable for the UNDP/WHO Study of Water Supply and Sewerage

		To be completed not later than
A.	**Engineering**	
1.	Veeranam Scheme Review	January 31, 1977
2.	Assessment of existing water supply systems	January 31, 1977
3.	Assessment of existing sewerage systems	January 31, 1977
4.	Recommendations for immediate works program	March 31, 1977
5.	Final design and tender documents - immediate works program	December 31, 1977
6.	Water Supply Master Plan, 1978-2000	September 30, 1977
7.	Sewerage Master Plan, 1978-2000	September 30, 1977
8.	Review of operations and maintenance procedures	October 31, 1977
9.	Feasibility study for first package of works in Master Plan (excluding immediate works program (water and sewerage))	January 31, 1979
B.	**Institutional, Organization, Management, Finance**	
1.	Review and advising on institutional arrangements	February 28, 1977
2.	Detailed proposals for reform (including fiscal)	June 30, 1977
3.	Implementation of reform proposals	May 31, 1978

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Road and Traffic Improvements

A. Introduction

1. The road network in the Madras Metropolitan Area (MMA) serves most of the public and private transport needs of the population and is characterised by the predominance of slow-moving traffic using the system. Bicycles are the main mode of private transport, accounting for 25%-50% of all traffic and about 21% of all passenger trips. Buses are the main mode of public transport, accounting for 10%-20% of traffic on the roads on which they operate and for over 40% of all passenger trips. Private automobile traffic in Madras is relatively low (about 15% of total) compared with most other major cities in developing countries, reflecting low automobile ownership and low incomes. Pedestrian movements are quite heavy in most major streets in the city accounting for 21% of all trips. The remainder of the traffic is made up of commercial trucks (15%) and slow moving commercial traffic (human- and animal-drawn carts).

2. The present road network is comprised of about 90 km of arterial roads, which are generally divided roads intended to serve through-traffic but without access control, and some 470 km of collector-distributor roads. In addition, there are local streets which are intended primarily for providing access to premises located along their alignment and do not account for significant traffic movements. The arterials consist of a network of radial routes originating from the central business area to the south, west and north of the city (Map IBRD 12401). These arterials form the main access corridors for the metropolitan area and much of the development has taken place along these routes. As the area expands further, it will be necessary to develop some of the orbital routes which would also relieve the radial routes from some of their present traffic.

B. The Problems

3. The present road network has generally sufficient capacity to meet the requirements of the vehicular traffic. Travel speeds on most road links are acceptable for the city network, the minimum average speed being about 15 km per hour. There are, however, specific bottlenecks in the network where traffic is greatly delayed. These include intersections, narrow bridges, rail/road crossings, and road crossings with heavy pedestrian traffic. In

a few streets along orbital routes, localized road widening may be necessary to accommodate heavy bicycle flows and vehicular traffic anticipated from future development.

4. The main problems of the present road network are, instead, those which relate to the movement of pedestrians and bicycles. The footpath capacity along many major roads is simply insufficient to accommodate the very considerable number of pedestrian movements. Many footpaths are in poor condition, having their surfaces un-made or broken up for a lack of adequate maintenance, and having numerous transverse obstructions which force the pedestrians to walk in the road. Over the last few years, the surface of several major roads has been gradually widened to improve the flow of vehicular traffic to the point that the foothpath width has been reduced to below the minimum standards. The use of the main roadway by pedestrians not only poses a safety hazard, but it also obstructs the flow of other traffic. An improvement in the design and quality of footpaths would make them more attractive to pedestrians than the road and would improve road safety as well as reduce road congestion.

5. On several major roads, including the radial roads, a substantial portion of the roadway is taken by bicycles which form up to 50% of the traffic. For roads with a low level of traffic and where the width of the road is sufficient, the relatively modest vehicular traffic generally finds it convenient to drive in the middle of the road to avoid pedestrians and cyclists. The cyclists' speed of travel is not affected appreciably by the presence of motorized vehicles. Under these circumstances, provision of separate facilities for cyclists can only be justified on safety grounds, provided that the facilities for cyclists do not reduce their speeds. In some of the narrower roads, there is a considerable interaction between cyclists and vehicular traffic, and provision for separate facilities for cyclists is justifiable as a lower cost solution than the expansion of roadway width. Improvements in the present orbital routes can be made on this basis.

6. Elimination of specific traffic bottlenecks and improvement in the facilities for pedestrians and bicyclists would also benefit the buses by improving their speeds. With the present composition of traffic in Madras, particularly the low level of automobile traffic, it is not necessary to provide separate facilities for buses. As has already been mentioned, there is no real problem in respect of traffic capacity so separate traffic lanes for buses are not warranted. Provision of separate bus bays are also not generally necessary in Madras because these would only benefit other fast moving traffic at the expense of additional time required for buses to enter the bays and additional walking time for passengers in some circumstances.

7. An extensive Traffic and Transportation Study completed in 1974 by the GTN Directorate of Town and Country Planning proposed major investments for expansion of the capacity of the network of Rs 148 crores (US$164 million) over a five-year period plus heavy investments in the rail system.

These investments were justified on the basis of a six-fold increase in car and motorcycle trips between 1971 and 1981. In reality, however, between 1971 and 1976, car trips appear to have declined somewhat and there has been only a slight increase in motorcycle trips resulting, inter alia, from a three-fold increase in fuel prices. Future traffic growth is expected to be moderate (perhaps proportional to the population) and the present facilities would be adequate for the next few years. Individual bottlenecks in certain road segments were also identified as a part of the study, of which the ones with sufficiently high rates of return have been included for improvement in the present project.

C. Project Description

8. The road and traffic improvement component of the project is aimed at improving the movement of pedestrians, bicyclists and buses, and to support the desired patterns of growth for the metropolitan area by improvements in the orbital routes. To accomplish these objectives, the project includes (see Map IBRD 12402 for the location of the elements, and Table 1 for a detailed cost breakdown):

(i) upgrading and construction of about 12 km of the Inner Ring Road between the G.S.T. Road and Madras-Tiruvallur Road, designed as 2-lane single carriageway with cycle tracks on both sides;

(ii) improvement of about 200 km of footpaths and about 50 km of cycle tracks, construction of nine pedestrian subways, and lighting of 24 intersections with high accident rates;

(iii) grade separation at two road/rail crossings;

(iv) traffic engineering measures and carriageway improvements to selected streets and intersections in the city network with orbital flows of traffic;

(v) improvement of seven minor bridges for river/canal crossings; and

(vi) street furniture, road painting equipment, traffic signals and traffic enforcement equipment for police.

Inner Ring Road

9. The portion of the Inner Ring Road included in the project is designed to link together important areas of new industrial development at Velacheri, Guindy, Villivakkam and Madhavaram with major residential developments of Shastri Nagar, Alandur, Ashok Nagar, K.K. Nagar and Anna Nagar. In

the absence of this road, movement from north to south has to pass through the built-up areas of the city along the radial routes resulting in increased traffic congestion. It is estimated that the completion of the proposed section of the Inner Ring Road will result in diverted traffic of about 30,000-35,000 vehicles per day.

10. From the junction of the Inner Ring Road with G.S.T. road, about 5 km of road already exists and the works included are those to upgrade this section to a paved 2-lane single carriageway with bicycle tracks on both sides. The stretch from 5 km to the junction of Tiruvallur road does not exist and will be completed under the project. Traffic rotaries will be provided at the junctions with Anna Salai, K.K. Nagar Main Road and Poonamallee High Road, all of which carry a heavy volume of traffic. The road also passes over the Cooum river and construction of a major bridge is proposed. Other works included are signalization of the junction with Arcot Road and lighting of intersections.

11. The cost breakdown, excluding contingences and supervision charges, of the Inner Ring Road is as follows (Rs lakhs):

Road improvement and construction	63.04
Traffic rotaries	14.91
Cooum River bridge	30.84
Signalization	1.34
Intersection lighting	13.13
Sub-Total	123.26
Land and property compensation	43.91
Total	167.17

Pedestrian and Bicycle Facilities

12. Pedestrian Subways. The project includes provision for pedestrian subways at road crossings with high pedestrian crossings and vehicle flow. Five of the pedestrian subways are located along the Anna Salai which has a vehicular traffic of over 1,000 vehicles per hour. These pedestrian subways are located at Hindu Office, Shanthi Theatre, L.I.C. Office, Thousand Lights and Saffire Theatre, which have pedestrian crossings varying from 800 to 3,300 per hour during the morning and evening peaks. One pedestrian subway is located along the Poonamallee High road near Kilpauk Medical College which has a pedestrian traffic of about 800 per hour and a vehicular traffic of 900 vehicles per hour. Of the remaining three subways, one double subway is located at the intersection of South Beach Road and Rosary Church Road and the other two at Thiruvattiyur High Road near I.D. Hospital and near Theagaraja College.

13. The cost of construction of the nine pedestrian subways is estimated to be Rs 74.43 lakhs, excluding contingencies and supervision costs.

14. Footpaths and Cycle Tracks. The project includes improvement of about 200 km of footpaths and about 50 km of cycle tracks. Improvements will include widening, upgrading of surface, provision of guard rails at selected points of heavy pedestrian movement and markings. Such improvements will be made along the Anna Salai, the Poonamallee High Road and several selected streets in the network, particularly those which carry circumferential movements. The flow of bicycles on Anna Salai are up to 3,800 per hour and pedestrian movements at selected points are more than 3,000 per hour during the peak periods. Bicycle and pedestrian flows on selected points along Poonamallee High Road are in excess of 2,500 and 800 per hour respectively. Both of these roads are also major arterials and carry a heavy volume of vehicular traffic. About 100 km of other streets in the network, on which footpath and cycle track improvements are to be made, will be selected by the Traffic Engineering Unit to be established in the Madras Corporation (see para 29 below). In addition, to reduce accidents street lighting will be provided at 24 intersections along Anna Salai and Poonamallee High Road.

15. The cost for the footpath and cycle track improvement, including intersection lighting, is estimated to be Rs 112.2 lakhs, of which Rs 7.2 lakhs is for land acquisiton and property compensation.

Road/Rail Grade Separations

16. There are several at-grade road/rail crossings in the metropolitan area. Some of these crossings are located in major streets creating severe bottlenecks in the system. However, because of high cost of grade separations, it is important that these are only provided where there is a real bottleneck for fast moving traffic. Bicycles and slow moving traffic are often better served by the existing level crossings which avoid the imposition of gradients. The project provides for two road/rail grade separations; one at Nelson Manickam Mudaliar Road near Nungambakkam railway station, and the other at Vaidyanathan Mudali street near Thondiarpet railway station. Nelson Manickam Mudaliar Road is the main and shortest link connecting Anna Nagar and South Madras passing through a number of educational institutions and industries. It carries heavy vehicular traffic (about 1,300 per day). The gate is frequently closed (about 50% of the time) due to a number of express and suburban trains using the line. Under the project, the road will be carried in a subway underneath the rail line.

17. Vaidyanathan Mudali street carries about 400 vehicles per day. It is the main link connecting the city with the new developments in the north and with the oil refineries. The railway line crossing this road is the route of most express, passenger and goods trains and the gate at the crossing is closed for a total duration of 15 hours a day. The grade separation to be constructed will be a road bridge over the railway line.

18. The construction cost of the two grade separations is estimated to be Rs 85.6 lakhs, excluding contingencies and supervision cost.

Improvements to City Street Network

19. The improvements proposed to the city street system include localized widening, junction improvements by traffic engineering measures, widening of narrow bridges and replacement of several minor bridges which are in danger of failure. In addition, footpath and cycle tracks are to be provided in a few selected streets as discussed earlier. In selecting the streets for these improvements from the existing network, emphasis has been given to those streets which would establish orbital routes of traffic thus relieving traffic pressures from the radial routes, and those which would facilitate the extension of the public transport network. The widening is to be carried out to a 14 m width along most of the road length, but it is not necessary at this time to widen sections of these roads which are already wider than 9 m and capable of supporting simultaneously two-way traffic movement. Also, in some of the proposed roads, where widening was proposed at the expense of reducing footpath width, further road widening was not included.

20. The important orbital routes and the roads included along the routes for which improvement works are proposed (see Map IBRD 12402) are as follows:

(a) CBD Bypass (Ebrahim Sahib Street). The existing right-of-way of 14 m to 18 m is adequate and only some localized widening and channelization of junctions is proposed. Total estimated cost is Rs 8.5 lakhs.

(b) Inner Core Bypass. It is the only feasible orbital route in the north-west until the Inner Ring Road can be built north of Avadi Road. Improvements are proposed at selected points along Flowers Road, Millers Road, Bricks Kiln Road, Cooks Road, Stephensen Road and Gantz Road. A bridge is to be built on the Nullah at Gantz Road as it is presently too narrow to permit two-way vehicular movements. Total estimated cost is Rs 5.1 lakhs for road improvement and Rs 12.7 lakhs for the bridge.

(c) Orbital Link from G.W.T. Road to South Beach. Includes localized widening and improvement to intersections primarily on Nelson Manickam Mudaliar Road, Tank Bund Road, Usman Road, Chamiers Road and Annamalaipuram Road; and widening of the bridge over the Nullah at Nelson Manickam Mudaliar Road. 1/ The total estimated cost is Rs 33.9 lakhs for the improvement works and Rs 11.9 lakhs for the bridge.

(d) Elliots Beach Road. This road is presently being widened and no additional widening is required. The only works included are for providing suitable cross-drainage and

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1/ Grade separation of the Nelson Manickam Mudaliar Road near Nungambakkam railway station which has been discussed earlier, will also improve this orbital route.

service conduits across the carriageway; estimated cost, Rs 10.2 lakhs.

(e) N.S.C. Bose Road and Bazaar Roads. These roads are already six lanes wide and quite adequate for present traffic. This route is very well used by pedestrians and buses. The only works included are the provision of a bus zone and for better organization of parking; estimated cost Rs 6.8 lakhs.

21. The total cost of the city street improvement is estimated to be Rs 89.0 lakhs, excluding contingencies and supervision charges. In addition, the cost of relocation of services is estimated at Rs 16.0 lakhs.

River/Canal Crossings

22. There are a number of minor river/canal crossings in the city which are old and too narrow for the present levels of traffic. Besides the two bridges included in the city street improvement, seven other such bridges have been identified as being in need of immediate replacement because of their poor physical condition. These are located at the crossings of Demello's Road, Kilpauk Garden Road, Parkasa Mudali Road, Theagaraya Road, Vijayaraghavachari Road, G.N. Chetty Road and Venkatnarayana Road. Although none of these bridges carry a very large volume of traffic, a significant cost would be incurred because of traffic diversion if any one of these fails. The life of these bridges is estimated at less than five years. The cost of the seven bridges is estimated as Rs 13.0 lakhs.

Traffic Engineering and Management

23. At present there is no systematic program for traffic engineering and management for the metropolitan area. These functions are performed by the State Police and the Highway Research Station of the Department of Highways and Rural Works. Traffic engineering measures are proposed on an ad hoc basis by the Police on the basis of their experience with traffic enforcement and are often implemented without adequate technical analysis. The Highway Research Station offers technical guidance from time to time, but it is overburdened with many other statewide responsibilities (e.g. designs, material testing, etc.). The project would both strengthen and reorganize the traffic management functions in the area (see para 29 below) and provide the necessary equipment to carry out these functions.

24. The project provides basic equipment needed to improve traffic enginering and management in the metropolitan area. Equipment provided for traffic management includes: traffic signs, parking control devices, flashing beacons at pedestrian crossings, road painting machinery and signals for ten selected intersections. The traffic signals will be used partly for training of staff in their proper use, as signalization on a large scale is not warranted under the present traffic conditions in Madras.

25. Traffic enforcement equipment to be provided includes weigh bridges, smoke detection apparatus, noise level detector, radar equipment and micro-wave links and monitors.

26. The cost of the traffic engineering equipment is estimated to be Rs 33.9 lakhs and of the traffic enforcement machinery as Rs 26.0 lakhs.

D. Project Organization

27. The responsibility for the execution of the project component will be shared primarily by the State Department of Highways and Rural Works (DHRW) and the Madras Corporation. In addition, the State Police will share the responsibility with these two organizations for the traffic management and control aspects of the project. MMDA will monitor the overall progress of the project and coordinate the work of the DHRW and Madras Corporation.

28. All works proposed on the Anna Salai and Poomanallee High Roads, and the construction of the Inner Ring Road will be the responsibility of DHRW, since these major roads are under their jurisdiction. The remaining works pertain to the city street network, which is under the jurisdiction of the Madras Corporation. However, because of the Corporation's limited technical and execution capability for the more sophisticated works, all the major works proposed for the city street system will also be executed by DHRW on behalf of the Corporation. These works include the two grade separations, all major and minor bridges and all pedestrian subways. Madras Corporation will be responsible for the improvement and construction of footpaths and cycle tracks and for all street widening and intersection improvements on roads other than those under DHRW's jurisdiction. Table 1 indicates the execution responsibility for each of the project components.

29. The responsibilities for traffic engineering and management under the project will be divided among the Madras Corporation, DHRW and the State Police along the following lines: Madras Corporation will be primarily concerned with better facilities for pedestrians and cyclists and will plan for their future requirements; DHRW will, with technical support from the Highway Research Station, be responsible for the development of new traffic techniques, improvement in the existing procedures for traffic management, one-way systems and parking controls; the State Police will carry out the traffic monitoring and enforcement responsibilities. Traffic engineering units will be established in each of the three agencies. Assurances were obtained during negotiations that these units will be established and staffed adequately by July 1, 1977. Agreed terms of reference for the three traffic engineering units are given in Appendix I.

30. Following the lines of responsibility for traffic management and enforcement given above, all equipment for traffic engineering will be provided to DHRW and for traffic monitoring and enforcement to the State Police.

Department of Highways and Rural Works

31. DHRW is a department of the State Government responsible for design, construction, improvement and maintenance of all national and state highways and major district roads in the state. Within the city of Madras, it is responsible for 36 km of major roads. In addition, design and cost estimates for all major works undertaken by Madras Corporation are subject to approval by DHRW and many of these works are actually carried out by DHRW on behalf of the Corporation.

32. DHRW is headed by a Chief Engineer, who is assisted by an Additional Chief Engineer, responsible for all national highways in the state (Chart 10). Under the Chief Engineer are a number of Superintending Engineers responsible for separate geographical areas (circles) into which the State has been divided. Each circle is staffed adequately by qualified engineers and technicians. The roads in Madras are covered by a separate wing. Following its normal practice, DHRW will designate two separate circles, each headed by a Superintending Engineer, for the execution of the project. DHRW carries out its own design works in accordance with the standard practice in India.

33. DHRW maintains a separate Highway Research Station for technical investigation and research. It is an effective institution and is staffed by competent engineers. Its traffic laboratory and traffic engineering cell carries out surveys of traffic for making trend projections, analysis of accident information supplied by the police, design of traffic junction improvements and sanctioning of developments which are likely to affect traffic flows. Although the traffic engineering cell has responsibilities covering the whole of the state, it is presented with so many requests for analysis of special cases just from Madras that it clearly cannot deal with all its responsibilities. These requests partly result from the reputation of the cell for quality advice. It is recommended that the proposed new traffic engineering units for MMA should draw in the initial stages some staff from this cell.

Madras Corporation (Works Department)

34. The Works Department of Madras Corporation is responsible for the design, construction and improvement of all roads, footpaths and cycle tracks. The department is headed by the City Engineer, who is equivalent to a Superintending Engineer in DHRW. Under the City Engineer are two Executive Engineers, each responsible for road upgrading and bridges. The value of works executed by the City Engineer in 1975/76 was about Rs 21 million as compared with Rs 7 million in 1974/75. The present staff of the Works Department would be able to execute the works proposed under the project which are not covered by DHRW.

35. Maintenance of roads (as well as other engineering works) comes under two separate departments, each headed by an Assistant Commissioner. The City Engineer has no direct responsibility for these works. Separation of capital works from maintenance works has not proved to be satisfactory

because of coordination problems and the lack of a proper assessment of relative priorities of the two functions. The Corporation has agreed to review these functions.

36. A new unit for traffic engineering will be created under the City Engineer for planning, improvements and construction of footpaths and bicycle tracks (see para 29 and Appendix I).

State Police

37. The State Police is responsible for the day-to-day traffic supervision and enforcemment in the city. A Traffic Committee, chaired by the Commissioner of Police for Madras, is responsible for instituting traffic engineering measures. Suggestions for these measures generally originate with the Traffic Investigation Unit or the Traffic Unit of the police and are approved by the Committee. The Traffic Investigation Unit is primarily concerned with accident investigation. It is responsible for promptly investigating all accidents and for establishing all the necessary accident statistics. The Traffic Unit is responsible for enforcement of the traffic laws and the day-to-day traffic operation. It is also responsible for all traffic control equipment including traffic signals, road markings and sign posting. The Traffic Unit will continue its present responsibilities under the project and would provide information on traffic problems to the traffic unit to be set-up in DHRW. Traffic enforcement equipment to be provided under the project would strengthen the unit in carrying out these tasks.

E. Economic Evaluation

38. The benefits of the different components are derived from one or more of:

(i) savings in vehicle operating costs resulting from improved traffic flows;

(ii) time savings of bus and car passengers, cyclists, and pedestrians; and

(iii) reduction in accidents.

The hourly cost of the different vehicles has been assumed as: Rs 30 for trucks and buses; Rs 12 for cars and taxis; and Rs 5 for motor cycles and motor rickshaws. Value of time for passengers, bicyclists and pedestrians has been assumed to be Rs 0.50 per hour, which is one half of the average wage in Madras. The cost of accidents has been assumed to be: Rs 15,000 for a fatal accident; Rs 1,200 for serious injury, and Rs 25 for a simple injury. All costs include the cost of land, civil works, equipment, supervision and an allowance of 10% for physical contingencies.

Pedestrian Subways

39. The benefits of the subways are measured by the reduction in accident costs and by savings in vehicle, passengers, cyclists and pedestrian travel times. The economic rate of return for the 9 subways (12% of total cost) is estimated to be between 13% and 18% if the value of time is assumed at Rs 0.50 per hour, and between 11% and 16% if no value is attached to time savings of individuals.

Footpaths and Bicycle Tracks

40. Improvements in footpaths and cycle tracks would not only improve pedestrian and bicycle movements but would also improve traffic flows. It is not possible to quantify these benefits for a lack of technical data. It has, however, been ensured that the design standards provided are the minimum appropriate in accordance with the guidelines of the Indian Roads Congress. Total investment in footpaths and bicycle tracks improvement and new construction represent about 18% of the total cost of the roads component.

Inner Ring Road

41. The benefits of the Inner Ring Road are measured by the cost savings of traffic which would be diverted from the existing routes which are 3 to 5 km longer, by the savings to the present traffic using the unimproved sections of the road, and by the traffic generated by the completion of the road. Benefits will also be derived by cyclists who would be provided with separate cycle tracks on both sides of the road, but these benefits have not been quantified. On this basis, the economic rate of return of the Inner Ring Road (representing 28% of total cost) is estimated to be 43% and the first-year return as 54%.

Road/Rail Grade Separation

42. The benefits of the grade separation (representing 14% of total cost) are measured by the time savings by the different types of vehicles, bus and car passengers and bicyclists. The economic rate of return and first-year return are estimated at 13% and 12% respectively if time savings to individuals are valued at Rs 0.50 per hour. The rate of return is about 9% if time savings to individuals are ignored.

Bridge Upgrading

43. The benefits of bridge widening (4% of total cost) are measured by time savings resulting from a smoother flow of traffic; the rates of return are calculated as 10%. The minor bridges proposed for reconstruction (2% of total cost) are all in poor physical condition and are in danger of collapsing. The benefits of reconstruction are measured by the increase in vehicle operating costs and time costs which would have to be incurred by the user if they were to be diverted to alternative routes. It is difficult to predict

accurately when the bridges may actually collapse, but it is the engineers' judgement that their maximum remaining life is five years. Assuming an equal probability of failure in each of the next five years, the rates of return of the various bridges are calculated to be between 13% and 27% assuming a zero value of time savings to individuals.

Orbital Road Improvements and Traffic Engineering

44. The improvements proposed on the orbital roads (25% of total cost) would generally improve the traffic flows on the arterials and at the same time make some of the new sections in Madras more accessible. It is not, however, possible to quantify the resulting benefits of these small improvements.

45. The portions of the roads and traffic component for which it has been possible to quantify the benefits account for about 55% of the total cost. The weighted average rate of return for these components is estimated to be 28%, if time savings to individuals are valued at Rs 0.50 per hour, and 24%, if such time savings are ignored.

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MADRAS URBAN DEVELOPMENT PROJECT

Cost Estimates of Roads and Traffic Improvements

No.	Description	Project Ref. /1	Execution /2 Responsibillty	Estimated Cost (Rs lakhs)
I.	Construction of Inner Ring Road			
	(a) km 0/0 to 11/7, widening to 2-lanes with cycle tracks	II	DHRW	63.04
	(b) Traffic rotaries (3)			14.91
	(c) Bridges across Cooum River			30.84
	(d) Signalization at junction of Arcot Road			1.35
	(e) Lighting of intersections			13.13
	Sub-total (a-e)			123.27
	(f) Land acquisition and compensation for property			43.91
	TOTAL (I)			167.81
II.	Pedestrian and Cyclist Facilities			
	(a) Pedestrian subways:			
	Anna Salai (5)	I/I	DHRW	38.88
	Poonamallee High Road (1)	I/II	DHRW	10.99
	City Streets (3)	V/III	DHRW/MC	24.56
				74.43
	(b) Footpaths and Cycle Tracks:			
	Anna Salai (km 0/3-12/4)	I/I	DHRW	10.11
	Poonamallee High Road (km 1/3-9/4)	I/II	DHRW	3.68
	Lighting of intersections (24)	I	DHRW	23.88
	City streets (100 km)	III	MC	67.37
				105.04
	Sub-total (a-b)			179.47
	(c) Land acquisition and property compensation	I		7.18
	TOTAL (II)			186.65
III.	Road/Rail Grade Separation			
	(a) Vaidyanathan Mudali Street	IV	DHRW/MC	44.06
	(b) Nelson Manicham Mudaliar	III/V	DHRW/MC	41.52
	TOTAL (III)			85.58
IV.	City Street Improvement			
	(a) CBD bypass improvement	III/I	MC	8.47
	(b) Inner Core bypass:	III/I		
	(i) road improvements		MC	5.08
	(ii) bridge over Nullah at Gantz Road		DHRW/MC	12.71
	(c) Orbital link GWT Road - South Beach Road:	III/V		
	(i) road improvements		MC	33.89
	(ii) widening of bridge over Nullah		DHRW/MC	11.86
	(d) Elliots Beach Road	III/III	MC	10.16
	(e) N.S.C. Bose Road	III/IX	MC	6.78
	(f) Shifting of services for (a)-(e)		MC	16.00
	Sub-total (a-f)			104.95
	(g) River or Canal Crossings:	V/I	DHRW/MC	
	(i) Demello's Road			1.69
	(ii) Kilpauk Garden Road			1.10
	(iii) Parkasa Mudali Road			1.69
	(iv) Theagaraya Road			2.28
	(v) Vijaysraghavachavi Road			1.69
	(vi) G.N. Chetty Road			2.28
	(vii) Venkatanarayana Road			2.28
	Sub-total (g)			13.01
	TOTAL (IV)			117.96

No.	Description	Project Ref. /1	Execution Responsibility /2	Estimated Cost (Rs lakhs)
V.	Traffic Engineering and Management			
	(a) Traffic engineering equipment	VI	DHRW	
	(i) one-way system and signs			0.84
	(ii) reorganization of traffic at Central & Engmore station areas			6.17
	(iii) flashing beacons at 13 crossings			0.42
	(iv) road painting machinery (2)			0.42
	(v) traffic signals (10)			13.38
	(vi) traffic engineering improvements and parking reorganization and control			12.71
	Sub-total (a)			33.94
	(b) Traffic monitoring and enforcement	VI	SP	
	microwave links/monitors, weigh bridges, smoke detection apparatus, noise level detector, radar equipment			26.00
	TOTAL (V)			59.94
	Total Project Base Cost			617.31
	of which: land and property compensation			(67.09)
	civil works			(510.00)
	equipment			(40.22)
	Physical Contingencies (10% of civil works)			55.00
	Design and Supervision (12½%)			75.66
	Sub-total			747.97
	Price Contingencies (see para 4.03)			170.23
				918.20

/1 These correspond to the project and sub-project reference numbers used by the project authorities in the preparation of the project and are indicated here for clarification. The missing reference numbers in the sequence are because of the deletion of several components from the project.

/2 DHRW - Department of Highways and Rural Works;- Madras Corporation;DHRW/MC - Executed by DHRW on behalf of MC; SP - State Police.

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MADRAS URBAN DEVELOPMENT PROJECT

Terms of Reference for Traffic Engineering Units

Objectives

1. The objectives of the three Traffic Engineering Units to be established are:

(a) To provide for the efficient and free movement of present road users on existing roads.

(b) To control and, if necessary, restrict the minority of road users so as to minimize their encroachment on the freedoms of the majority. This will generally, but not always, involve the control of those using personal and/or motor transport so as to preserve the freedoms of those on foot and bicycles.

State Highway Department Traffic Engineering Unit

2. The principal functions of the Unit in DHRW will be:

(a) To establish standards for all traffic engineering work in accordance with the above policy based on international and Indian Roads Congress standards, on the standards already produced for the Madras Urban Development Project, and on further studies referred to below.

(b) To identify one-way systems and other traffic management systems in and around sections of roads heavily used by traffic or pedestrians with a view to providing adequate capacity for the existing moving traffic and greater freedom of movement for pedestrians, cyclists and bus passengers.

(c) To seek solutions in congested streets whereby one or more streams of traffic (probably except buses) are removed to an alternative route so that more space can be provided for pedestrians, cyclists and bus passengers.

(d) To review the operation of existing traffic signals and to provide new traffic signals in such a way that they work efficiently and appear to do so to road users so that respect for them can grow.

(e) To study carriageway markings, particularly at important junctions, so that these are applied uniformly. To undertake corrective measures as necessary.

(f) To update the traffic sign system in Madras to comply with international standards, which are now endorsed by the Indian Roads Congress.

(g) To introduce a direction signing system at important points in the metropolitan area.

(h) To propose and undertake measures for parking control as a tool to restrict trip ends and hence restrain the total volume of traffic seeking to enter congested areas.

Corporation Traffic Engineering Unit

3. The Unit established in the Corporation will be primarily concerned with providing adequate facilities for pedestrians and cyclists. The activities of the Unit will include:

(a) Survey of footpaths to identify those being too narrow, having poor surface, having broken or poorly maintained surface, having steps exceeding 5 cm up or down, or being obstructed by building corners.

(b) Prepare a priority list for improvement and program of work to utilize the funds provided in the project.

(c) Surveys of heavily used cycle routes to identify points of greatest conflict with traffic.

(d) Preparation of a program for the provision of cycle tracks. Consideration will be given to providing cycle tracks at the expense of existing road space, rather than at the expense of footpaths or by road widening.

Police Traffic Engineering Unit

4. The police traffic engineering unit will be responsible for traffic control and monitoring. Its activities will include:

(a) Application of uniform traffic control techniques to encourage users to obey traffic signals, signs and markings.

(b) Evaluation of switching on and off schedule for traffic signals and use of police control as a complementary measure for enforcement of traffic signals rather than that of overriding.

(c) Enforcement of regulation condusive to road safety, e.g. speed limits and weight limits.

(d) Devise means to increase traffic police mobility to cover a larger number of points with traffic difficulties.

(e) Establish a Control Center, having assistance of closed-circuit television in conjunction with the radio control, and installation of cameras at selected intersections. Training of operators on this equipment.

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Bus Transport

A. Transportation in Madras Metropolitan Area

1. Bus transportation is the main mode of transport in Madras, carrying in 1970 over 40% of all trips, and over 80% of trips by public transport (Table 1). Bicycles and pedestrians accounted for another 42% of all trips in 1970. Railways offer only limited service in the metropolitan area and accounted for 11% of all trips in 1970. The trips by private cars are insignificant because of the low level of automobile ownership.

2. At present, buses carry an average of 1.7 million passengers each day, which represents an annual increase of about 9% in the past five years. The major increase in bus ridership occurred in 1973 and 1974 when petrol prices were increased substantially (Table 2). There has also been some shift in trips from bicycles to buses in the same period. Bus transportation is expected to continue to be the main mode of public transport for the metropolitan area, and bus passenger traffic can be expected to continue to grow as the population and income levels increase. The Madras Transportation Study (1970) had predicted a four-fold increase in the mass transportation trips over 20 years (1971-1991), or an average annual increase of about 7.5%, while private fast-moving transport trips were expected to increase ten-fold. Spot checks of present traffic flows indicated a decline in the number of private fast-moving transport trips between 1970 and 1976. Thus, while the bus passenger traffic growth has been generally in line with the projections of the study, increase in total motorized transport demand has been less. Since the effects of fuel price increases on bus passenger traffic have by now been fully realized, it is believed that future growth in traffic will follow the general population and income trends in the metropolitan area. An annual growth in bus passenger traffic of 6.5% has been assumed.

B. Bus Transportation

3. Pallavan Transport Corporation (PTC), a GTN undertaking, is the sole operator of bus services in the metropolitan area. In 1975, it operated a fleet of 1,340 buses from 11 depots to serve the metropolitan area. It provided service on some 199 different routes, of which 102 were city routes (originating and terminating within the city of Madras) and 97 town routes (having one or both terminals outside the city). The route

length for the city services varies from 3.3 km to 22.4 km, and for the town routes from 4.3 km to 42 km. The total route kilometerage for city and town routes is 1,311 km and 2,110 km respectively.

4. The bus fleet of PTC in the metropolitan area has a high proportion of older buses (Table 3). About 45% of the fleet is older than 8 years and about 22% is older than 10 years. This situation has developed because in the past few years the bus fares were maintained by GTN at unrealistically low levels, which limited PTC's ability to generate sufficient resources for its normal bus replacement. The operating cost of a bus increases with age and usage. Historical records of operating costs maintained by Pallavan and studies undertaken by consultants to PTC indicate that the cost of bus operation increases rapidly after about 8 years. Moreover, the reliability and service availability of the older buses is lower compared with the newer buses.

5. PTC's bus replacement policy is to replace buses after 8 years of service as per recommendations of the Indian Road Transport Institute. However, this policy is based on the assumption that a bus would be utilized for the same number of kilometers each year irrespective of age. In practice, it should be possible to schedule the older buses during the peak periods only and taking them out of service for the rest of the day, and using the newer and more economical buses more intensively. With this rescheduling of bus use, it is estimated that bus replacement can be postponed until after about 12 years of service. PTC has now revised its replacement policy in accordance with this recommendation and agreed to study the effectiveness of the new policy over the project period.

6. The demand for bus transportation in Madras, as in most other cities of the world, is heavily concentrated during the morning and the evening peak hours. The morning peak is between 8 a.m. and 10 a.m. and the evening peak between 4 p.m. and 6 p.m., the morning peak being the more pronounced of the two. It is estimated that about 40% of all daily passenger trips are carried during these hours. This results in severe congestion during these hours and buses on some routes are often overloaded by as much as 100%. The situation can be expected to deteriorate with the expected increase in bus passengers over the next few years. However, an increase in capacity to alleviate overcrowding in the peak hours is not the most economical solution to this problem. PTC and the State Government have recognized this and in August implemented a system of staggered work hours for government offices, private businesses, factories and schools, so that at least a part of the increased passenger demand can be accommodated with the present fleet. The impact of staggered working hours on the demand for bus service will be evaluated carefully by PTC over the next four to six months. As a target, it has been agreed that increases in Pallavan's fleet will be restricted to 55% of the growth in passenger demand.

7. There are at present 12 depots where the buses are garaged and serviced. Ten of these depots are designed to maintain 100 buses and two are

designed to maintain 50 buses. One more depot with a capacity of 100 buses is under construction. These depots are already being used above their capacity and because of this new buses have to be assigned to far-off depots resulting in considerable dead kilometerage, which is already of the order of 2.54 km for every 100 km of productive run. Additional depots would be required to reduce overloading of the existing depots and to accommodate any further increases in the bus fleet.

8. There are some 103 terminal points in the system from which bus services originate. However, only at 9 of these places are there any proper terminal facilities. In the remaining 94 places, buses are parked on the streets. This has a serious effect on bus service and operating schedules, besides inconveniencing passengers and obstructing other traffic.

C. Description of Bus Component of the Project

9. In order to improve the bus service in Madras and to enable it to meet anticipated transport demand in the future, the project provides:

(a) replacement of 285 overaged buses (over 12 years of age) over a period of three years;

(b) provision of 3 new depots to accommodate 250 buses;

(c) provision of 8 bus terminals; and

(d) provision of 400 passenger shelters.

Bus Replacement

10. With the adoption of the bus replacement policy described earlier (para 5), PTC would need to replace 380 buses between 1977-1980. The project would provide 285 of these buses, while the remaining 95 would be financed from Pallavan's internally generated resources. In addition, it is estimated that 170 buses would be required for augmentation of the metropolitan bus fleet. This estimate is based on the target of satisfying 55% of the increased passenger demand, the remainder to be met by staggering of peak loads (see para 6). Fleet augmentation will be financed from borrowings outside the present project.

11. The bus chassis will be procured by international competitive bidding in accordance with IDA guidelines and the delivery of the chassis will be spread over three years (1977-1980). Bus bodies will be built by Pallavan's body building workshop to its standard specifications. This workshop is highly competitive as evidenced by its winning of several body building contracts for other bus companies in India. The quality of the work

is satisfactory. The workshop has sufficient capacity to meet the requirements of the project. However, no disbursements will be made against bus bodies (US$1.1 million) since these would not be subject to competitive bidding.

Depots

12. The project would provide 2 major and one minor depot to relieve crowding at the existing depots and to accommodate the anticipated increase in the bus fleet. The major depots are located at Poonamallee and Perambur, each capable of accommodating 100 buses with the possibility of future expansion. The Poonamallee depot is the terminal point for 42 routes and transit point for an additional 36 routes. The Perambur depot is located in a well populated part of the city in the vicinity of important industrial areas. The minor depot will be located at Basin Bridge to accommodate 50 buses initially and with the possibility of expansion to accommodate 80 buses. Each depot will be provided with machinery for daily maintenance and repairs, fuel dispensers, inspection ramps and washing facilities. The depots and the related equipment will be procured after local competitive bidding. Detailed engineering designs have been prepared for the depots and are satisfactory.

Terminals

13. The project would provide 8 bus terminal/parking facilities at various points of high intensity usage. The terminals would be located at Villivakkam, Tiruvottiyur, Thiruverkadu, Simpsons (Periar Bridge), Thiruvanmiyur, Poonamallee, Arumbakkam, and Foreshore Estate. The capacity of the terminals would vary from 15 to 36 buses depending on the location. Detailed designs of the buildings have been prepared and are satisfactory. Civil works will be contracted after local competitive bidding because of their small size and because they are scattered over the city.

Passenger Shelters

14. Some 400 passenger shelters will be provided throughout the city to alleviate queuing and congestion problems and to protect bus passengers against inclement weather. The designs of the shelters have been standardized to suit the requirements of the city. Contracts for shelters will be grouped into 10-12 smaller contracts and option will be given to a contractor to bid the whole package. These contracts for civil works will be let after local competitive bidding as the amount involved (US$100,000 over 3 years) is too small to be of interest to an international contractor.

D. Cost Estimates

15. The total cost of the bus component is estimated at Rs 6.6 crores (US$7.3 million) including contingencies and is summarized below:

Item	Rupees (lakhs)			US$(million)		
	Local	Foreign	Total	Local	Foreign	Total
1. Buses						
Bus Chassis	267.2	23.5	290.7	2.97	0.26	3.23
Bus Bodies	84.4	4.4	88.8	0.94	0.05	0.99
	351.6	27.9	379.5	3.91	0.31	4.22
Contingencies						
Price	72.4	5.6	78.0	0.80	0.06	0.86
Sub-total Buses	424.0	33.5	457.5	4.71	0.37	5.08
2. Civil Works						
Depots	35.9	4.0	39.9	0.40	0.04	0.44
Terminals	56.0	6.2	62.2	0.62	0.07	0.69
Shelters	8.1	0.9	9.0	0.09	0.01	0.10
	100.0	11.1	111.1	1.11	0.12	1.23
Contingencies						
Physical	10.0	1.1	11.1	0.11	0.01	0.12
Price	34.2	3.8	38.0	0.38	0.04	0.42
	44.2	4.9	49.1	0.49	0.05	0.54
Sub-total Civil Works	144.2	16.0	160.2	1.60	0.17	1.77
3. Land	35.9	-	35.9	0.40	-	0.40
4. Depot Equipment	2.8	1.3	4.1	0.03	0.01	0.04
Contingencies						
Price	0.5	0.3	0.8	0.01	-	0.01
Sub-total Equipment	3.3	1.6	4.9	0.04	0.01	0.05
TOTAL BUS COMPONENT	607.4	51.1	658.5	6.75	0.55	7.30

16. The cost estimates are based on the most recent bids of foreign and domestic suppliers of bus chassis and bus body builders. Estimates for civil works are based on detailed designs and use the most recent contract prices for similar works in Madras. A physical contingency of 10% has been allowed for civil works and price contingencies of 8% per annum for equipment and 12% per annum for civil works have been allowed in accordance with IDA's current guidelines for India.

E. Organization and Management

17. Pallavan Transport Corporation is a GTN undertaking responsible for the operation of all local and long-distance bus service in and from Madras. It has three main wings - Metropolitan Wing, District Wing and Express Wing - each under a managing director. The metropolitan wing is responsible for service within the metropolitan area, the district wing for all services within 200 km from Madras City and from the Coimbatore depot, and the express wing for long distance express bus service. Each wing is independent of the other and has its own accounting and balance sheets, although the separation of the balance sheets of the metropolitan and the district wings has not yet been completed since the Government order of August 1975 creating the three wings. 1/ The three wings have a common Government-appointed Board of Directors.

18. The metropolitan wing of PTC will be responsible for the bus component of the project. Under the Managing Director are 8 unit-level officers including two Operations Managers, Commercial Manager, Technical Manager, Traffic Engineering Manager, Financial Adviser-cum-Chief Accounts Officer and Chief Personnel Officer (see Chart 6). It has 7 middle-level officers and 54 other lower-level officers. The total staff of the Corporation is about 12,000, comprised of 7,097 traffic staff (bus drivers, conductors and supervisors), 3,587 employees of the technical wing (fitters, mechanics, and foremen) for repairs and maintenance, and 1,385 clerical and administrative staff. The metropolitan wing at present maintains a fleet of 1,404 buses. In 1975-76 it operated about 100 million bus-kilometers and carried about 1.7 million passengers per day.

19. The Metropolitan Wing of PTC is well run by a competent management. It has instituted an effective system of financial and management controls. Each bus depot has been designed as a cost center and a close check is maintained for each depot on performance indicators such as: utilization of fleet, completion of scheduled service, trips lost, breakdowns, accidents, fuel consumption, maintenance costs, fare collections, etc. An incentive wage system links the performance of the depot to the compensation paid to the staff. As a result, the performance of PTC since its inception has been above average as judged by its fleet utilization and fleet availability (above 90%) and

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1/ Prior to August 1975, PTC had only the metropolitan and district wings. The express service was provided by the GTN Department of Transport.

a continuous increase in the kilometer run per bus in service (Table 4). It is believed that because of these innovative management measures, PTC was able to keep its cost increases per bus-km in metropolitan service to 12% per annum between 1972 and 1975, which was a period of high inflation in India when general price levels rose an average of 14% annually and when fuel prices were doubled.

F. Finances

20. PTC was incorporated in December 1972 and operates as a public limited company. It is required to operate on a commercial basis and maintain its accounts in accordance with sound accounting principles. Capital and operating budgets are prepared by PTC for approval by the State Government which also controls the Corporation's borrowings. Since the 1975 reorganization, separate accounts are maintained for each of the three wings, including separate accounts for traffic operations and maintenance depots. However, a single consolidated balance sheet was prepared for the metropolitan and the district wings pending a review of the distribution of assets. Starting with 1976-77, separate balance sheets will be prepared for these two wings when the distribution of assets and liabilities has been completed. The accounts are subject to independent commercial audit.

Past Financial Performance

21. On formation, PTC took over from the Tamil Nadu State Transport Department the assets of the public transport system operating in metropolitan Madras and the Chingleput District. As a result, it had a net worth of Rs 5.62 crores represented by a State Government equity holding amounting to Rs 3 crores and a State Government loan of Rs 2.62. Although PTC is expected to be a financially viable semi-autonomous entity, in practice the Government exercises a fair degree of control on its finances. All fares must be approved by the Government and PTC is obliged to continue to operate unremunerative routes, which are deemed appropriate by the Government. It also provides concessions to students and physically handicapped persons, the cost of which was estimated for 1974-75 at about Rs 2 crores.

22. The high level of inflation experienced in India during 1974 and 1975 had a significant impact on the financial results for 1975 for the metropolitan and district services when an overall deficit of Rs 0.9 crores was incurred. Fuel costs increased by almost 50% and maintenance costs also increased sharply. The Motor Vehicle Tax was also increased during the year 1/ and, as a result, the working expenses for the year showed an overall increase of 38% over FY 1974. However, PTC was able to make substantial improvements

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1/ In FY75, Motor Vehicle Taxes amounted to Rs 2.91 crores, an increase of 66% over the amount for FY74. PTC has appealed against its liability for sales tax, which to the end of FY75 amounted to Rs 0.23 crores.

in operational efficiency by rationalizing the route structure and improving fleet utilization to a 90% level, such that during the year the overall cost increase per effective bus-km was held at 15%. Fare increases for metropolitan service implemented early in FY75 1/ increased revenue sufficiently to cover these substantial cost increases, even though a small (7.5%) overall reduction in traffic was experienced in the period immediately following the increase. In addition, various incentive bonus schemes have improved daily collections and reduced fuel consumption and over the period the operating ratio 2/ for the metropolitan wing improved from 110 to 104.

23. During the period through FY75, PTC incurred capital expenditures amounting to Rs 7 crores, including Rs 5.23 crores on new buses, which were financed mainly from loans from the State Government, the Government of India and from the scheduled Banks, together with a small increase in the State Government's equity holding. 3/ As a result, the capital structure of PTC changed substantially with the debt equity ratio deteriorating from 47:53 in 1972 when PTC was formed to 85:15 at the end of FY75. 4/ Moreover, the growth in financial reserves has been adversely affected by consistent annual deficits which by FY75 had accumulated to Rs 2.55 crores as against reserves amounting to Rs 0.48 crores. Throughout this period, the relationship between current assets and current liabilities was unsatisfactory. At the end of FY75, current assets 5/ (excluding inventories) amounted to 63% of current liabilities.

24. In September 1975, with the transfer of express bus service from GTN Department of Transport to PTC and the establishment of three independent wings within PTC to operate Metropolitan, District and Express services, assets and liabilities were allocated between the Metropolitan and District Wings (the balance sheet for the Express Wing was always maintained separately). The individual unaudited balance sheets as at March 31, 1976, illustrating the allocations then made of assets and liabilities, are summarized in Table 7. Of the total stock of buses owned by PTC at the beginning of FY76 1,277 or 77% had been retained by the Metropolitan Wing for operation of the city services. On reorganization, the paid up capital of the composite PTC

1/ A flat increase of 5 paisa (Rs 0.05) on each fare stage.

2/ The operating ratio is the percentage of operating costs to operating revenues. Operating costs include depreciation but exclude interest charges and appropriations.

3/ In September 1974, the State Government decided that all district routes operated over distances up to 200 km or less should be handed over to the Corporation, and 108 buses were transferred to the Corporation at a valuation of Rs 0.50 crores which was treated as an increase in the paid-up share capital held by the State Government.

4/ During FY75, the borrowing powers of the Corporation were increased to three times the paid-up share capital.

5/ About Rs 1.82 crores, or 30% of the current assets, are represented by short-term investments and advances to staff.

was retained in the Metropolitan Wing and the State Government loan of Rs 3.86 crores was allocated Rs 1.54 crores to Metropolitan and Rs 2.32 crores to District Services. However, the entire accumulated deficit of Rs 2.55 crores was allocated to city services and carried forward in the balance sheet of the Metropolitan Wing as an expedient pending a detailed review by certified accountants. In FY75, about 151 unrenumerative routes were operated in the metropolitan area as against 106 in the district services. The operating cost per bus was marginally higher for metropolitan services, but so was fleet utilization. The net cost per passenger kilometer for metropolitan and district services suggests an allocation of the accumulated deficit of 5:2 metropolitan:district.

25. During FY76, the revenue of the undertaking as a whole increased by 13%, as against 21% for working expenses. The depreciation 1/ provision for the year amounted to Rs 2.25 crores, and resulted in an operating deficit of Rs 2.76 crores for the undertaking as a whole, of which Rs 1.76 crores was borne by the Metropolitan Wing which, after adjusting for debt servicing obligations, suffered a net cash shortfall for the year amounting to Rs 1.03 crores 2/. This was financed by withholding accrued interest payments due on Government loans and contributions to gratuity and pension funds. Current assets (including advances to staff) only marginally exceeded current liabilities (including bank overdraft) and, if inventories are excluded, quick assets provided only 46% coverage of current liabilities.

26. In view of the foregoing, urgent remedial action was seen to be necessary to secure the solvency and improve the liquidity of the undertaking. To this end, the Government responded by sanctioning an average 22% increase in bus fares from March 1976. The Government has also agreed that in the future sufficient revenues would be generated to achieve the overall financial objectives of meeting the operating expenses including depreciation, satisfying debt servicing obligations and generating sufficient internal funds to provide for adequate replacement of retired assets. In addition, GTN converted the loans made by it and the unpaid interest due into a permanent debt on which an interest of 12% will be payable but which will be waived during the period to 1980. No adjustment has yet been made to the allocation of the accumulated deficit, which presently exceeds the financial reserves and equity of the Metropolitan Wing.

Future Prospects

27. Forecasts of operating expenditures, depreciation and debt servicing for the metropolitan wing are illustrated in Tables 5 and 6. Working expenses per bus-km are projected to increase at 10% per year initially, reducing to 8% in 1980-81, and amounting to 57% for the 5-year period. However, in view of anticipated improvements in fleet utilization (para 10), the increased cost per

1/ Depreciation on buses is provided for at 30% on the reducing value basis.

2/ Debt service costs amounted to Rs 1.08 crores and depreciation to Rs 1.81 crores.

passenger km during the period is expected to be on the order of 46%. To support the projected operating costs and generate sufficient internal resources to service external loans and allow for replacement of assets in accordance with the financing plan (para 10), the PTC will need to increase operating revenues such that the operating ratio for the metropolitan wing improves from 103 estimated for FY77 to 95 for FY81. Assurances were obtained at negotiations that the operating ratio will not exceed 99 for FY78, reducing progressively to 95 by FY81. These targets would be achieved through a combination of operational improvements, cost reductions, and fare increases as necessary. As a result, PTC will be able to generate an increasing proportion (neglible in FY78 to 54% in FY81) of the overall investment requirements of the metropolitan wing. The financing plan for the next five years will be as follows:

(Rs Crores)

	FY1977	FY1978	FY1979	FY1980	FY1981
APPLICATION OF FUNDS		---Project Period-----			
Capital Expenditures					
IDA Project	-	2.02	2.64	1.93	-
Other	2.21	0.72	1.60	2.76	4.83
Increase in Cash and Working Capital	0.57	0.72	0.96	1.00	0.18
Total Application	2.78	3.46	5.20	5.69	5.01
Sources of Funds					
Internally Generated Funds	1.11	2.18	3.24	4.32	5.54
Add Sale of Assets	0.20	0.25	0.30	0.30	0.30
	1.31	2.43	3.54	4.62	5.84
Less Debt Servicing	0.87	1.69	2.18	2.56	3.03
	0.44	0.74	1.36	2.06	2.81
Loans - GTN/IDA	-	2.02	2.64	1.93	-
Others	2.34	0.70	1.20	1.70	2.20
Total Sources	2.78	3.46	5.20	5.69	5.01

28. The investment program envisages capital outlays in FY77 amounting to Rs 2.21 crores. Loans amounting to Rs 1.44 crores have been negotiated with the Industrial Development Bank of India, the State Bank of India and the

Tamil Nadu Transport Development Finance Corporation Ltd. but residual borrowing of about Rs 0.9 crore will be necessary 1/ and has been included in the financing plan.

29. The debt servicing cost in FY77 is estimated at Rs 0.87 crores and sufficient trading revenues are expected to be available to meet this. The level of internally generated funds available to finance capital outlays thereafter should ensure satisfactory debt service coverage (see Table 6) and cause the overall debt/equity ratio to improve significantly. Assurances were obtained at negotiations that from FY79 a debt service coverage ratio 2/ of not less than 1.5 will be maintained.

G. Project Beneficiaries and Justification

30. The main beneficiaries of the bus component of the project would be bus passengers who represent a broad cross-section of the population of Madras, most being between the 25th and 75th income percentiles. Bus transportation is the main means of transport for office and factory workers, students and a majority of housewives. Benefits for the different project components are assessed as follows:

(a) bus replacement (representing 69.4% of the project component) would result in a reduction in the operating cost of the buses and would increase service availability and use of buses;

(b) provision of depots (representing 12% of the project component) would permit location of some of the buses to points closer to where they are needed, and thus reduce dead kilometerage;

(c) bus terminals (representing 16.3% of the project component) would result in reduced bus congestion and improved passenger convenience at 8 major terminals; and

(d) passenger shelters (representing 2.3% of the project) would improve passenger convenience.

1/ The terms of this financing which includes Rs 0.5 crores converted from overdraft remain to be defined but have been assumed at 15% for 15 years.

2/ The debt service coverage ratio is the ratio of net revenue (before depreciation and interest charges) to debt servicing costs (including repayment of principal and payment of interest charges, etc.)

Bus Replacement

31. The replacement of 285 overaged buses would result in direct cost savings of about 13% to 55% over the different years of usage. Studies of bus operating costs carried out by Pallavan's consultants indicate that the variable operating cost of a bus averages about Rs 0.58/bus-km in the first two years; Rs 0.86/bus-km in the next 6 years; Rs 1.05/bus-km in the next 4 years; and Rs 1.35/bus-km thereafter. Also, annual kilometerage per bus declines from 70,000 kms in the first 8 years to 60,000 kms in the next 4 years and about 55,000 kms after 12 years. On this basis, the economic rate of return of the bus replacement component is estimated to be 45%.

Depots

32. The three depots to be provided under the project would accommodate 250 buses which are presently located in other depots more distant from where the buses are deployed. This results in excessive dead kilometerage for these buses, estimated at about 20% above the average for the system as a whole (5 kms/bus/day). The benefits of the depots are measured by the reduction in dead kilometerage of 250 buses to the overall system average resulting in increased availability. It is estimated that with the project these 250 buses would be available for an additional one km of productive run, which can be directly calculated into increased revenues. On this basis, the economic rate of the depots is estimated to be 24%.

Terminals

33. The 8 terminals to be provided under the project would accommodate some 200 buses which at present are parked on the streets causing considerable congestion. The terminals would reduce congestion at these points and improve passenger convenience. It is not possible to compute accurately these benefits. However, assuming that the terminals would reduce congestion to the extent that the productivity of the 200 buses using them is increased by 5%, the economic rate of return of the terminals would be about 15%. In the judgment of Pallavan's management, efficiency improvements of such a magnitude are likely to result from the terminals.

Passenger Shelters

34. The beneficiaries of passenger shelters would be the bus passengers, who would be afforded greater comfort and convenience. This may in turn increase the demand for bus transportation. It is, however, not possible to quantify these benefits.

35. The weighted average rate of return for the entire bus component is estimated to be 39%. An increase in project cost by 20% would reduce the average rate of return to 27%.

ANNEX 8
Table 1

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Trip Distribution by Travel Mode (1970)

Travel Mode	No. of Trips per day	Percent
Car	84,065	3.2
Motorcycle/Scooter	43,688	1.7
Bus	1,100,107	41.5
Train	303,632	11.5
Slow Moving	2,368	0.1
Bicycles	565,182	21.3
Walking	544,630	20.7
	2,643,672	100.0

SOURCE: Traffic and Transportation Plan for Madras Metropolitan Area, Volume I, January 1974.

June 25, 1976

ANNEX 8
Table 2

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Growth in the Metropolitan Bus Passenger Traffic and Bus Fleet

Year	Passengers Carried per day (million)	Average Annual Increase (%)	No.of Buses in Fleet	% Growth of Fleet
1966/67	0.85	-	N.A.	-
1970/71	1.16	8.0	N.A.	-
1971/72	1.23	6.0	915	-
1972/73	1.13	-8.2	1,059	15.7
1973/74	1.41	24.7	1,082	2.1
1974/75	1.54	9.2	1,172	8.3
1975/76	1.73	12.3	1,340	14.3

Average Compounded Passenger Growth Rate 1971/72-1975/76 = 9%

Average Compounded Bus Fleet Growth 1971/72-1975/76 = 9%

SOURCE: Pallavan Transport Corporation

June 25, 1976

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Age Distribution of Metropolitan Bus Fleet (as of April 1976)

Years Completed	Number of Buses		
	Leyland	Benz	Total
13	3	-	3
12	11	-	11
11	90	7	97
10	199	3	202
9	133	9	142
8	106	66	172
7	82	50	132
6	109	30	139
5	79	78	157
4	17	21	38
3	30	-	30
2	21	-	21
1 and less	260	-	260
TOTAL	1,140	264	1,404

SOURCE: Pallavan Transport Corporation

June 25, 1976

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Operational Performance Indicators of Pallavan Transport

	1972	1973	1974	1975
Effective Fleet (% of total fleet in active status)	99	91	91	91
Fleet Availability (% of active fleet dispatched)	96	96	98	96
Fleet Utilization (% of operated km to scheduled km)	NA	93	94	92
Effective kms per bus per day	158	177	186	192

Source: Operational and Performance Statistics, DTC.

June 1976.

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Pallavan Transport Corporation Ltd.

Operating Statement
(rs Lakhs)

	1972-73	1973-74 Actual	1974-75	-----1975-76---- Revised Estimate			1976-77	1977-78	1978-79 Projections	1979-80	1980-81
				Metro	District	Total			Metropolitan Wing		
Average Fleet Strength (Vehicles)	1,334	1,387	1,528	1,341	375	1,716	1,439	1,502	1,557	1,614	1,677
Effective Kms	105.9	95.3	113.9	94.5	40.0	134.5	102.7	107.1	112.2	115.7	120.7
TRAFFIC REVENUE	1,321	1,361	2,000	1,694	575	2,269	2,120	2,520	2,978	3,416	3,909
OPERATING EXPENSES											
Salaries and Wages	489	566	665	632	139	771					
Fuel	254	248	356	348	115	463					
Maintenance	337	355	545	443	178	621	2,044	2,345	2,704	3,043	3,428
Motor Vehicles Tax,etc.	194	176	291	210	149	359					
Miscellaneous	49	63	90	81	56	137					
Sub-Total - Working Expenses	1,323	1,408	1,947	1,714	637	2,351	2,044	2,345	2,704	3,043	3,428
Depreciation /1	126	91	128	181	44	225	139	150	185	237	286
Sub-Total - Operating Expenses	1,449	1,499	2,075	1,895	681	2,576	2,183	2,495	2,889	3,280	3,714
OPERATING SURPLUS	(128)	(138)	(75)	(201)	(106)	(307)	(63)	25	89	136	195
NON OPERATING REVENUE /2	54	74	61	25	6	31	35	43	50	59	73
NET SURPLUS	(74)	(64)	(14)	(176)	(100)	(276)	(28)	68	139	195	268
INTEREST CHARGES	20	7	76	78	21	99	45	75	107	140	199
NET SURPLUS AFTER INTEREST	(94)	(71)	(90)	(254)	(121)	(375)	(73)	(7)	32	55	69
Ratios											
Working Ratio	100	103	97	101	111	104	96	93	91	89	88
Operating Ratio	110	110	104	112	118	114	103	99	97	96	95

ANNEX 8
Table 5

Source: Mission Estimate - October 1976.

/1 Calculated at 30% p.a. on the reducing balance for buses.
/2 Includes interest on cash surpluses.

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Pallavan Transport Corporation Ltd. - Metropolitan Wing

Statement of Sources and Applications of Funds
(Rs Lakhs)

SOURCES	1976-77	1977-78	1978-79	1979-80	1980-81
Surplus before Interest	(28)	68	139	195	268
Depreciation	139	150	185	237	286
Sale of Assets /1	20	25	30	30	30
Increase in Accounts Payable /2	16	17	17	18	20
Borrowings:					
a) IDBI	36	-	-	-	-
b) GOI	10	-	-	-	-
c) Repatriate Bank	12	-	-	-	-
d) State Bank of India	13	-	-	-	-
e) TDFC	80	-	-	-	-
f) Debentures to Staff	15	-	-	-	-
g) GTN/IDA /3	-	272	384	363	220
h) Other /4	68	-	-	-	-
Total Sources	381	532	755	843	824
APPLICATIONS					
Fixed Capital Expenditure - IDA	-	202	264	193	-
" " " - non IDA	221	72	160	276	483
Increase in Accounts Receivable /5	14	15	17	18	20
Increase in Inventories /5	24	27	29	32	36
Debt Service					
Interest					
On GTN/IDA Loans	-	11	34	55	61
On Other Loans	45	64	73	85	138
Repayment of Principal					
On GTN/IDA Loan	-	-	16	37	44
On Other Loans	42	94	95	79	60
Subtotal Debt Service	87	169	218	256	303
Repayment of Bank Overdraft	37				
Total Applications	383	485	688	775	842
Cash Surplus	(2)	47	67	68	(18)
Cash at Beginning of Year	18	16	63	130	198
Cash at End of Year	16	63	130	198	180
RATIO					
Debt Service Coverage	1.28	1.29	1.49	1.69	1.83

Source: Mission Estimate - October 1976

/1 Scrap value of buses estimated at Rs 10,000.
/2 Proportional to increase in fleet of Metropolitan Wing
/3 Assumed at 10.5% interest over 15 years (1-year grace period) with equal installments of principal.
/4 Includes conversion of overdraft
/5 Predicated according to increased turnover and expanded vehicle fleet.

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Pallavan Transport Corporation Ltd. - Comparative Balance Sheets as at March 31, 1973 Through 1981
(Rs Crores)

	1973	1974	1975	1976	1976/1 4.1.76	1977	1978	1979	1980	1981
	-- Composite P.T.C. --			ACTUAL		Metropolitan Wing			PROJECTION	
ASSETS AND OUTLAY										
Fixed Assets	6.23	7.45	11.42	9.43	9.47	10.99	13.26	16.95	21.31	25.91
Less Accumulated Depreciation	1.27	2.18	3.46	4.48	4.36	5.75	7.25	9.10	11.47	14.33
Net Fixed Assets in Operation	4.97	5.27	7.96	4.95	5.11	5.24	6.01	7.85	9.84	11.58
Investments	0.06	0.07	0.20	0.18	0.16	0.16	0.16	0.16	0.16	0.16
Work in Progress	0.30	0.18	0.01	0.01	0.10	0.59	0.81	1.06	1.09	1.02
Total Investments	0.36	0.25	0.21	0.19	0.26	0.75	0.97	1.22	1.25	1.18
Preliminary Expenses	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Current Assets										
Inventories	1.78	2.14	3.10	2.44	2.22	2.46	2.73	3.02	3.34	3.70
Amounts Receivable	0.64	0.55	1.03	1.36	0.87	1.01	1.16	1.33	1.51	1.71
Loans and Advances	3.32	2.10	1.82	1.14	0.97	0.97	0.97	0.97	0.97	0.97
Cash and Temporary Deposits	0.06	0.12	0.11	0.15	0.18	0.16	0.63	1.30	1.98	1.80
	5.80	4.91	6.06	5.09	4.24	4.60	5.49	6.62	7.80	8.18
Less Current Liabilities										
Amounts Payable	5.75	4.63	3.37	4.21	2.63	2.79	2.96	3.13	3.31	3.51
Bank Overdraft	0.47	0.46	0.61	0.51	0.37	-	-	-	-	-
Provisions	-	0.51	0.75	0.99	1.01	1.01	1.01	1.01	1.01	1.01
Net Current Assets	(0.42)	(0.69)	1.33	(0.62)	0.23	0.80	1.52	2.48	3.48	3.66
TOTAL ASSETS AND OUTLAY	4.92	4.84	9.51	4.53	5.61	6.80	8.51	11.56	14.58	16.43
LIABILITIES AND SURPLUSES										
Long Term Loans										
Secured	-	0.50	0.59	0.89	0.93	0.73	0.53	0.33	0.13	-
Unsecured /2	2.64	2.63	7.49	4.90	6.47	8.59	10.57	13.50	16.17	17.46
Sub-Total Debt Outstanding	2.64	3.13	8.08	5.79	7.40	9.32	11.10	13.83	16.30	17.46
Equity and Provisions										
Share Capital - Issued, Subscribed and Paid Up	3.00	3.00	3.50	3.50	3.35	3.35	3.35	3.35	3.35	3.35
Capital Reserve	-	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Development Fund	0.12	0.13	0.14	0.15	0.12	0.12	0.12	0.12	0.12	0.12
Passenger Amenities Reserve	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Employees Housing and Amenities Reserve	0.09	0.10	0.10	0.11	0.09	0.09	0.09	0.09	0.09	0.09
Miscellaneous Funds	-	0.10	0.21	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Operation Surplus (Deficit)	(0.94)	(1.65)	(2.55)	(5.09)	(5.42)	(6.15)	(6.22)	(5.90)	(5.35)	(4.66)
Sub-Total - Equity and Provisions	2.28	1.71	1.43	(1.26)	(1.79)	(2.52)	(2.59)	(2.27)	(1.70)	(1.03)
TOTAL LIABILITIES AND SURPLUSES	4.92	4.84	9.51	4.53	5.61	6.80	8.51	11.56	14.58	16.43
Ratios										
Current Asset Ratio	0.93	0.88	1.28	0.89	1.06	1.21	1.38	1.60	1.81	1.81
Liquid Asset Ratio /3	0.65	0.49	0.63	0.46	0.50	0.56	0.70	0.87	1.03	0.99

/1 Capital structure revised with effect from 4.1.76
/2 Includes discount on IDBI Bills
/3 Includes loans and advances

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Technical Assistance

1. The technical assistance component has five major elements: (a) five advisers to MMDA for two years each; (b) short-term consultants' services to MMDA to assist particularly in the establishment of a monitoring and evaluation system; (c) the provision of consultant's services to Madras Corporation to revise its accounting system; (d) training particularly of MMDA and Madras Corporation staff; and (e) aerial photography and related equipment and services. Estimates of man-months and costs (assuming man-month rate of US$1,000 for local consultants and US$6,000 for foreign consultants) are as follows:

		Man-months			Cost (Rs Lakhs)
		Local	Foreign	Total	
(a)	Advisers to MMDA	72	48	120	32.4
(b)	Short-term consultants' services to MMDA	60	6	66	8.6
(c)	Consultants' services to Madras Corporation	140	12	152	19.0
(d)	Training	-	-	-	9.8
(e)	Aerial photography	-	-	-	2.2
	Total	272	66	338	72.0

2. Terms of reference for the advisers to MMDA are in Section A (paras 3-17) and specifications for the aerial photography are in Section B (paras 18-22). Short-term consultants' services for monitoring and evaluation will be obtained intermittently as the need arises and following the initial specification of the program by MMDA and its advisers. Consultants' services required by the Madras Corporation will also be specified by MMDA and its advisers in consultation with the Corporation and the UNDP/WHO consultants. Training programs will be recommended to MMDA by its advisers.

A. Job Descriptions of Advisers to MMDA

Urban Planner

3. Qualifications: Broad professional training and at least five years of experience in urban planning. Experience in leading teams of economists, planners, and engineers in preparing development plans. Training

and/or experience in sociology/economics in addition to urban planning would be desirable. Experience in the use of aerial surveys for planning and design purposes would also be desirable.

4. Duties: The Urban Planner will advise and assist MMDA in carrying out the attached work program, and particularly in:

(a) specifying growth strategies for the metropolitan area;

(b) review of infrastructure investment programs in all major sectors (particularly housing, water supply and transport) to determine their compatibility with development plans;

(c) physical planning of sites and services and slum improvement projects;

(d) monitoring and evaluation of the programs; and

(e) training of the staff of MMDA and other agencies.

5. Duration: Two years.

Urban Economist

6. Qualifications: Professional training and experience in urban and regional economics. Should have at least five years of experience in project programming and evaluation in an urban environment.

7. Duties: The Urban Economist will assist MMDA in carrying out the attached work program, and particularly in:

(a) evaluating the effectiveness of the various sectoral plans in achieving the development objectives;

(b) determining specific development objectives for the key sectors;

(c) a review of the employment sector and recommending investment programs which can be integrated with spatial growth plans;

(d) analysis of relationship among employment, housing and transport;

(e) economic evaluation of the infrastructural investment proposals; and

(f) training of the staff of MMDA and other agencies.

8. Duration: Two years.

Financial Analyst (Captial Budgeting)

9. Qualifications: The adviser should have professional training and experience in senior financial management position, preferably in the Government or the public sector.

10. Duties: The adviser shall advise and assist MMDA in carrying out the attached work program, and particularly in:

(a) setting up a programming and budgeting system covering the major sectors in the metropolitan area;

(b) financial analysis of the investment programs of the various government and private agencies involved in these sectors;

(c) analysis of the investment needs as a whole for the area and determine investment potentials based on overall financial and organizational constraints;

(d) assessment of financial abilities of the local bodies and others to implement the proposed program; and

(e) training of MMDA's counterpart staff in these activities.

11. Duration: Two years.

Financial Analyst (Municipal Finance)

12. Qualifications: The adviser should have professional competence and at least five years experience in finance and economics, particularly in municipal finance.

13. Duties: The adviser shall advise and assist MMDA in carrying out the attached work program, particularly in:

(a) determining the ways and means of augmenting the finances of the local bodies under its jurisdiction;

(b) assisting the local bodies in implementing the various measures proposed and in improving financial management;

(c) developing investment programs for the key sectors in view of constraints on resource mobilization (working with the Financial Analyst (Capital Budgeting)); and;

(d) training of the staff of MMDA and local governments.

14. Duration: Two years.

Small Scale Business Expert

15. Qualifications: The adviser should have a minimum of five years practical experience in the development and operation of small-scale and cottage industries. Most of the time should have been spent in developing countries. Experience with financial institutions would be desirable.

16. Duties: The adviser shall advise and assist MMDA in carrying out the attached work program, and particularly in:

(a) determining employment generation requirements and potentials in the MMDA;

(b) carrying out a study of the informal sector;

(c) developing suitable programs for employment creation, in collaboration with Government institutions, banks, voluntary groups and the private sector;

(d) designing and executing training programs for small-scale entrepreneurs;

(e) evaluation and follow-up of the various programs; and

(f) training of the staff of MMDA and other agencies.

17. Duration: Two years.

B. Specifications and Cost Estimates for Aerial Photography

18. The area to be surveyed is estimated at 300 km^2. The contact prints of 9" x 9" will overlap by 60% longitudinally and 12% laterally. This accuracy would be sufficient to permit the assembly of a semi-controlled mosaic.

19. Contact prints in stereo couples will be prepared at a scale of 1:8,000 and enlargements of selected areas (slums) will be made on transparent mylar base at a scale of 1:1,000.

20. The cost of flight film and film processing is estimated at US$3,000. The cost of 3 sets of contact prints and 200 enlargements on mylar is estimated at US$14,000.

21. Additional equipment which would be purchased to make full use of the photos:

	US$
2 mirror stereoscopes	300
3 pocket stereoscopes	100
2 planimeters	400
Sepia and blue print paper	500
File equipment for storage of contact prints and mylar enlargements	500
	1,800

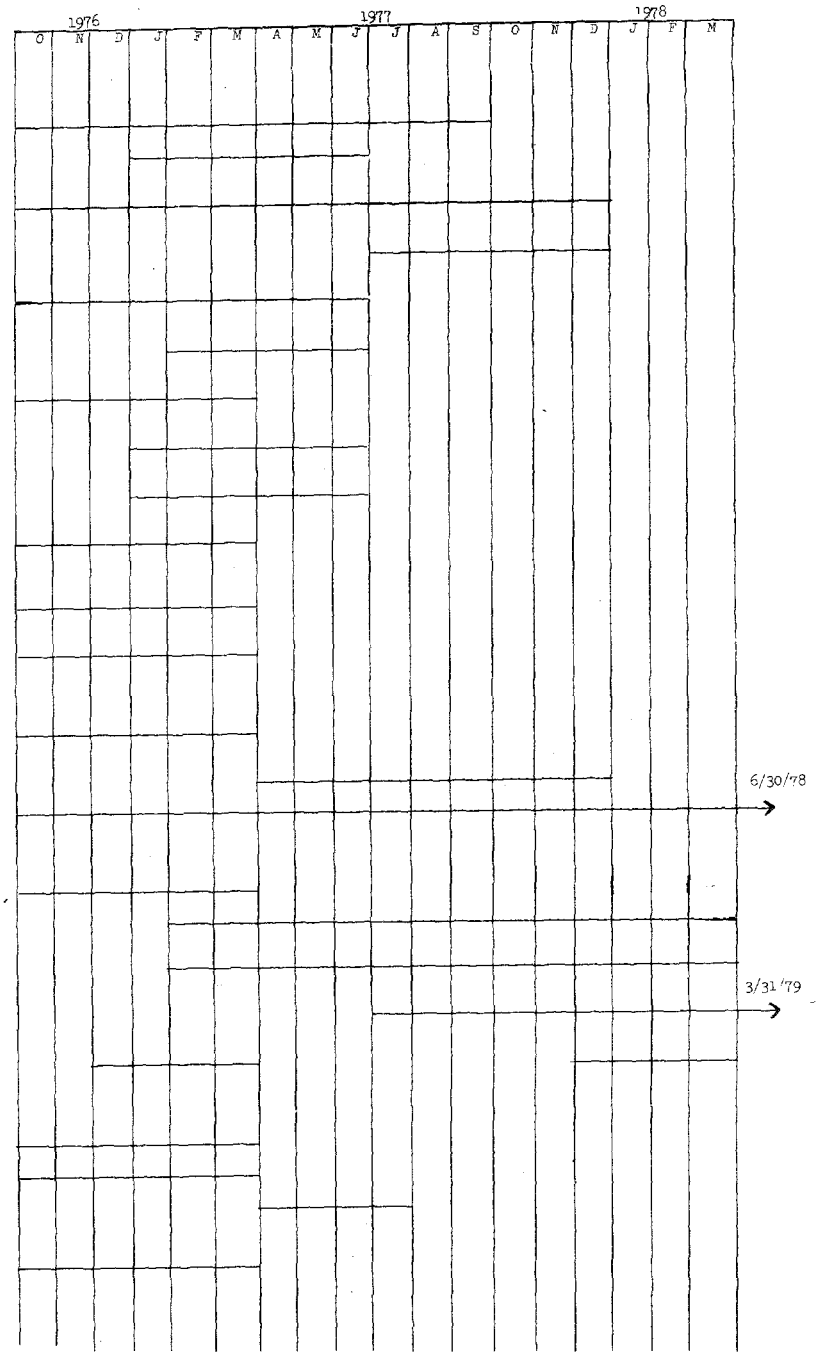
22. Total cost: about US$20,000 (Rs 180,000).

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Key Implementation Actions

Action	Responsibility
A. Organization	
1. Establish new departments in MMDA and appoint heads	MMDA
2. Recruit advisers to MMDA	MMDA
3. Prepare administrative regulations for the revolving funds	MMDA/TNHB/TNSCB
4. Review road maintenance organization in MC	MC
5. Establish Financial Management Unit in MC	MC
6. Establish Traffic Engineering Cell in MC	MC
7. Finalize organization for execution of roads component	DHRW
8. Establish Traffic Engineering Cell in DHRW	DHRW
9. Establish Traffic Management Cell in Police Department	Police
10. Finalize organization for execution of slum improvement component	TNSCB
11. Finalize organization for implementation of maternal & child health component	DSW
12. Finalize organization for execution of sites and services	TNHB
B. Policy	
1. Prepare evaluation report on the introduction of staggered work hours	PTC
2. Undertake income survey for resettlement tenaments	TNSCB/MMDA
3. Prepare slum improvement program	MMDA/TNSCB/TNHB
C. Finance	
1. Prepare expenditure and revenue projections for MC	MC
2. Reorganize accounts of MC	MC
3. Separate accounts for water supply and sewerage	MC
4. Ensure that water supply and sewerage revenues are sufficient to cover costs	MC
5. Review financial projection for PTC for 1978 and 1979	PTC
D. Execution of Physical Project Components	
1. Complete engineering designs of 10 slums	MMDA/TNSCB
2. Complete tender documents for Phase 1 of bus chassis procurement (ICB)	PTC
3. Tendering and contract award of (2)	PTC
4. UNDP/WHO consultants' review of water supply component (immediate works program)	TWAD



ANNEX 11

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Schedule of Estimated Disbursements

IDA Fiscal Year and Quarter	Disbursements During Quarter (US$'000)	Cumulative Disbursements at End of Quarter (US$'000)
FY1978		
December 31, 1977	50	50
March 31, 1978	150	200
June 30, 1978	300	500
FY1979		
September 30, 1978	800	1,300
December 31, 1978	1,200	2,500
March 31, 1979	2,000	4,500
June 30, 1979	3,000	7,500
FY1980		
September 30, 1979	2,000	9,500
December 31, 1979	2,500	12,000
March 31, 1980	3,000	15,000
June 30, 1980	3,000	18,000
FY1981		
September 30, 1980	2,200	20,200
December 31, 1980	2,200	22,400
March 31, 1981	800	23,200
June 30, 1981	800	24,000

Source: Mission Estimate, November 9, 1976.

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Madras Corporation: Organization and Finance

Organization

1. The Madras Corporation is constituted as an autonomous local government under the Madras City Municipal Corporation Act of 1919 and is governed by a council of 120 elected representatives who in turn elect a Mayor from among their number. However, GTN maintains considerable control over the administration and finances of the corporation. The Commissioner, who is appointed by GTN, is the executive head of the Corporation. GTN approval is required for the Corporation's budgets, revisions in tax levies and to its borrowings, for which GTN is the major source. In 1974, the Council was dissolved and replaced by a Special Officer, also appointed by GTN 1/.

2. The primary functions of the Corporation are to develop and maintain infrastructure facilities and services including roads, water supply and drainage, street lighting, conservancy, medical facilities, elementary education and parks and playgrounds. In addition, it is also responsible for licensing buildings and industries, enforcing building construction control, and collection of local taxes. These services are administered centrally through nine functional and five support departments (Chart 5). In addition, there are two District Organizations (North and South), each headed by an Assistant Commissioner responsible for all conservancy and maintenance activities in their respective areas. The Corporation employs about 5,000 permanent establishment staff and another 10,000-15,000 staff are employed in the various services provided by the Corporation. About 50% of total annual expenditures are for salaries and wages.

3. Some functions are supplemented by the various departments of GTN. The major city roads which are designated as state or national highways are constructed and maintained by the Highways and Rural Works Department of GTN; and major water supply and sewerage schemes are designed and constructed by Tamil Nadu Water Supply and Drainage Board and maintained by the Corporation.

1/ The Madras City Municipal Corporation Act (1919) provides the Government with the power to dissolve the Council under extraordinary circumstances.

Finances

4. The Corporation is statutorily required to raised sufficient revenues to meet the current costs of operation and maintenance including debt servicing costs and, in addition, show a minimum balance of Rs 1.5 lakh on the General Revenue Account. The Corporation has found it impossible until recently to comply with the requirement. Tables 1 and 2 show a breakdown of revenues and expenditures for the Corporation from 1971/72 to 1975/76 and the budgeted amounts for 1976/77.

5. The Corporation obtains its revenues from a variety of taxes, the most important being property taxes, which are intended to finance general administration, water supply, sewerage, drainage, lighting and elementary education services, and the entertainment tax. The Corporation also levies fees and charges on a number of commercial enterprises, including land development schemes and markets, etc, and receives grants and subsidies from the government for education, health and family planning services and for certain special programs. Capital expenditures are financed by loans from GTN, the Life Insurance Corporation (LIC) and, to a limited extent, financial institutions.

6. Self-generated revenues of the Corporation have increased in current terms in the last five years at an average annual rate of 12 percent, but have declined by 4-5 percent per annum in real per capita terms. Property tax revenues, which represent over 50% of self-generated revenues, have begun to improve since 1974 after a period of stagnation. However, in real per capita terms they have declined by 2-3 percent per annum. This has resulted in a decline in the general level of services in the city.

7. Up to 1974/75 the Corporation consistently incurred annual deficits on its current accounts, mainly as a result of the deficits in water supply, sewerage, drainage and education services. The water supply and drainage taxes presently finance only 75% of service costs, and education revenues including the Government subsidy finance only 70% of service costs. The total deficit budgeted in 1976/77 for water supply, drainage and education services amounts to Rs 2.12 crores (US$2.36 million) as against Rs 1.20 crores (US$1.33 million) in 1975/76. As a result, expenditures on other services such as road maintenance, public health and conservancy services have decreased in real terms.

8. The proposed project would impose an additional burden on the Corporation of almost Rs 50 lakhs (US$0.6 million) per year in increased debt charges for the roads component, increased maintenance costs arising from the site and services and slum improvement projects, and improved roads and footpath maintenance 1/. In addition, the expected population increase (3.5% per annum) would require an expansion of services.

1/ Debt charges resulting from the water and sewerage component will be covered from increased charges for these services.

9. Financial administration and fiscal management in Madras Corporation have been the subject of continuing GTN concern. In 1970, consultants (IBCON Pvt Ltd) were appointed to examine the tax assessment and collection procedures and in 1971, a committee comprised of senior officials was appointed by GTN to study ways to increase the Corporation's finances. The Committee proposed several measures, the most important of which were the restructuring of the property taxes and establishment of proper financial planning mechanisms in the Corporation. The Committee was severely critical of the outdated accounting system being maintained, the defective budgetary control being executed and the widespread diversion to current service expenditures of Government loans and grants sanctioned for capital works. The Committee recommended that consultants be appointed to streamline and simplify the accounting system as a whole and the revenue accounting procedures in particular, that budgets should be submitted for GTN approval, and that a financial advisor at the grade of Deputy Secretary should be appointed by the Corporation and charged with the responsibility for financial planning and control.

Property Taxes

10. Since property taxes account for over 50% of the revenues of the Corporation, major increases in revenues would need to be derived from this source. Property tax rates are assessed as a percentage of the annual rental value of land and buildings. The existing tax rate varies from 15-1/2% for annual rental value under Rs 500, to the statutory maximum of 30% for properties with annual rental value of over Rs 7,000 (see Table 3). Tax revenues are notionally apportioned for water supply, drainage, lighting and general purposes. An additional 4-5% is collected as education tax. Property tax collections are generally satisfactory. About 80% of current assessments and about 45% of arrears are collected.

11. The main problem with the property tax system has been the underassessment of properties. The present assessment procedures leave the assessment of properties to the judgement of the assessors, where rental receipts are not available or where the property is occupied by the owner. Even where rental receipts are available, they may not represent the current rental value of the property and assessment of such property is also left to the judgement of the assessor. This method of assessment has proved to be unsatisfactory, particularly because the assessors are not trained valuers but are merely drawn from the administrative and clerical staff of the Corporation, and the system affords scope for malpractice and leads to a large number of appeals against assessment. The GTN appointed Committee instituted a sample survey which indicated that revenue growth has been lower than growth in property values and it recommended that a Central Valuation Authority be established and a Chief Valuation Officer made responsible for the revision of the assessment books. The IBCON consultant's report of 1970 recommended a more systematic procedure for assessment based on floor area, location and type of property as a means of removing a large

measure of discretion in the assessment. However, the Committee recommended that this particular proposal not be implemented and no action has been taken to date 1/.

12. Other measures presently under consideration by GTN include an increase in the rate of property taxes as recommended by the High Powered Committee and a revision in the constitution and powers of the Taxation Appeals Committee of the Corporation in order to expedite the appeal procedure. These measures would no doubt be useful in achieving the overall financial target for the Corporation.

Financial Management

13. The Corporation follows the traditional practice of local bodies of maintaining its accounts on a cash basis. The budget is the sole means of financial control. This does not permit an accurate evaluation of the real costs of the various services, nor does it promote cost effectiveness by spending departments. There are no planned investment targets or incentives to improve operational efficiency. Lack of financial planning has often resulted in unrealistic projections of revenues which have not been achieved but which have encouraged growth in expenditures. As a result, the Corporation has consistently incurred deficits on current account and financed these from capital loans and grants. This irregular practice has been criticized by the Accountant General as long ago as 1969 and his criticism has been endorsed by the Public Accounts Committee.

14. A major feature of the Corporation's finances is its present debt servicing obligation. The Corporation appears to give little consideration to its ability to service loans taken to finance capital outlays in spite of the considerable burden that debt servicing costs have recently assumed. Debt burden of the Corporation as a result has varied considerably in different years and it accounted for 28% and 23% respectively of all self-generated revenues in 1973/74 and 1974/75. Indeed, the Corporation has not always been able to meet its debt servicing obligations.

15. The foregoing indicates the urgent need for the Corporation to establish an effective system of budgeting and financing control. The present Account Department needs to be strengthened and up-graded into a Financial Management Department. The Government has recently appointed a financial consultant to look into the overall finances of the Corporation and he will assist in the setting up of the Financial Management Department.

1/ IDA recommended against a similar system in Calcutta in favor of a capital valuation system.

ANNEX 12
Table 1

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Revenues of Madras Corporation (1971/72-1976/77)
(Rs lakhs)

	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77 1/
A. TAX REVENUE						
1. Property Tax	654	658	858	981	1,079	1,130
of which:						
General Tax	(299	287	376	428	471	493)
Water Tax	(34	35	47	54	59	62)
Drainage Tax	(111	134	171	196	216	226)
Lighting Tax	(95	85	109	125	137	144)
2. Education Tax	(115	117	155	178	196	205)
3. Entertainment Tax	212	235	235	253	250	260
4. Duty on Transfer of Property	52	54	52	80	80	81
5. Others	94	115	99	118	156	199
Total Tax Revenue	1,012	1,062	1,244	1,432	1,565	1,670
B. NON-TAX REVENUE						
1. License Fee	23	21	26	27	40	40
2. Excess Water Charges	46	51	52	46	37	60
3. Rents on Land & Buildings	9	7	9	9	9	9
4. Revenue from Enterprises	29	45	46	47	45	52
5. Other	153	178	198	150	277	271
Total Non-Tax Revenue	260	302	331	279	408	432
C. GOVERNMENT GRANTS						
1. Education		21	25	22	40	45
2. Compensation for Loss of Tolls		4	4	4	4	4
3. Health & Family Planning Programs		2	28 3/	-	20 3/	17 3/
4. Other		-	30 3/	-	100 3/	215 3/
Total Govt. Grants	20 2/	27	87	26	164	281
TOTAL CURRENT REVENUES	1,292	1,391	1,662	1,737	2,137	2,383

1/ Budgeted amounts
2/ Breakdown not available. Total amount estimated.
3/ Special grants from State Government to compensate for pay scale revision.

SOURCE: Madras Corporation

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Revenue and Capital Expenditures of Madras Corporation
(1971-72 - 1976/77)
(in lakhs of Rs)

	1971/72	1972/73	1973/74	1974/75	1975/76	1976/77 1/
A. REVENUE EXPENDITURES						
Management		140	176	135	161	175
Education		212	242	255	307	349
Roads & Bridge Maint.		236	172	126	198	212
Public Health & Conservancy		412	455	476	601	638
Lighting		148	106	108	116	133
Water Supply		89	101	105	132	158
Drainage		102	128	130	166	180
Renumerative Enterprises		31	21	26	31	40
Debt Service:		160	438	388	302	375
General Purposes		(86)	(230)	(245)	(222)	(236)
Lighting		(14)	(43)	(18)	(17)	(16)
Water Supply		(49)	(79)	(78)	(53)	(77)
Drainage		(11)	(86)	(47)	(10)	(46)
Other Expenses		80	40	99	111	113
Total Revenue Expenditure	1,496 2/	1,610	1,879	1,848	2,125	2,373
B. CAPITAL EXPENDITURES						
Public Health	40	16	20	37	67	108
Roads & Bridges	151	140	133	68	208	256
Lighting	52	79	36	17	44	45
Water Supply & Drainage	574	98	122	107	361	375
Renumerative Enterprises	3	5	9	1	32	183
Town Planning	3	2	2	2	-	-
Others	103	36	2	10	33	39
Total Capital Expenditures	926	376	324	241	746	1,011
C. CURRENT ACCOUNT 3/						
SURPLUS(DEFICIT) of which:						
Water Supply & Drainage	N.A.	(31)	(27)	(44)	(49)	(113)
Education	N.A,	(74)	(62)	(55)	(71)	(99)
Debt Service as % of Selg-generated Revenues	N.A.	11.7	27.8	22.7	15.3	17.8

1/ Budget amounts.
2/ Breakdown not available.
3/ Total revenues minus total revenue expenditures.

SOURCE: Madras Corporation

ANNEX 12
Table 3

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Madras Corporation: Existing Rates of Taxation

Annual value of buildings & lands	Tax Rate for general purposes	Water and Drainage tax rate	Lighting tax rate	Total Rate
1. Rs 500 and below	5% of Annual value	7% of which 1½% shall be in respect of Water Tax and 5½% Drainage Tax	3½%	15½%
2. Over Rs 500 and upto and inclusive of Rs. 1,000	10½% Do	Do.	Do.	21%
3. Over Rs. 1,000 and upto and inclusive of Rs. 5,000	12% Do	Do.	Do.	22½%
4. Over Rs. 5,000 and upto and inclusive of Rs. 7,000	14½ Do.	Do.	Do.	25%
5. Over Rs. 7,000	19½ Do.	Do.	Do.	30%

Education tax under Section 34 of the Madras Elementary Education Act is levied at 4% on A.V. of Rs. 500 and below, at 4½% on A.V. of above Rs. 500 upto and inclusive of Rs. 1,000 and at 5% on A.V. of above Rs. 1,000.

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Madras Metropolitan Development Authority: Objectives, Work Program, Organization and Staffing

I. INTRODUCTION

1. During its relatively brief period of existence, the Madras Metropolitan Development Authority (MMDA) has established itself as a strong organization with competent staff. It has been charged with the responsibility of preparing development plans for the Madras Metropolitan Area (MMA). To date the main emphasis of MMDA has been on land-use planning and development of new areas. It is now, however, extending its activities from land-use planning to comprehensive urban development planning for the MMA, including social and economic as well as physical planning. With the preparation of the Madras Urban Development Project covering several different sectors, MMDA has already begun to focus on the broader problems of urban development. In order to complete this shift and to make the MMDA a true development planning authority, it is necessary to:

(a) define its development objectives more clearly;

(b) prepare and execute a specific work program to achieve the objectives;

(c) reorganize and strengthen its staff; and

(d) provide it with the necessary technical assistance.

2. This note outlines a work program for the MMDA through March 31, 1979, indicating the key issues on which efforts will be initially concentrated and the principal staff required to carry out the work. Based on this outline, MMDA will develop more detailed plans for specific aspects of the work.

II. OBJECTIVES

3. In line with National and State goals, the development objectives of MMA can be broadly stated as to gainfully employ and adequately service its rapidly growing population over the long-term, with particular attention given to the poorer segments of the population. The objective of MMDA is to

prepare economic, social and spatial development plans for the metropolitan area aimed at achieving the development objectives, keeping in consideration the overall resource mobilization constraints.

4. The development plans prepared by MMDA will primarily focus on public investments in the key sectors, particularly employment, housing, water supply and sewerage, transport and social services. However, the plans will be complementary to the activities of the private and non-governmental institutions.

III. SCOPE OF WORK

5. In order to meet the objectives defined above, MMDA will need to shift its present orientation and emphasis and to develop the necessary expertise. It is expected that this would be done over a period of about two years, at the end of which MMDA would have completed a comprehensive development program for the MMA to be regularly updated thereafter and the implementation of which would be continuously monitored and evaluated. As a starting point, MMDA will monitor the implementation and achievement of the Madras Urban Development Project. Concurrently, it will monitor the overall government programs in the key sectors and evaluate their effectiveness in meeting the development objectives. Future sectoral investment proposals will be made on the basis of this review. Following this approach, the work program of MMDA over the next two years (1977/78 and 1978/79) will consist of:

(a) monitoring and evaluation of the implementation of the Madras Urban Development Project;

(b) review of the existing investment programs and policies in the key sectors to determine their appropriateness and financial implications for the State Government and the various local bodies;

(c) review of local government finances in the MMA and advice and assistance in augmenting financial resources;

(d) prepare a development program for MMA including a capital budget for the next five years and an indicative program for the next ten years; as part of the preparation, MMDA would also:

  (i) develop financial implications of the proposed program for the State Government and the various local bodies and make further proposals for generating the requisite resources;

(ii) discuss the various proposals with the State Government and the concerned local governments and obtain their approval; and

(e) continue to work on land-use planning for the MMA.

6. In carrying out its work program, MMDA will rely on existing sources of information, including census reports, government and privately sponsored studies and research and undertake selected surveys where necessary to supplement data available. It will work closely with the concerned sectoral agency in carrying out such surveys. Details of the individual items of work and their expected times of completion are given below and also shown in a chart in Appendix 1.

Monitoring and Evaluation

7. Monitoring and evaluation of different sectoral programs will be an important function of MMDA. The results of evaluation will be useful for MMDA in revising/updating the development priorities of the MMA and in preparing future programs. To initiate this process, MMDA has been assigned the responsibility of monitoring the Madras Urban Development Project. Specific activities to be undertaken are:

(a) develop performance indicators for each individual component of the project to assess the impact of the project (March 1977);

(b) develop a system of project implementation reporting by each of the executing agencies (April 1977);

(c) prepare quarterly progress reports giving details of the project elements sanctioned, executed, expenditures and progress made in achieving the specified performance targets (quarterly); and

(d) prepare an evaluation report on the project at the end of each fiscal year assessing the success of the project in meeting its objectives and proposing any changes necessary in the strategy (April 1978 and annually thereafter).

Review of Existing Sectoral Programs

8. A review of the existing sectoral programs and policies will be carried out in order to: (a) assess the overall flow of government and private funds in the metropolitan area; (b) assess the benefits of the programs and whether the benefits derived are consistent with the development objectives; and (c) assess any changes in policy which could promote sectoral objectives. Details of the review to be carried out for individual sectors are given below.

9. Employment. Creation of productive jobs for the growing population of the MMA will continue to be a major concern. It is recognized that traditionally much of the emphasis in this area has been placed on employment creation in the formal sector. But it is clear that in Madras the informal sector will continue to play a significant role in absorbing a substantial number of entrants to the labor force. In its review, MMDA will pay particular attention to ways of stimulating activity in this sector. Specific aspects of the work will include:

(a) a review of investments by the various government agencies for industrial development giving the sources of funds, and an assessment of, inter alia, employment created, investments per job, types of skills required and capital-intensity of the industries included in the program (December 1977);

(b) private investments in industry and commerce and an assessment of the type and number of jobs created (December 1977);

(c) an in-depth study of the economic activity in the informal sector and recommendations for training and financial and technical assistance which would increase incomes and stimulate greater employment (May 1978); and

(d) a review of the relationship between location of different industries and commercial activities with other types of activities to determine the appropriateness of the existing land-use regulations and to recommend appropriate modifications, including proposals for better coordination between the location of industrial and residential development (August 1978).

10. Housing. The principal concerns in the housing sector are: (i) to ensure that the total housing stock in the metropolitan area is increasing at a rate at least commensurate with the population increase; (ii) the housing being provided is affordable by the various income groups, particularly by the low-income groups, and (iii) government policies and programs are consistent with the above considerations. Specific tasks to be undertaken by MMDA are:

(a) a review of public and private investments in housing to ascertain the sources of funds, types of housing stock generated, the extent to which the needs of specific income groups are not being satisfied, and the implications of the findings for the growth of slums and for government finances (September 1977);

(b) aerial survey of all slum areas and prepare a detailed program for slum improvement (by June 30, 1978) incorporating the following considerations (see Appendix 2):

(i) all slums in the MMA would be improved by March 31, 1985.

(ii) attention will be given to the need to provide housing sites and services including open plots affordable by the lowest income groups to reduce the growth of slums;

(iii) most slums (possibly about 80%) will be improved and the inhabitants given long-term security of tenure; and

(iv) certain slums which are not viable and/or are located on land required for other high priority purposes would be cleared and the inhabitants resettled, but only after a detailed socio-economic cost-benefit analysis has been carried out for each clearance scheme, indicating that clearance is justified.

(c) review of government policies (e.g. rent control, taxation, financing) affecting private investments in housing and recommend appropriate changes to encourage private investments to be channelled into low-income housing (December 1977); and

(d) an analysis of the existing housing patterns in relation to employment opportunities and transport and an assessment of the existing land-use and building regulations to see whether they are consistent with the locational requirements of different income groups (December 1977).

11. Water Supply and Sewerage. A detailed study of the water supply and sewerage sector is presently under way with assistance from UNDP/WHO. This study is expected to provide an analysis of the investment requirements in the sector. MMDA's role in this area will be primarily to coordinate with the UNDP/WHO study team to provide them with information on the expected physical developments in the metropolitan area and in directing attention to the needs of the low-income groups. The investment proposals and financial and administrative recommendations originating from the study will be compiled by MMDA (by December 1977) in order to determine their implication for the local government finance.

12. Transport. Extensive studies have been carried out within the past five years on the transport and traffic situation in the metropolitan area.

These studies provide a data base on traffic patterns in the region, although the need for investments in transport infrastructure appears to have been overstated. The studies also reveal that pedestrians, bicyclists and bus passengers account for the major portion of the transport demand in the area. MMDA will focus particular attention on these modes of transport in devising future investment programs. Specific work to be undertaken will include:

(a) a review of public investments in the various modes of transport and an assessment of their impact on the transport requirements of the various income segments of the population (June 1977);

(b) a brief survey of the transport needs of the different income groups and its effect on their locational patterns and travel costs (money and time) (December 1977); and

(c) based on findings under (a) and (b) and the data of the transport studies (updated as necessary) and in collaboration with Madras Corporation and Department of Highways and Rural Works, an assessment of the future (5-10 years) role of the various modes of transport (December 1977).

13. Social Support Programs. A number of government programs exist in the fields of maternal and child health, nutrition, public health, education and vocational training. The main concern of the MMDA in these areas would be to ensure that the programs are integrated into community development projects and that they are reaching the target population. It would also define the proper role of the different agencies including the voluntary agencies and community participation in program development. Specific activities to be undertaken are:

(a) a review of the existing sources of funding for the various programs and an assessment of their target populations, including an assessment of the role of the voluntary agencies and private foundations (October 1977); and

(b) an evaluation of the present coordination between the social support programs and other community development programs and recommendations for future administrative arrangements (December 1977).

Local Government Finances

14. The ability of the local governments to generate adequate resources is a key constraint in meeting the development objective. It is necessary to (i) reduce operating costs and improve standards of service, and (ii) develop an expanding revenue base for local government services in the MMA. MMDA would in parallel with its efforts in developing a future investment program,

and in conjunction with the studies being undertaken as part of the UNDP/WHO study of water supply and sewerage finances in the MMA, carry out:

(a) a review of present local government revenues and expenditures (December 1977);

(b) a study of the alternative sources of revenue available - particularly the property taxes and various direct charges for services provided - and recommend to the State Government and local governments ways in which the revenue base may be enhanced, together with revenue projections (December 1977);

(c) make projections of expenditures, including expenditures required to service an increase in the population as determined from the growth trends for each local government area; debt service on the existing and anticipated debt; and expenditures on replacement (December 1977); and

(d) provide advice and assistance to the State Government and the local governments for implementing accepted recommendations to augment their resources (continuously after January 1978).

15. For the city of Madras, activities (b) and (c), except for water supply and sewerage finances, would largely be carried out by Madras Corporation but MMDA would advise and assist as necessary and utilize the results in its overall review of local government finance in the MMA.

Area Development Plans

16. Under the provisions of the Town and Country Planning Act the MMDA has to prepare a master plan and follow it up with area development plans for the constituent units. The master plan has already been notified. This plan would require it to be regularly updated. Area development plans for 97 planning units within the city and 60 planning units outside it is presently being carried out and will be continued over the next three years.

Formulation of Future Development Programs

17. On the basis of the preceding activities, MMDA will propose future development programs including capital budgets. The concerned sectoral agencies will continue to be responsible for preparing the detailed proposals. The MMDA would offer guidelines to the agencies and will review all proposals for their economic and financial viability and for their consistency with the development objectives. Necessary steps to be taken by the State Government agencies and the individual local governments to implement the programs will be clearly defined and proposed.

18. The following specific activities would be required to prepare the investment program (most activities would overlap substantially with much iteration required, and the intermediate completion dates are only indicative):

(a) MMDA to translate the broad development objectives into specific sectoral objectives and guidelines based on its evaluation of the present policies and investment programs and obtain Government approval (December 1977);

(b) the individual agencies to prepare programs on the basis of the development guidelines and submit to MMDA (June 1978);

(c) MMDA to review the programs and propose to the Government investment packages which fulfill the established objectives, within the resource constraints (October 1978); and

(d) obtain Government approval and initiate preparatory work for implementation (January 1979).

IV. ORGANIZATION AND STAFFING

19. A proposed organization to implement the above work program is outlined in Chart 4. The present area development divisions would be consolidated into one Area Development Plans Department. Three new departments would be established for development planning, capital programming and financial management, and community development programs. A separate unit will be responsible for routine project monitoring and evaluation.

20. The Development Planning Department will further define the development objectives for the area and translate these into individual sectoral objectives. It will evaluate government policies and investment programs in each of the key sectors to determine appropriate changes and also have overall responsibility for proposing future development programs. The Capital Programming and Financial Management Department will compile government and private investment activities in the various sectors and determine existing and potential sources of funds for these programs, and also propose the capital budgets for the development programs. It will update this information regularly. It will review the finances of the local governments in the metropolitan area and of the government departments' activities in the selected sectors. It will make the projections of revenues and expenditures and advise and assist in augmenting revenues and in improving financial management in the MMA. The Community Development Programs Department will be responsible for all work related to employment generation and social services, and also identify and coordinate the preparation of comprehensive sites and services and slum improvement projects. The Area Development Plans Department will continue its present activities in land-use planning and area development and will assist the Development Planning Department in identifying spatial growth strategies for the metropolitan area.

21. The work of the technical departments will be supervised by a Chief Urban Planner. The present staff from the various Area Development Departments will be consolidated into one single department and strengthened as necessary in view of the existing commitments of MMDA for land-use planning. In addition, the following professional staff has been identified as required for the principal new departments:

Development Planning

1 - Senior Urban Planner (Head)
3 - Urban Economists
2 - Urban Planners
2 - Civil Engineers
2 - Municipal Engineers
1 - Transportation Planner

Capital Programming and Financial Management

1 - Senior Public Administrator (Head)
2 - Public Finance Specialists
3 - Financial Analysts

Community Development Programs

1 - Senior Industry Specialist (Head)
2 - Small-scale Industry Specialists
1 - Sociologist
1 - Public Health Specialist
1 - Economist
1 - Planner

Project Monitoring and Evaluation

1 - Economist/Planner (Head)
2 - Engineers
2 - Financial Analysts
2 - Accounts Officers

22. In addition, the following key experts (see Annex 9 for job descriptions) will be retained to assist MMDA for two years on a contract basis to provide training to its staff and to assist in carrying out the work program:

(a) Urban Development Planner;

(b) Urban Economist;

(c) Financial Analyst - Capital Programming;

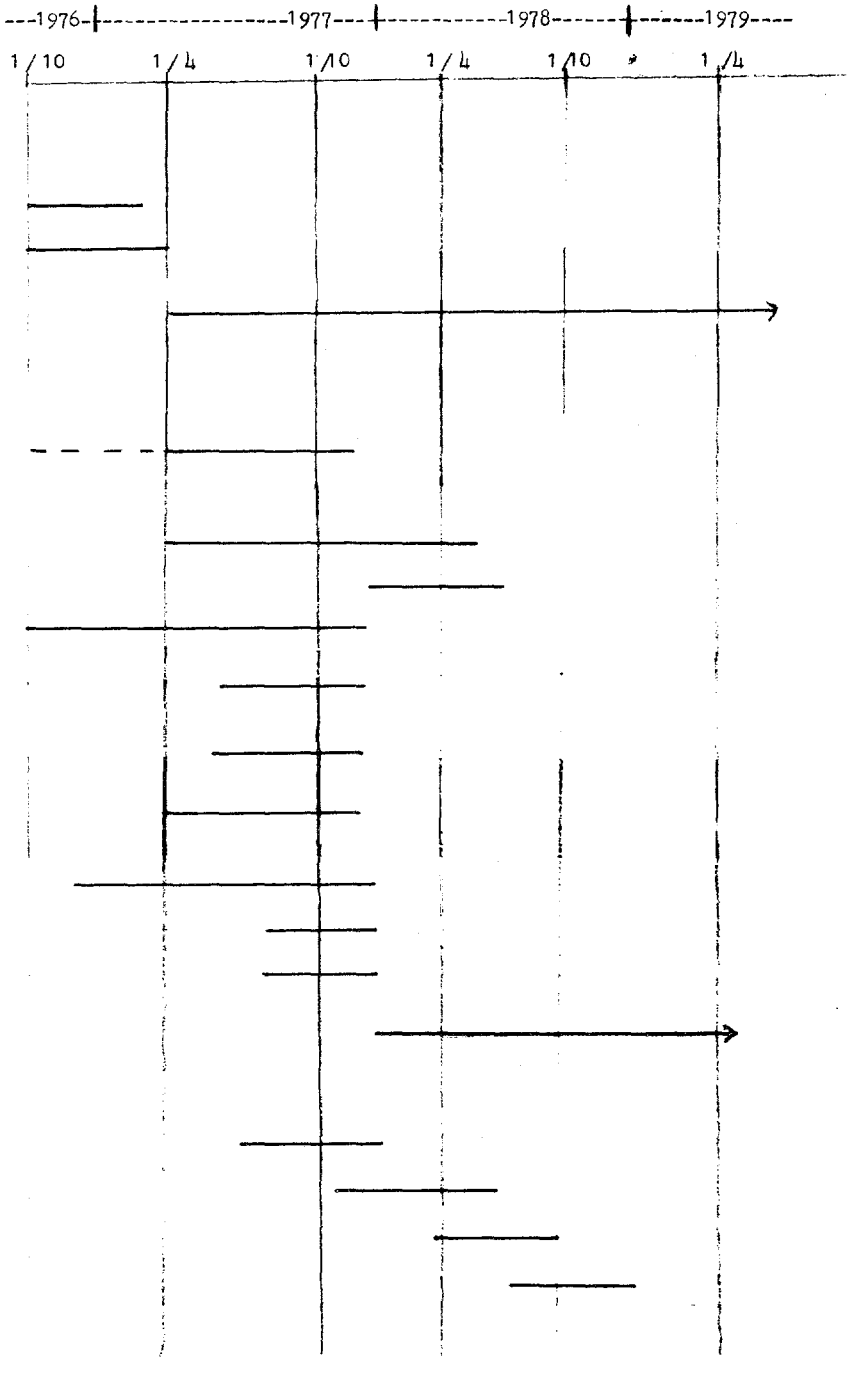
(d) Financial Analyst - Municipal Finance; and

(e) Small-scale Business Expert.

MADRAS URBAN DEVELOPMENT PROJECT

Madras Metropolitan Development Authority

Schedule of Activities



Ref	Activity
	Monitoring and Evaluation
7a	Develop monitoring indicators
7b	Develop project reporting system
7c/d	Prepare quarterly progress reports and annual evaluation reports
	Review of Existing Sectoral Programs
9a/b, 10a,11, 12a,13a	Review and evaluate government and private investments in individual sectors
9c	Study of informal sector
9d	Review of employment location issues
10b	Preparation of slum improvement program
10c/d	Review of government policies and regulations in housing
12b/c	Assessment of transport needs and future role of different modes
13b	Assessment of social support programs
	Local Government Finances
14a	Study of present revenues and expenditures
14b	Recommendations for augmentation of revenues
14c	Projections of expenditures
14d	Advise and assist local governments in augmentating financial resources
	Formulation of Development Programs
17a	Develop sectoral objectives and guidelines
17b	Prepare sectoral program proposals
17c	Review and select proposals
17d	Approval by Government and local bodies

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

Preparation of Slum Improvement Program

1. In collaboration with the Tamil Nadu Housing and Slum Clearance Boards, MMDA is to:

(a) assemble and analyze basic information on existing slums in the MMA and on the growth of slums; and

(b) prepare by June 30, 1978 a detailed program for the improvement of all slums in the MMA by March 31, 1985.

2. The program would prescribe appropriate improvements for each slum and their timing, as well as financing and implementing arrangements. Attention would be given to the impact of sites and services schemes on the rate of growth of slums and MMDA would specify the scope of the sites and services program which would have to be carried out in parallel with the improvement program. In general, the slum improvement program would adhere to the principles of the Madras Urban Development Project and the experience gained from its implementation would be utilized.

Surveys and Preliminary Analyses

3. An aerial survey of the MMA is being carried out to identify existing slums and to provide basic data for preparing the improvement program. The aerial survey is being complemented with sample ground surveys. This will establish physical parameters, such as topography, density, floor areas, plot sizes, type of building materials, existing infrastructure, etc. The physical parameters will be linked to socio-economic indicators, such as tenure, hut and land values, employment, income expenditure patterns, health, etc.

4. A typology map of the MMA slums will be prepared, indicating for each slum area: the area covered, number of households, number of dwelling units, and the improvement potential considering physical and socio-economic constraints. The number of open plots that can be serviced for new settlers would also be indicated.

Determination of Levels of Improvement

5. A determination of appropriate levels of improvement will be made based on an estimate of the ability-to-pay of the slum dwellers and their priorities for different types of improvement. Working drawings will be

prepared for typical slums defined on the basis of the typology map, showing the physical improvements to be made (drainage, water supply, sewerage, roads, footpaths and community facilties). Proposals will similarly be prepared for the necessary social support programs, including employment generation, nutrition and health, and education.

6. Any slum clearance schemes deemed necessary because the land is required for higher priority uses would be separately evaluated and justified against the alternative of locating the higher priority uses elsewhere. Any clearance schemes deemed necessary for other reasons (such as the slums being judged not to be viable communities or being located in flood-prone areas) would be separately evaluated and justified against the alternatives of (a) improvement, as outlined above, and (b) neither improvement nor clearance, with the inhabitants offered a choice between remaining or moving to a sites and services schemes.

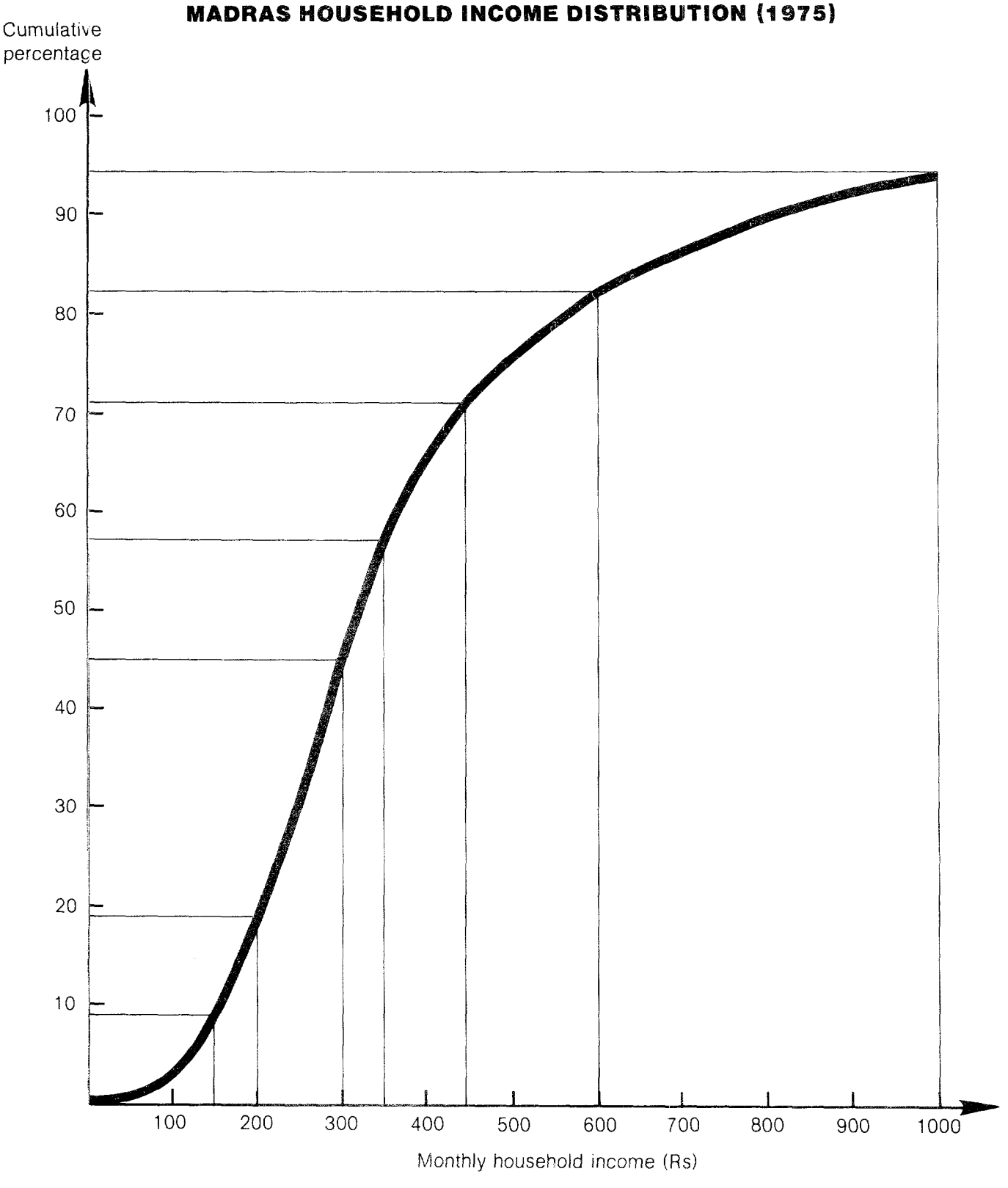
7. An assessment will be made of actual capital, operating and maintenance expenditures incurred in completed and ongoing slum improvement schemes, and the extent to which hire-purchase payments and service charges cover these expenditures will be determined. The assessment will be taken into account in the design of the program.

8. The financial feasibility of the program will be determined and levels of improvements and payments adjusted if necessary. A financing plan and a cash flow statement would be prepared.

Implementation

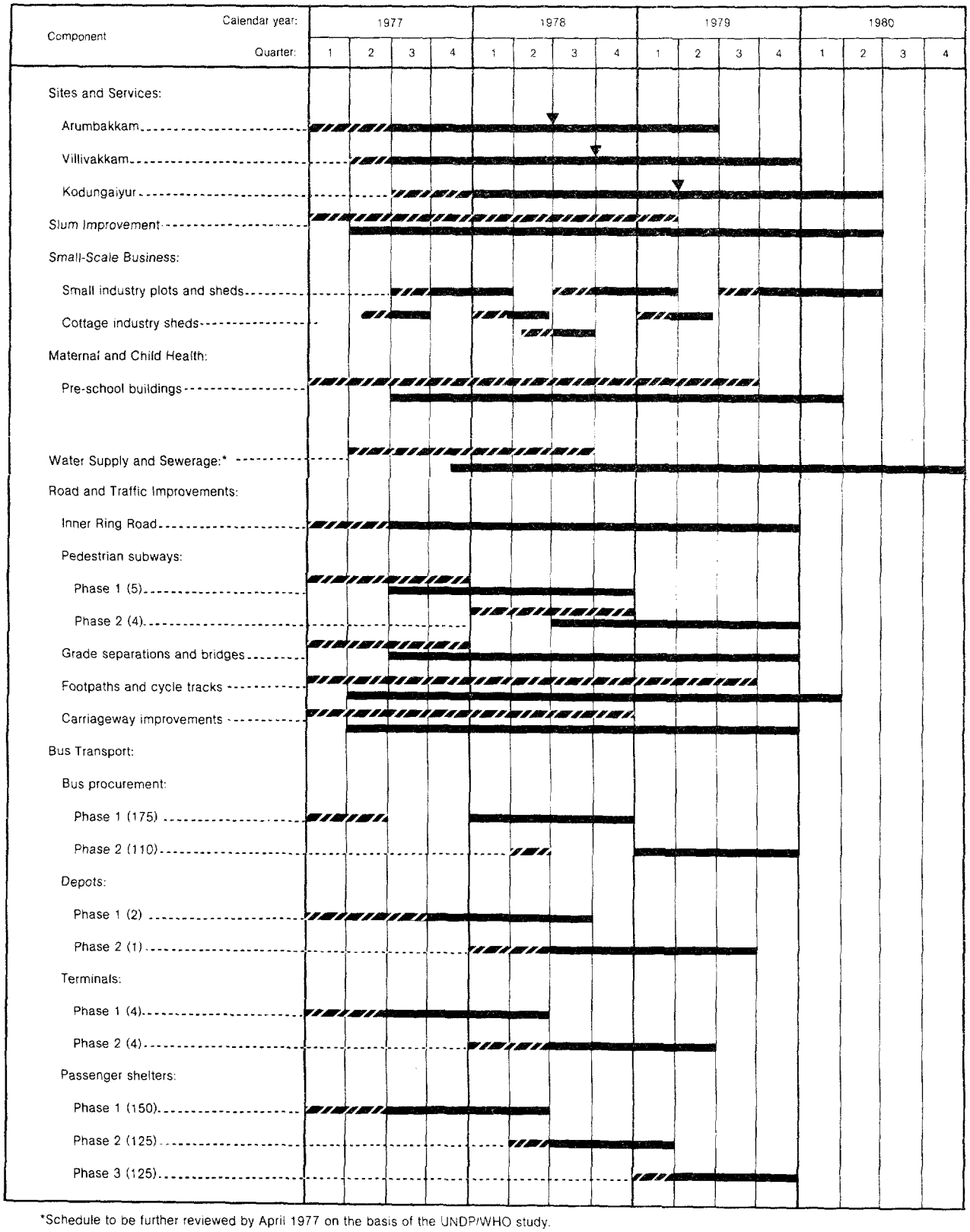
9. A schedule for implementation would be prepared specifying (a) responsibilities for key activities such as surveys, land acquisition, engineering design, construction, legal aspects, collection of payments, operation and maintenance, monitoring and evaluation etc., and (b) the timing of improvements for individual slums. Attention would be given to the need to revise the program regularly on the basis of monitoring and evaluation findings. In this regard, close coordination will be required with the sites and services program to assess its impact on the growth of slums.

INDIA
MADRAS URBAN DEVELOPMENT PROJECT
MADRAS HOUSEHOLD INCOME DISTRIBUTION (1975)



World Bank—16564

INDIA
MADRAS URBAN DEVELOPMENT PROJECT
IMPLEMENTATION SCHEDULE (PHYSICAL ELEMENTS)

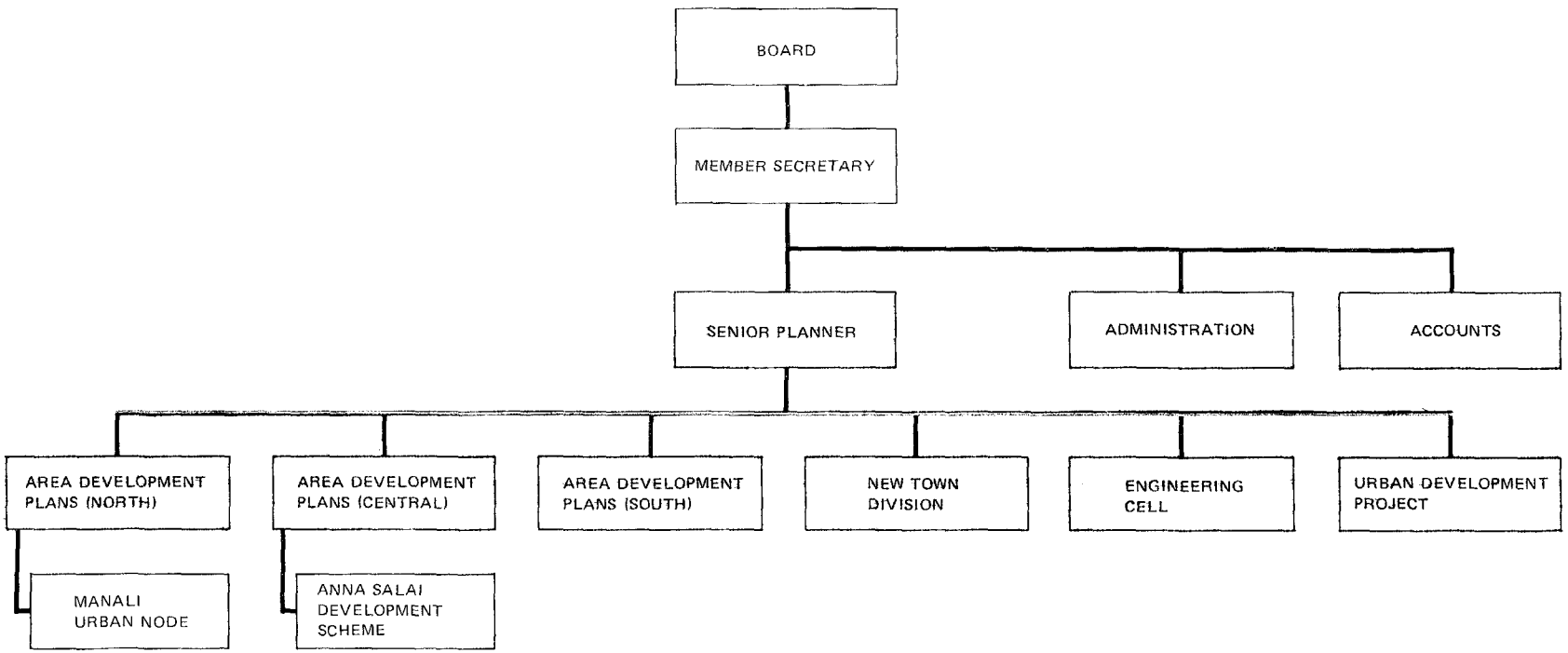


*Schedule to be further reviewed by April 1977 on the basis of the UNDP/WHO study.

Legend: Design and tendering.
Construction, delivery and installation.
▼ Entry of settlers and businesses.

World Bank—16563

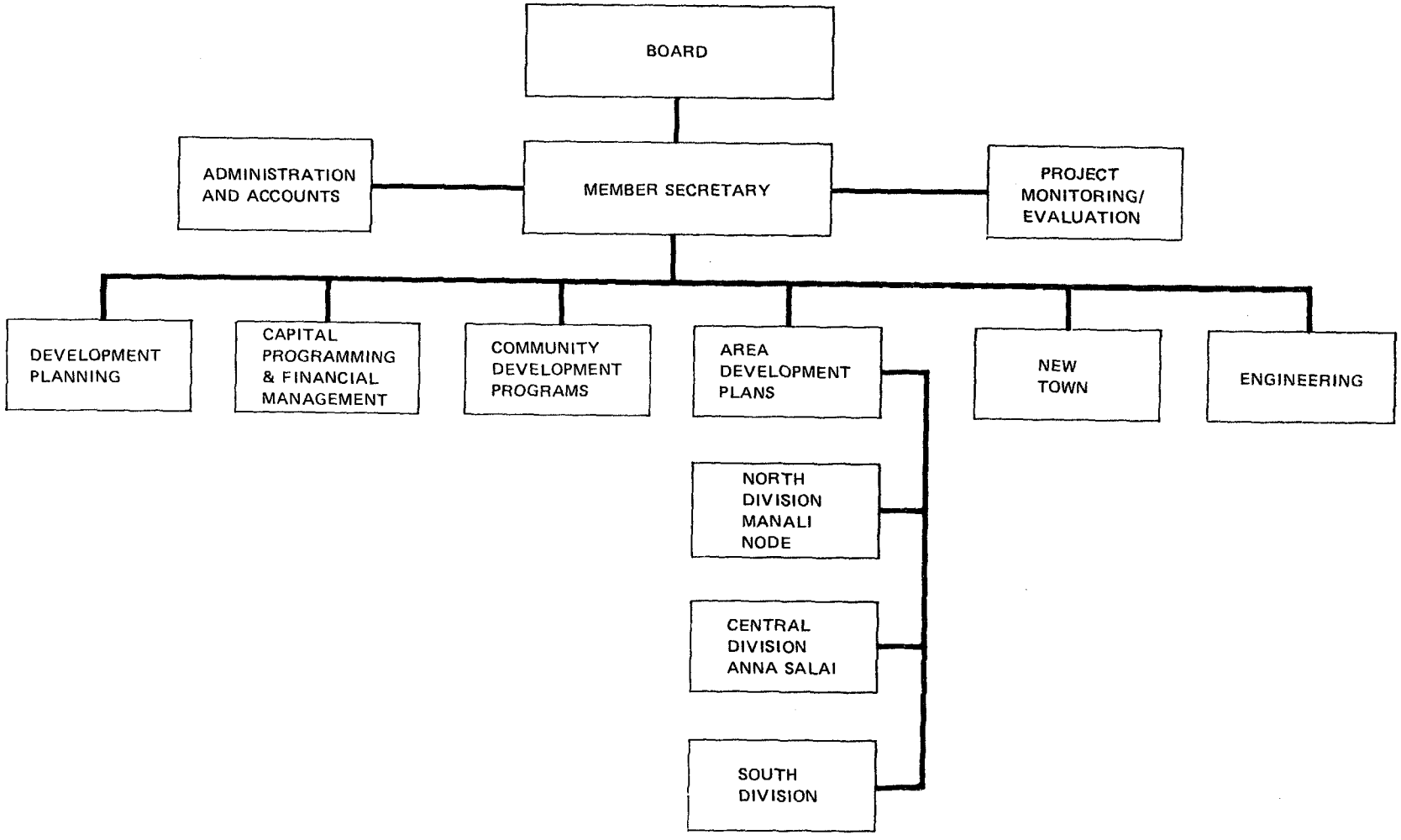
INDIA
MADRAS URBAN DEVELOPMENT PROJECT
Present Organization of Madras Metropolitan Development Authority



World Bank—16527

CHART 3

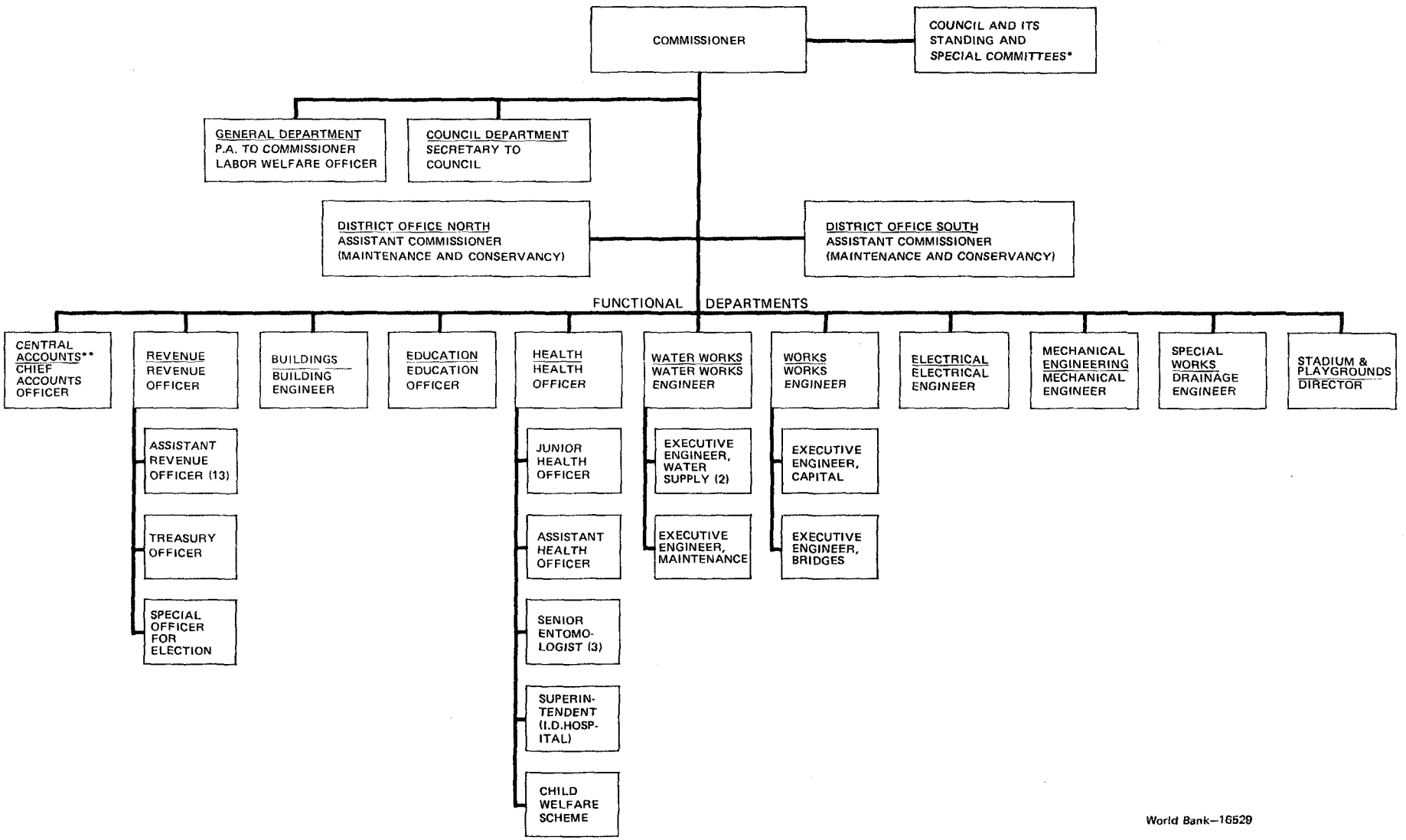
INDIA
MADRAS URBAN DEVELOPMENT PROJECT
Proposed Organization of Madras Metropolitan Development Authority



World Bank—16528

CHART 4

INDIA
MADRAS URBAN DEVELOPMENT PROJECT
Organization of Madras Corporation



World Bank—16529

CHART 5

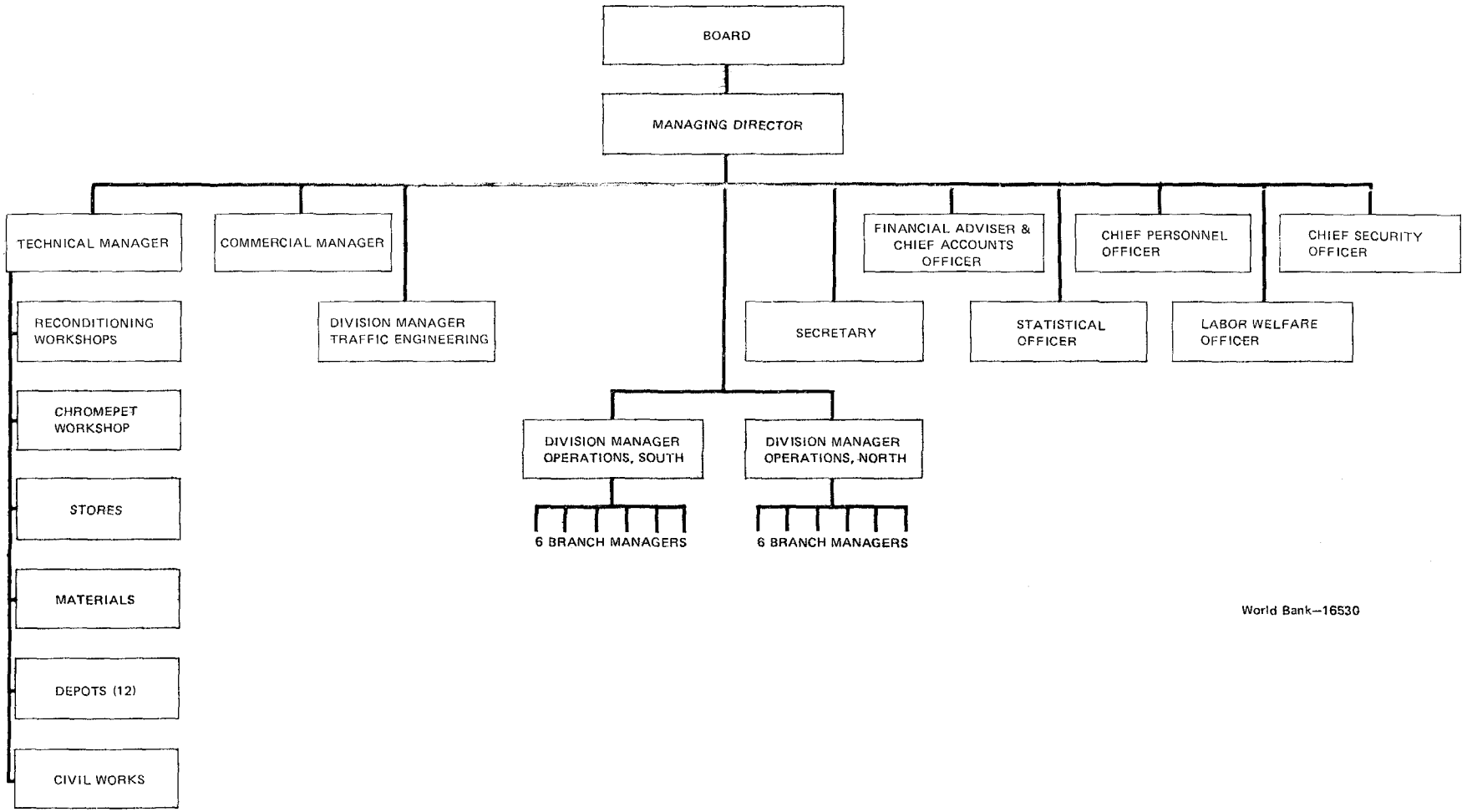
* At present replaced by the Special Officer

** To be incorporated in the new Financial Management Department

INDIA

MADRAS URBAN DEVELOPMENT PROJECT

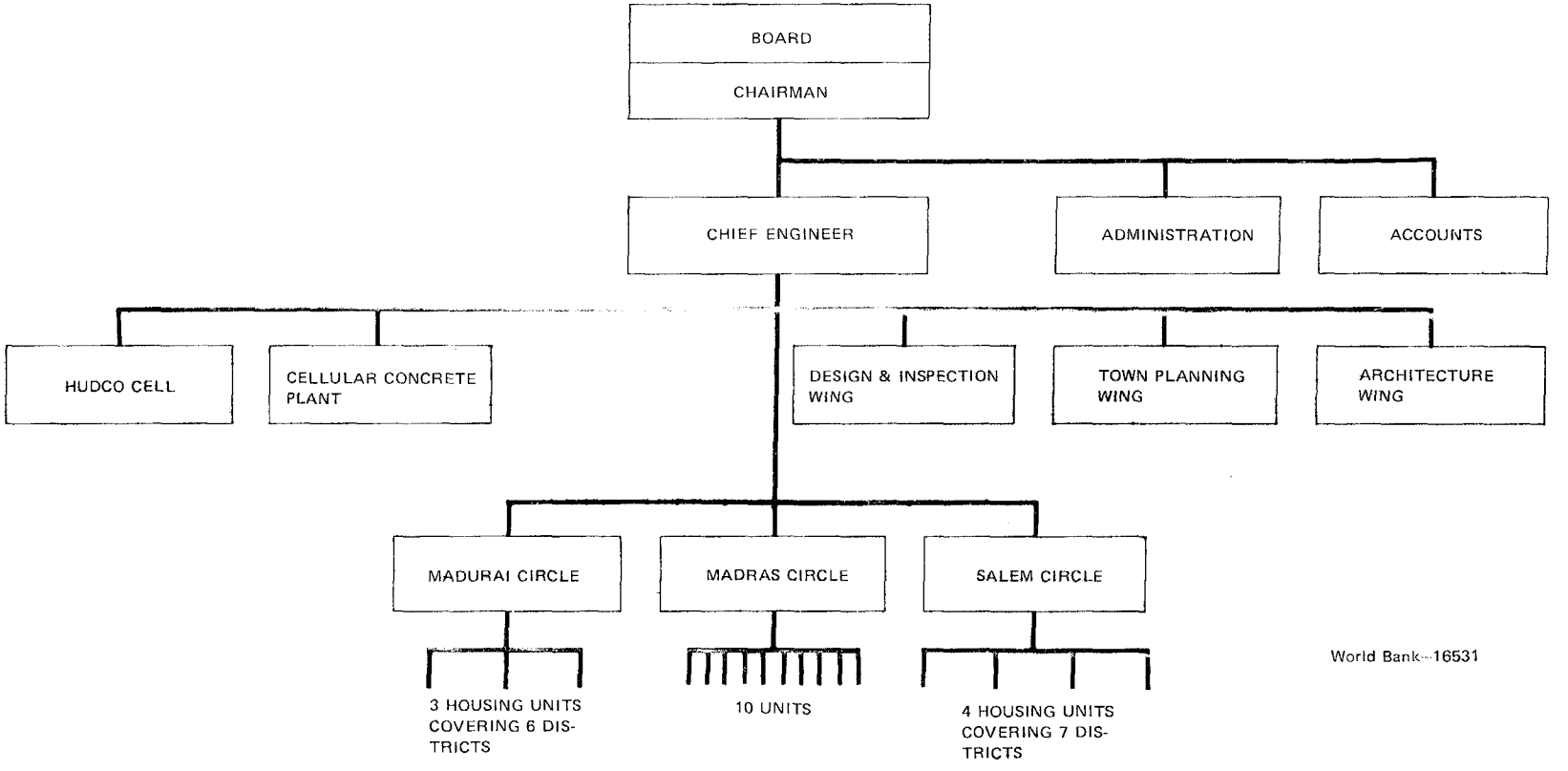
Organization of Pallavan Transport Corporation (Metropolitan Wing)



World Bank—16530

CHART 6

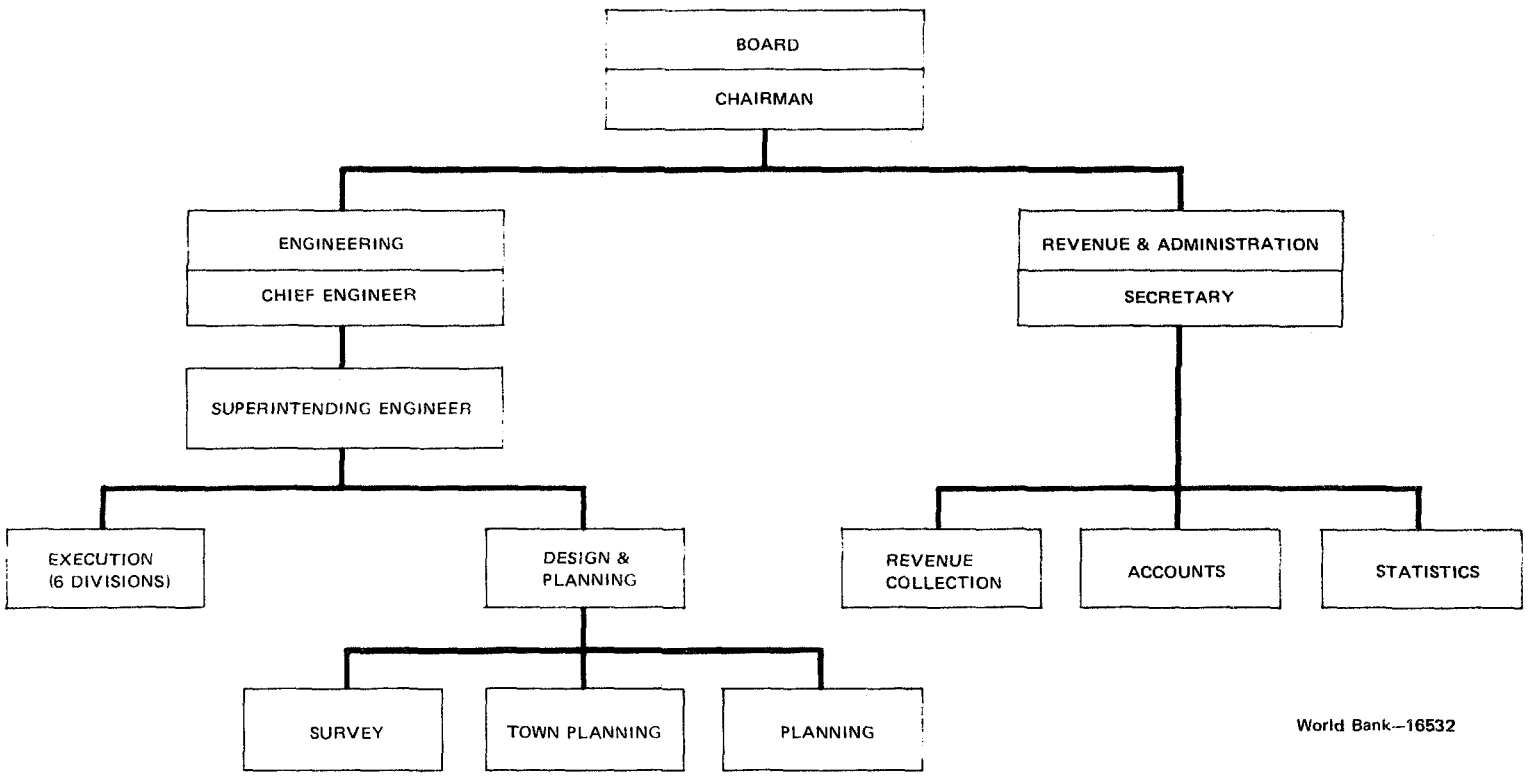
INDIA
MADRAS URBAN DEVELOPMENT PROJECT
Organization of Tamil Nadu Housing Board



World Bank--16531

CHART 7

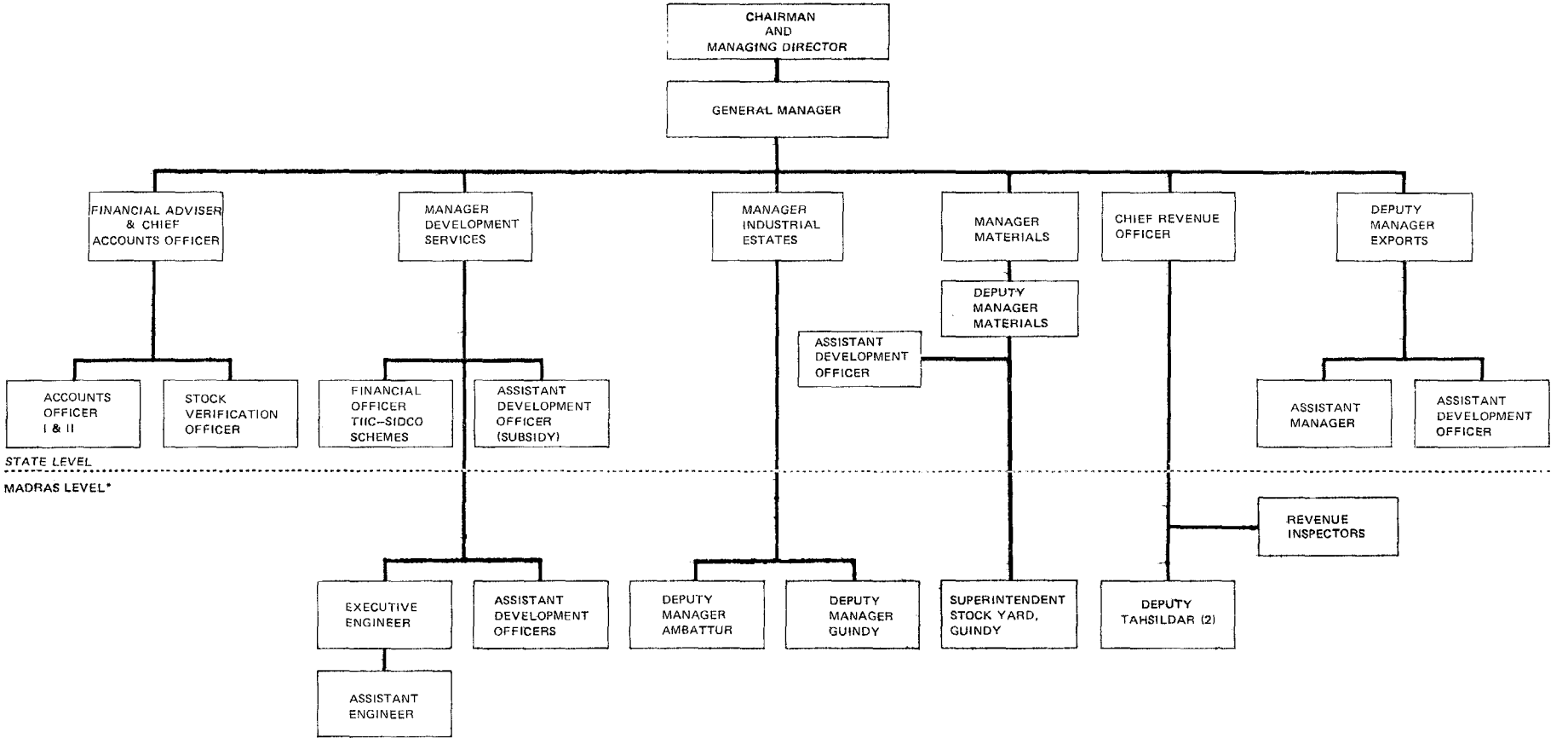
INDIA
MADRAS URBAN DEVELOPMENT PROJECT
Organization of Tamil Nadu Slum Clearance Board



World Bank–16532

CHART 8

INDIA
MADRAS URBAN DEVELOPMENT PROJECT
Organization Chart of Small Industries Development Corporation

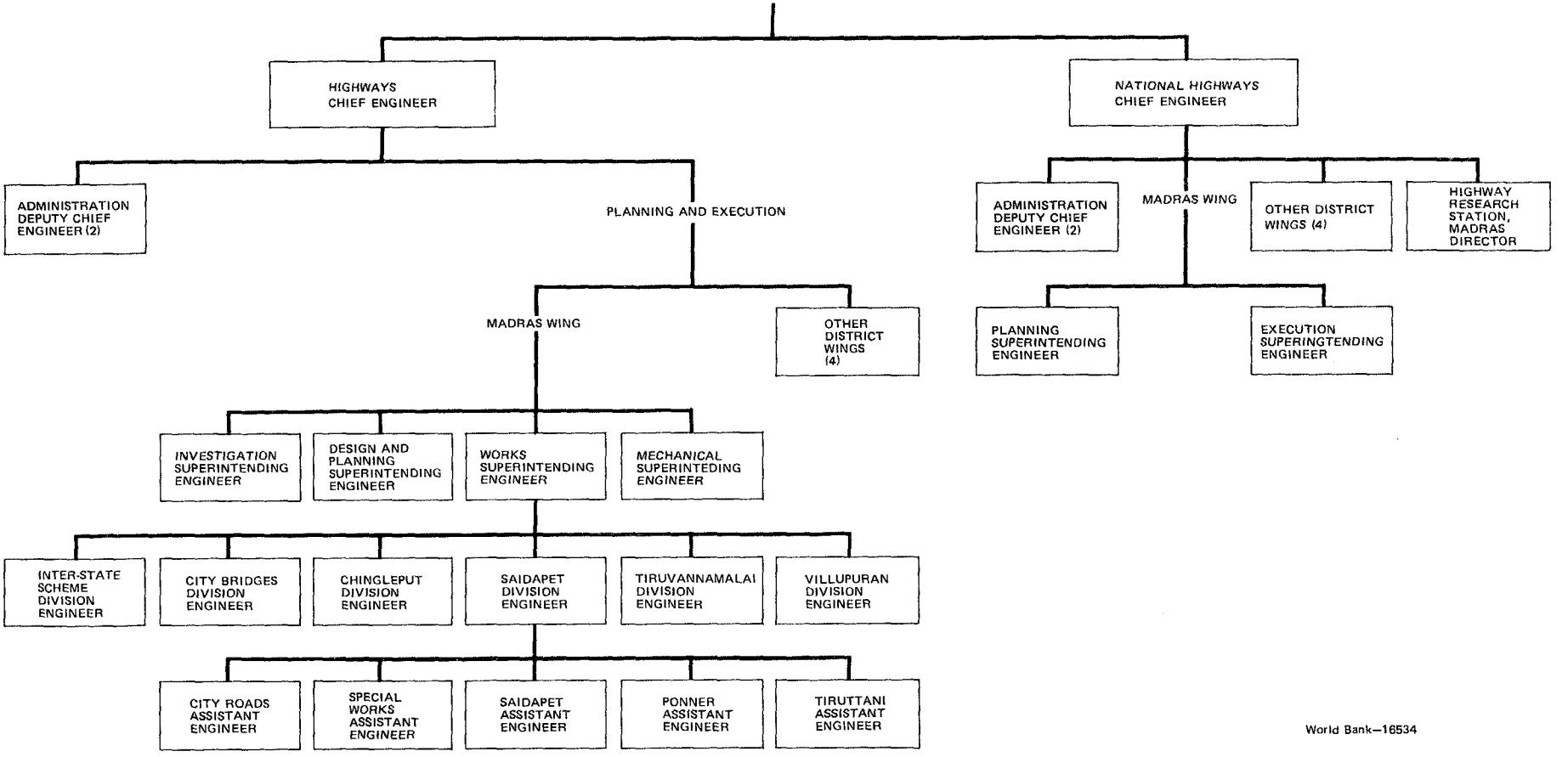


*The organization below state level in areas other than Madras is not shown.

World Bank–16533

CHART 2

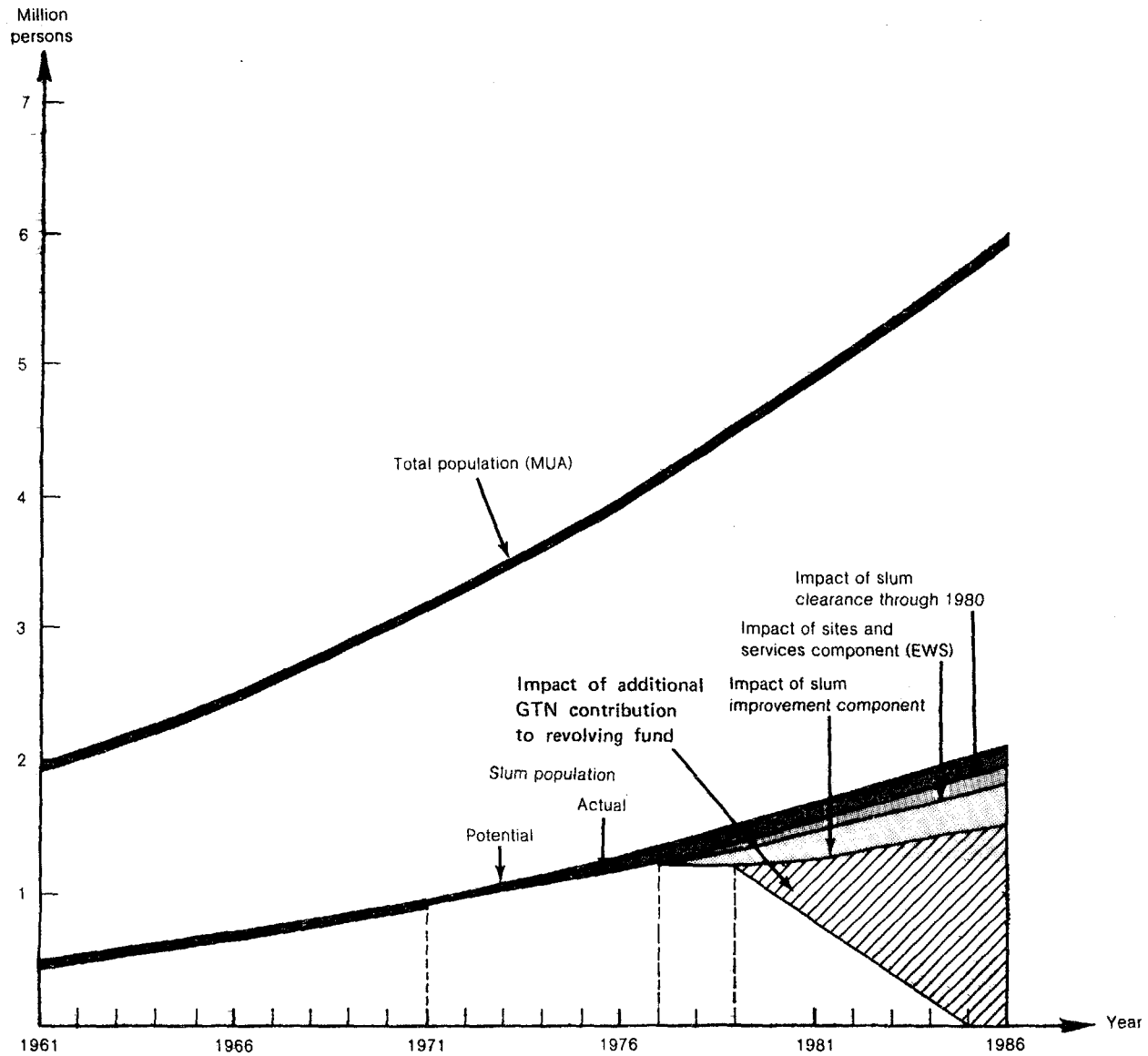
INDIA
MADRAS URBAN DEVELOPMENT PROJECT
Organization of Highways and Rural Works Department



World Bank—16534

CHART 10

INDIA
MADRAS URBAN DEVELOPMENT PROJECT
PROJECT IMPACT ON THE GROWTH OF MADRAS' SLUM POPULATION



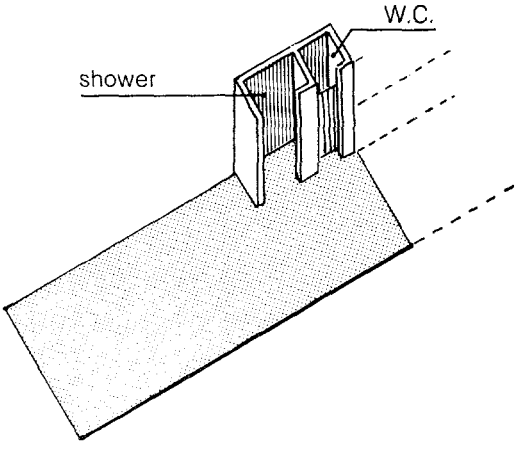
Notes: —Second order effects on the potential growth of slum population ignored.
—The effects of an estimated 10% annual inflation have been considered.

World Bank—16565

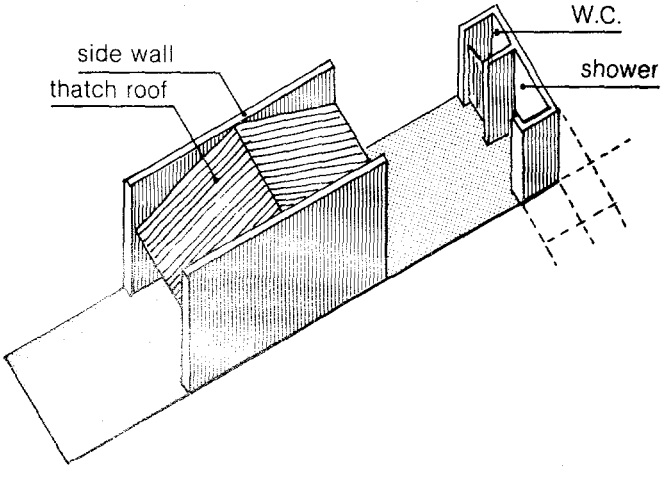
CHART 11

INDIA
MADRAS URBAN DEVELOPMENT PROJECT
PLOT AND CORE OPTIONS

Plot Type A = 40m² (13' x 33')

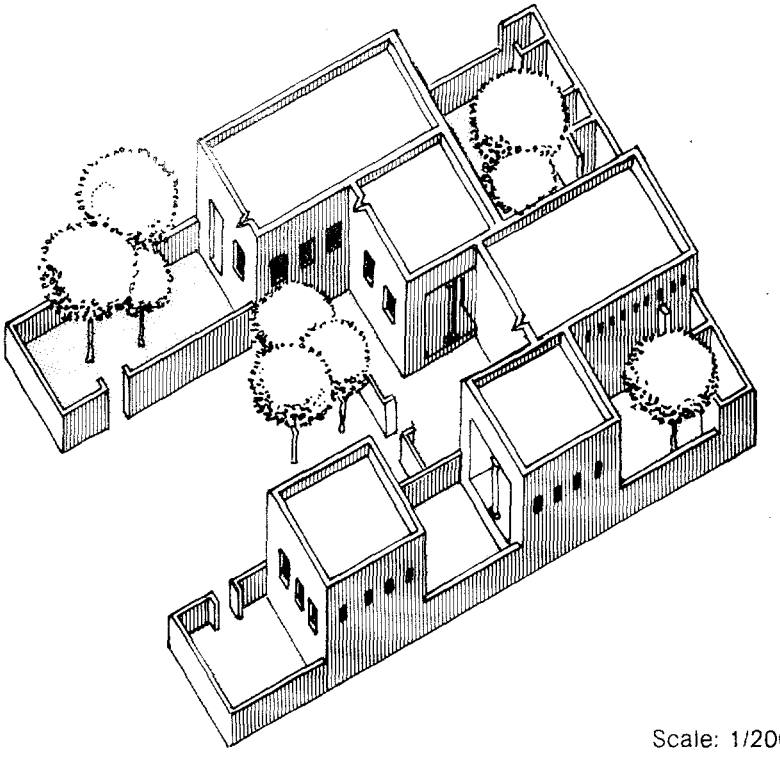


Plot Type B = 47m² (10' x 50')



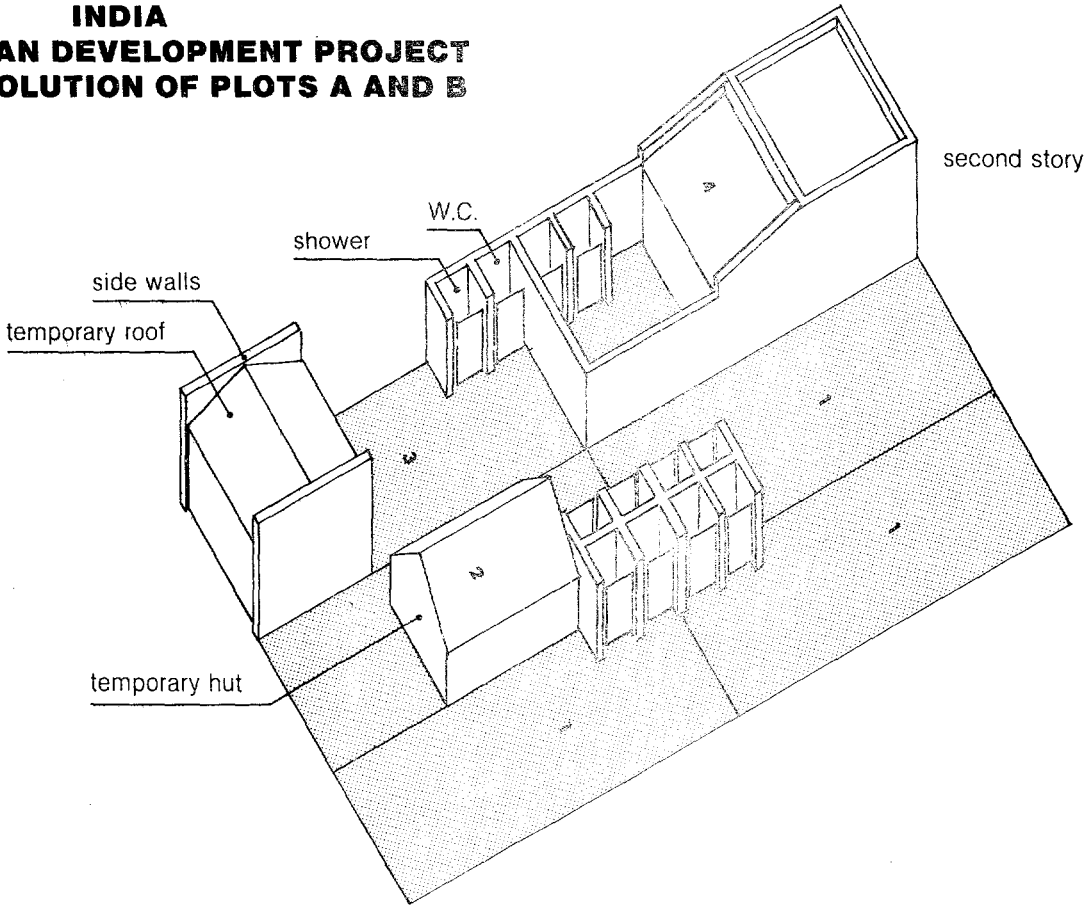
Plot Type C = 47m²

(Three plots represented)

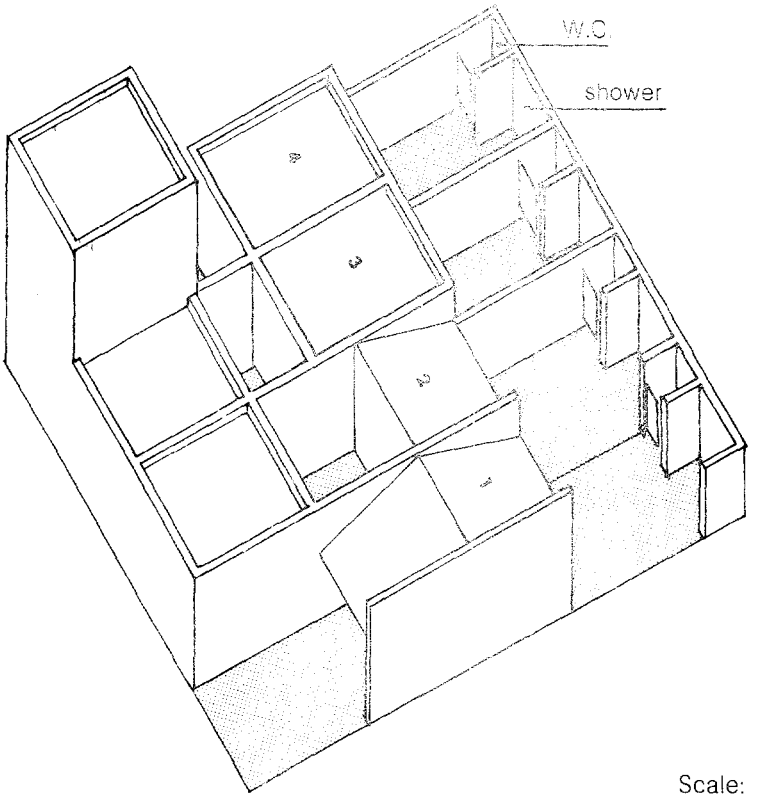


Scale: 1/200

INDIA
MADRAS URBAN DEVELOPMENT PROJECT
POSSIBLE EVOLUTION OF PLOTS A AND B



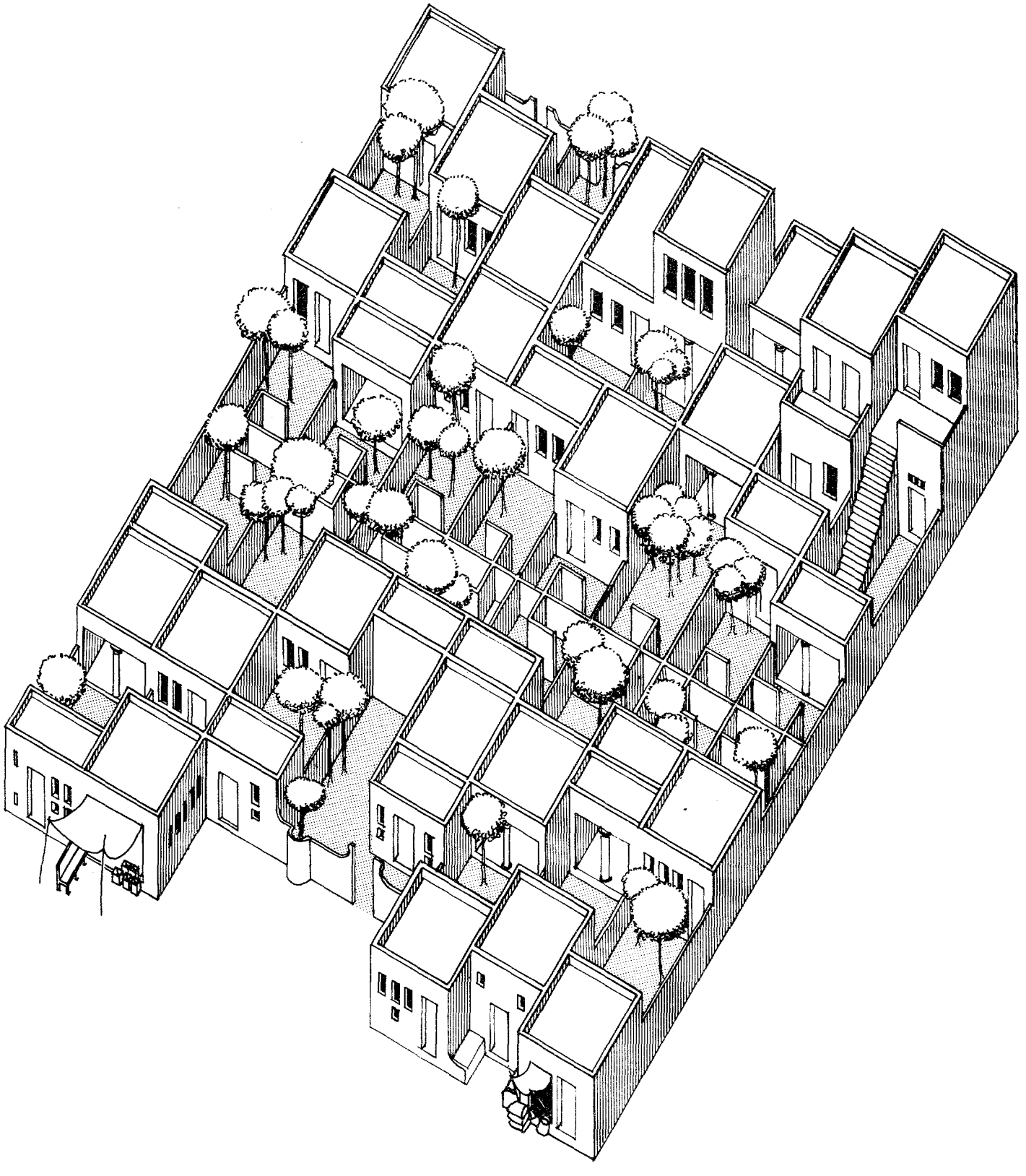
Plot A = 40m²
1. plot as sold
2. first stage
3. second stage
4. third stage



Plot B = 47m²
1. plot as sold
2. second stage
3. third stage
4. fourth stage

Scale: 1/200

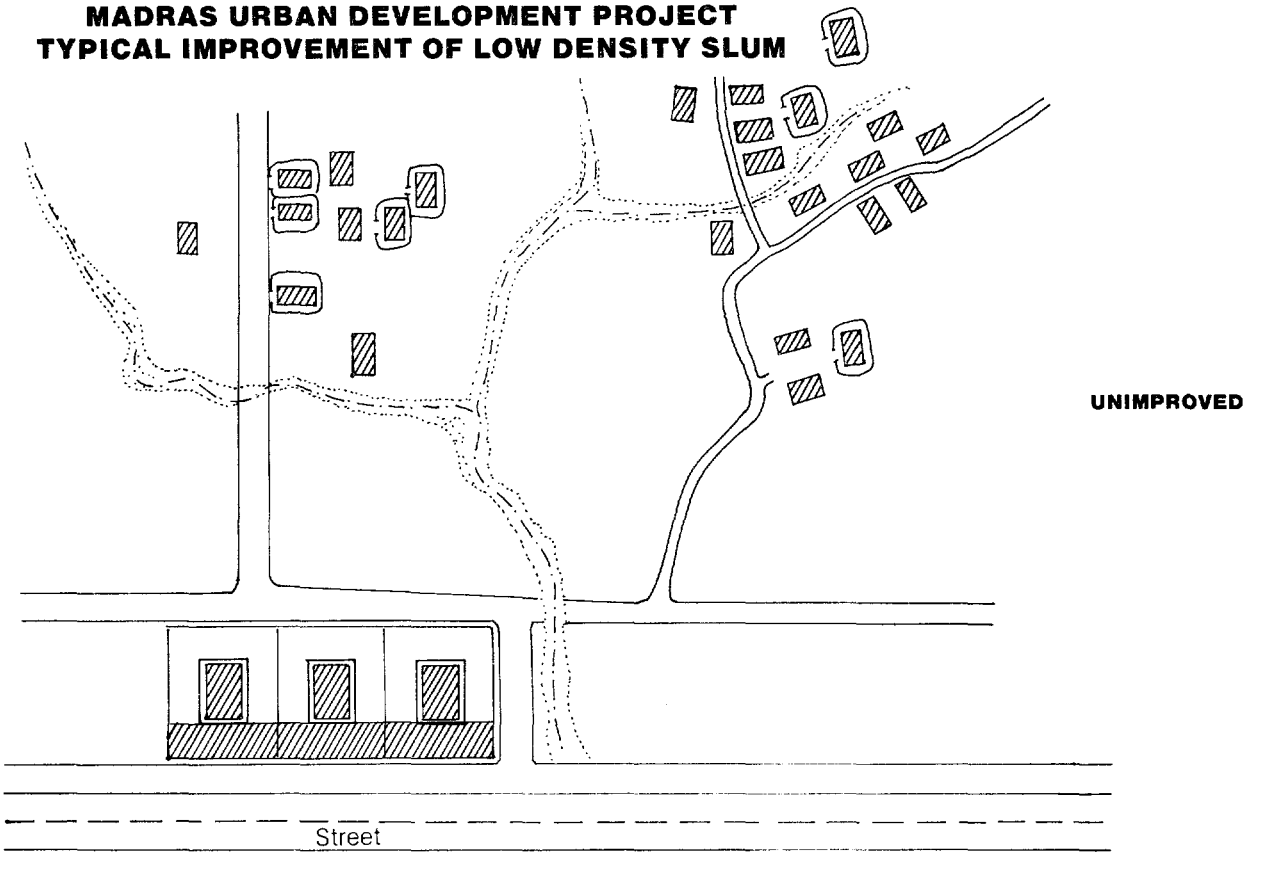
INDIA
MADRAS URBAN DEVELOPMENT PROJECT
PLOT C CLUSTER
(REPRESENTING ALSO THE FINAL STAGE OF EVOLUTION OF PLOTS B)



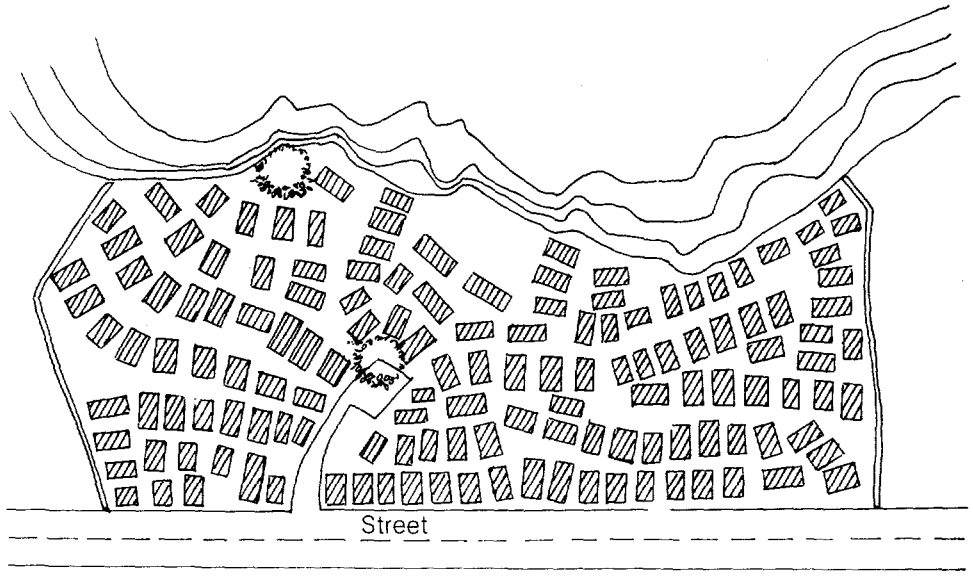
The isometric represents 15 dwelling units on 47m² plots.

Scale: 1/200

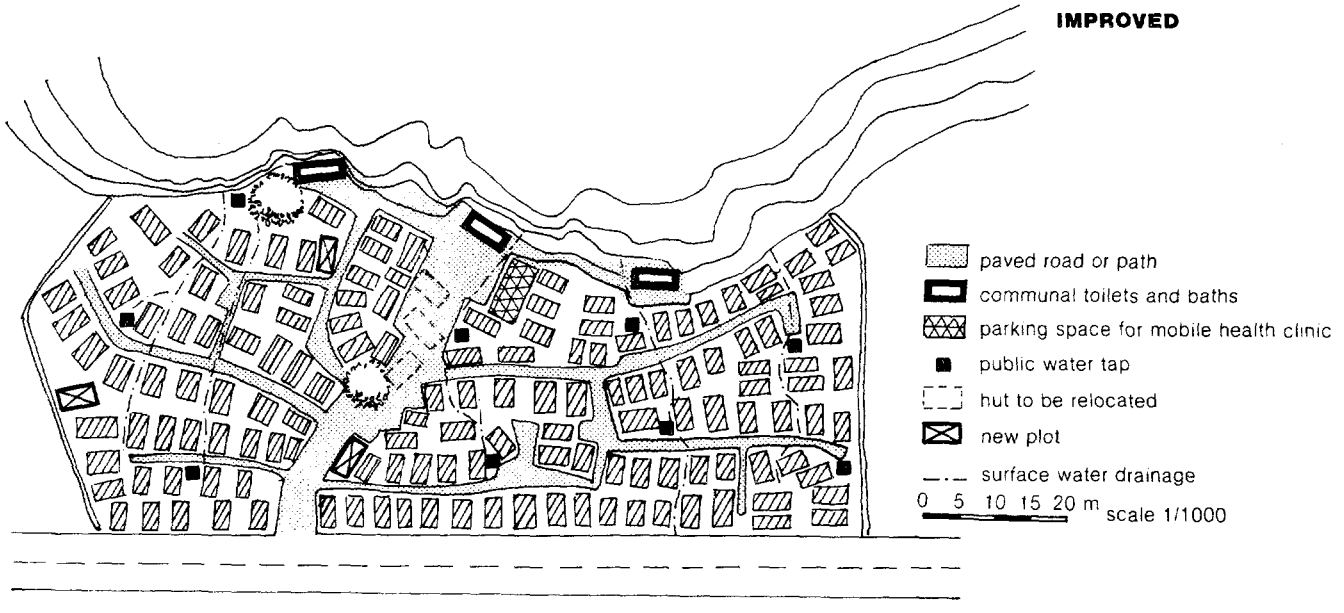
INDIA
MADRAS URBAN DEVELOPMENT PROJECT
TYPICAL IMPROVEMENT OF LOW DENSITY SLUM



INDIA
MADRAS URBAN DEVELOPMENT PROJECT
TYPICAL IMPROVEMENT OF HIGH DENSITY SLUM

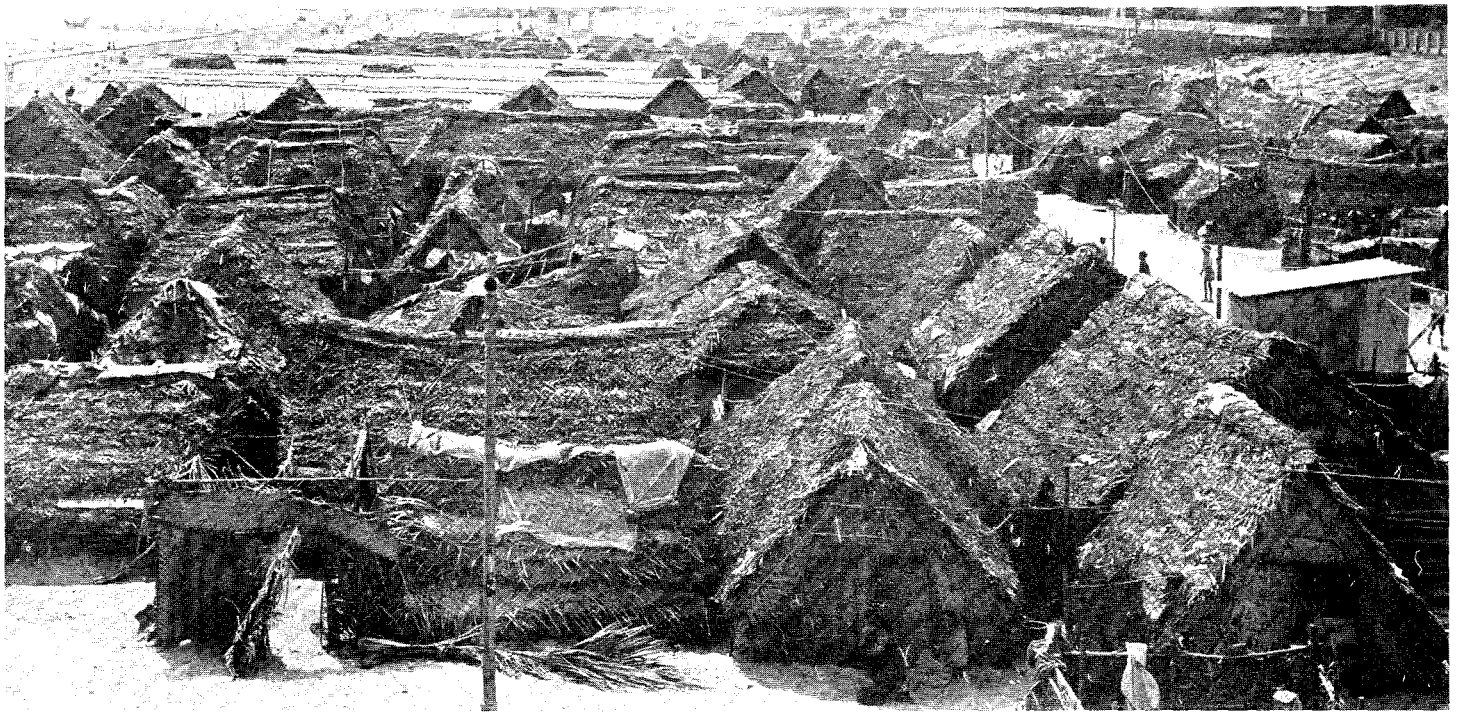


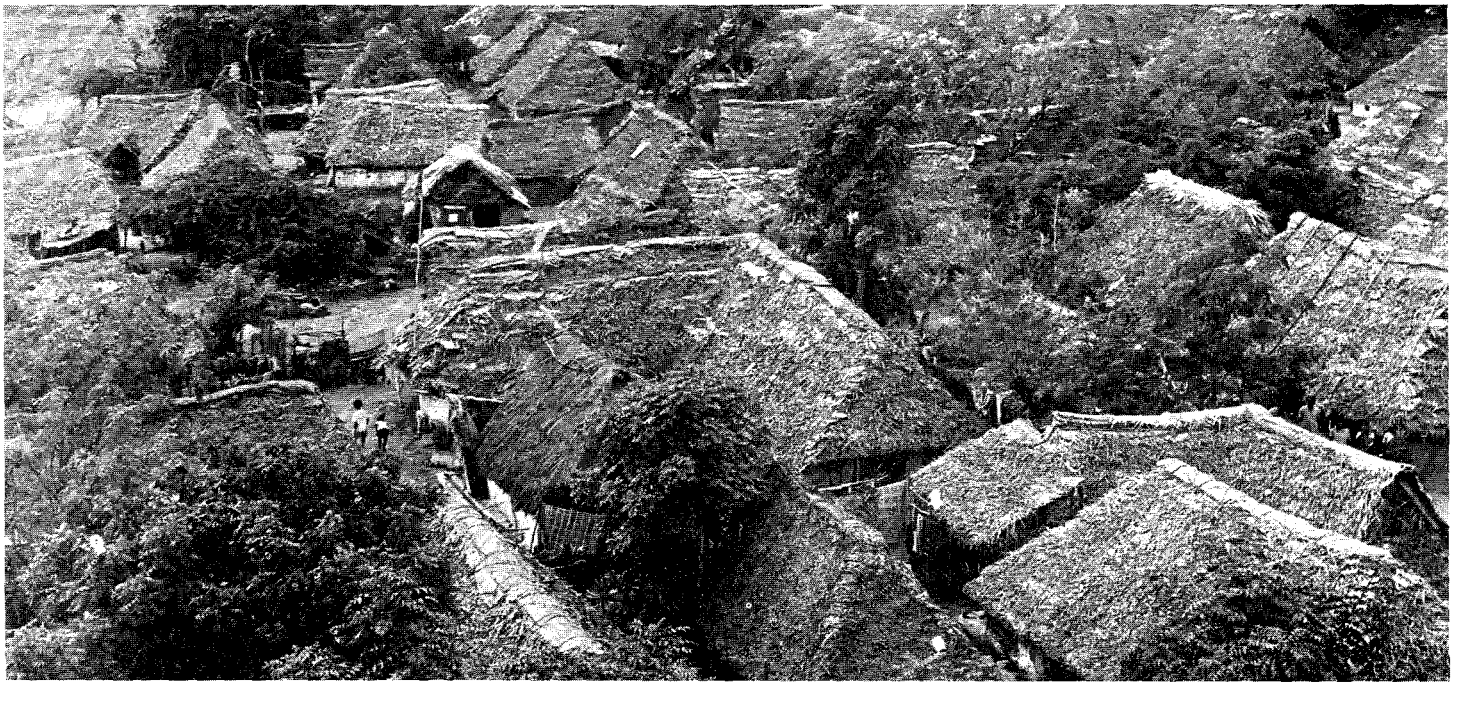
UNIMPROVED



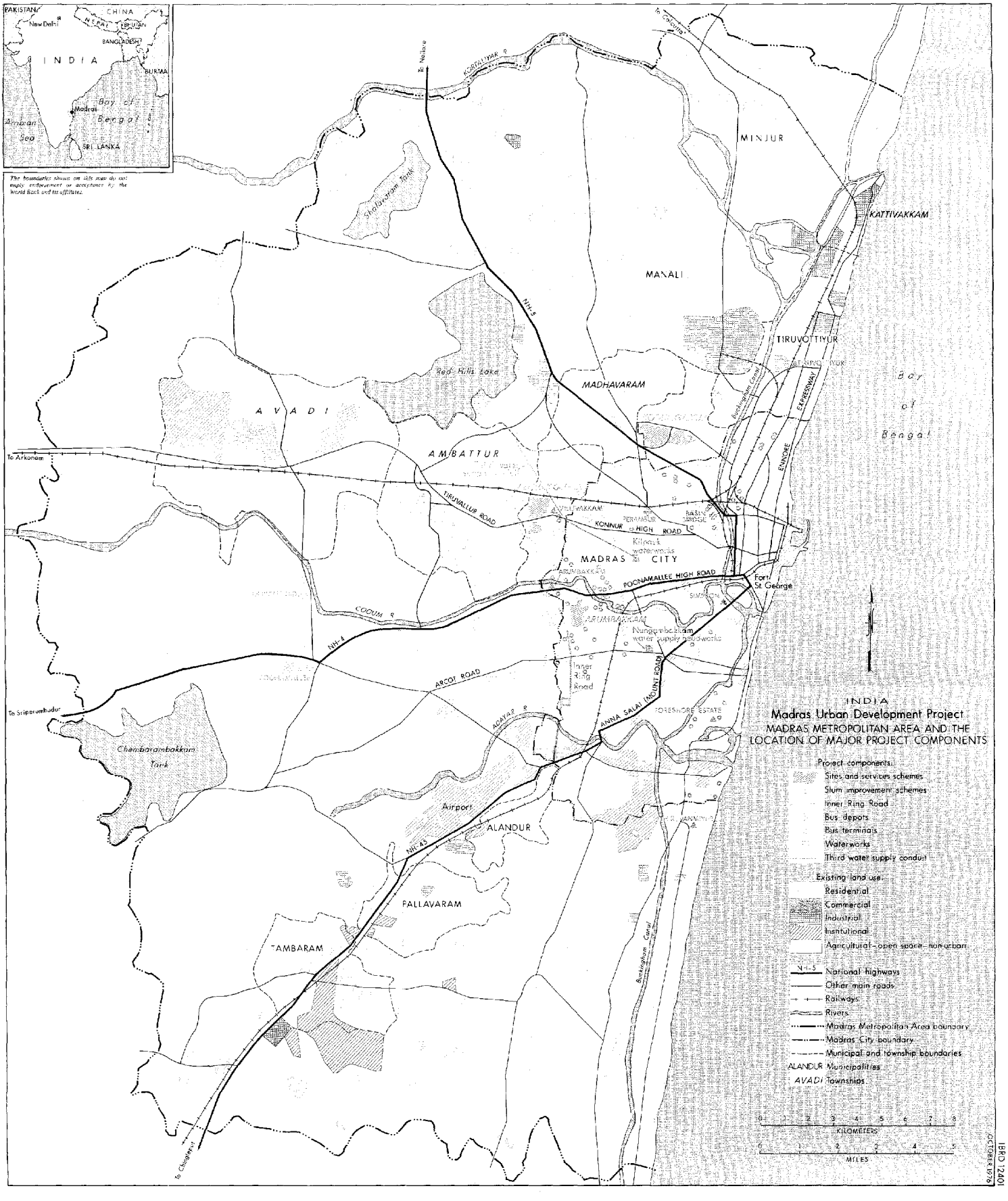
IMPROVED

INDIA
MADRAS URBAN DEVELOPMENT PROJECT
TYPICAL SLUM CONDITIONS (1)

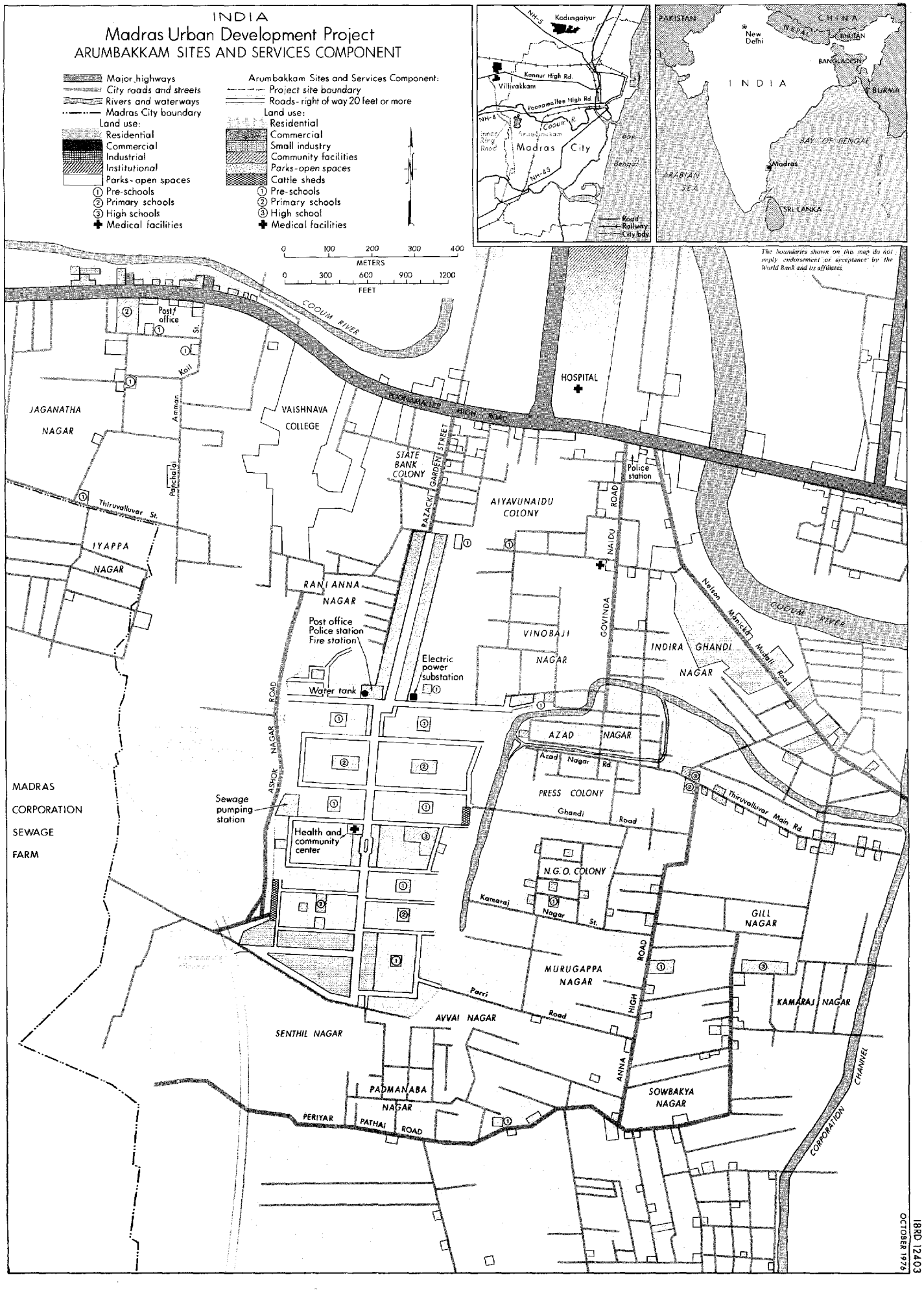




INDIA
MADRAS URBAN DEVELOPMENT PROJECT
TYPICAL SLUM CONDITIONS (2)


PAKISTAN
New Delhi
CHINA
NEPAL
BHUTAN
BANGLADESH
INDIA
BURMA
Madras
Bay of Bengal
Arabian Sea
SRI LANKA
The boundaries shown on this map do not imply endorsement or acceptance by the World Bank and its affiliates.
To Nellore
KORTALIYAR R.
To Calcutta
MINJUR
Chembarambakkam Tank
KATTIVAKKAM
MANALI
NH-5
TIRUVOTTIYUR
Red Hills Lake
MADHAVARAM
Buckingham Canal
EXPRESSWAY
ENNORE
Bay of Bengal
AVADI
AMBATTUR
To Arkonam
TIRUVALLUR ROAD
KONNUR HIGH ROAD
MADRAS CITY
Kilpauk waterworks
POONAMALLEE HIGH ROAD
Fort St George
COOUM R.
NH-4
ARCOT ROAD
Nungambakkam water supply pumping station
Inner Ring Road
ANNA SALAI (MOUNT ROAD)
To Sriperumbudur
ADAYAR R.
Chembarambakkam Tank
Airport
ALANDUR
NH-45
PALLAVARAM
TAMBARAM
To Chingleput
Buckingham Canal
INDIA
Madras Urban Development Project
MADRAS METROPOLITAN AREA AND THE LOCATION OF MAJOR PROJECT COMPONENTS
Project components:
Sites and services schemes
Slum improvement schemes
Inner Ring Road
Bus depots
Bus terminals
Waterworks
Third water supply conduit
Existing land use:
Residential
Commercial
Industrial
Institutional
Agricultural - open space - non-urban
NH-5 National highways
Other main roads
Railways
Rivers
Madras Metropolitan Area boundary
Madras City boundary
Municipal and township boundaries
ALANDUR Municipalities
AVADI Townships
KILOMETERS
MILES
IBRD 12401
OCTOBER 1978


INDIA
Madras Urban Development Project
ROAD AND TRAFFIC IMPROVEMENT COMPONENT
Project:
Inner Ring Road
Footpath and cycle tracks to be improved
Carriageways and intersections to be improved
Pedestrian subways and bridges
Minor bridges
Rail / road grade separations
Major roads (National Highways)
Other roads and streets
Railways
Rivers / canals
Madras City boundary
0 1 2 3
Kilometers
0 1 2
Miles
NH-5 GRAND NORTH TRUNK ROAD
To Nellore
To Calcutta
Tiruvottiyur High Road
Ennore Expressway
Kathivakkam High Road
Buckingham Canal
V.Mudali St.
Basin Br. Rd.
Old Jail St.
Paper Mills Road
To Arkonam
Ganz Road
Perambur H. Rd.
Cooks Rd.
Konnur High Road
New Avadi Road
Tiruvallur Road
Otteri Nullah
Brick Kiln Road
Demellons Road
Sydenhams Road
Popham's Broadway
N. Beach Road
Harbor
N.S.C. Bose Rd.
R. Bazaar Rd.
E. Bazaar Rd.
Kilpauk Garden Road
HIGH ROAD
POONAMALLEE
NH-4
To Sriperumbudur
Nelson Manickam Road
COOUM RIVER
Adams Rd.
Nungambakkam H. Rd.
ANNA SALAI
Westcott Rd.
S. Beach Rd.
Kodambakkam High Rd.
Arcot Road
Usman Road
NH-45 (Mount Rd.)
Royapetta H. Rd.
Edward Elliots Rd.
Chamiers Road
S. Canal Rd.
R.K. Mutt Road
Greenways Road
ADAYAR RIVER
Adayar Bridge Rd.
Elliots Beach Road
Besant Ave. Rd.
Buckingham Canal
NH-45
To Chingleput
Bay of Bengal
The boundaries shown on this map do not imply endorsement or acceptance by the World Bank and its affiliates
PAKISTAN
CHINA
NEPAL
BHUTAN
New Delhi
BANGLADESH
INDIA
BURMA
Arabian Sea
Madras
Bay of Bengal
SRI LANKA
IBRD 12402
OCTOBER 1976


INDIA
Madras Urban Development Project
ARUMBAKKAM SITES AND SERVICES COMPONENT
Major highways
City roads and streets
Rivers and waterways
Madras City boundary
Land use:
Residential
Commercial
Industrial
Institutional
Parks - open spaces
① Pre-schools
② Primary schools
③ High schools
✚ Medical facilities
Arumbakkam Sites and Services Component:
Project site boundary
Roads - right of way 20 feet or more
Land use:
Residential
Commercial
Small industry
Community facilities
Parks - open spaces
Cattle sheds
① Pre-schools
② Primary schools
③ High school
✚ Medical facilities
0 100 200 300 400
METERS
0 300 600 900 1200
FEET
Kodungaiyur
NH-5
Kannur High Rd.
Villivakkam
Poonamallee High Rd.
NH-4
Koovum R.
Arumbakkam
Madras City
NH-45
Bay of Bengal
Road
Railway
City bdy
PAKISTAN
CHINA
NEPAL
BHUTAN
New Delhi
BANGLADESH
INDIA
BURMA
BAY OF BENGAL
Madras
ARABIAN SEA
SRI LANKA
The boundaries shown on this map do not imply endorsement or acceptance by the World Bank and its affiliates.
COOUM RIVER
Post office
St.
Koil
Amman
JAGANATHA NAGAR
Panchali
Thiruvalluvar St.
IYAPPA NAGAR
VAISHNAVA COLLEGE
POONAMALLEE HIGH ROAD
HOSPITAL
STATE BANK COLONY
RAZACKI GARDEN STREET
Police station
AIYAVUNAIDU COLONY
ROAD
NAIDU
RANI ANNA NAGAR
Post office
Police station
Fire station
Water tank
Electric power substation
VINOBAJI NAGAR
GOVINDA
Nelson Manickam Mudali Road
INDIRA GHANDI NAGAR
COOVUM RIVER
AZAD NAGAR
Azad Nagar Rd.
PRESS COLONY
Ghandi Road
Thiruvalluvar Main Rd.
ASHOK NAGAR ROAD
MADRAS CORPORATION SEWAGE FARM
Sewage pumping station
Health and community center
N.G.O. COLONY
Kamaraj Nagar St.
GILL NAGAR
MURUGAPPA NAGAR
HIGH ROAD
Parri Road
KAMARAJ NAGAR
AVVAI NAGAR
SENTHIL NAGAR
ANNA
SOWBAKYA NAGAR
PADMANABA NAGAR
PERIYAR PATHAI ROAD
CORPORATION CHANNEL
IBRD 12403
OCTOBER 1976

INDIA

Madras Urban Development Project

VILLIVAKKAM SITES AND SERVICES COMPONENT

Major highways
City roads and streets
Railways
Canal
Land use:
Residential
Commercial
Industrial
Institutional
Parks-open spaces
① Pre-school
② Primary schools
③ High schools
✚ Medical facilities

Villivakkam Sites and Services Component:
Project site boundaries
Roads-right of way 20 feet or more
Land use:
Residential
Commercial
Small industry
Community facilities
Parks-open spaces
Cattle sheds
① Pre-school
② Primary schools
③ High school
✚ Medical facilities

Post Office
Vetnary Hospital
KONNUR
Villivakkam Railway Station
Water well and tank
Sewage pumping station
Health and community center
Post Office
Police Station
Fire Station
Burial Ground
Tiruvallur Road
Post Office
Community Hall
Konnur High Road
New Avadi Road
Post Office

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PAKISTAN
CHINA
NEPAL
BHUTAN
New Delhi
BANGLADESH
INDIA
BURMA
Bay of Bengal
Madras
SRI LANKA

NH-5
Kadungaiyur
Konnur High Rd.
Villivakkam
Poonamallee High Rd.
NH-4
Arumbakkam
Proposed Inner Ring Road
Madras City
NH-45
Road
Railway
City bdy.

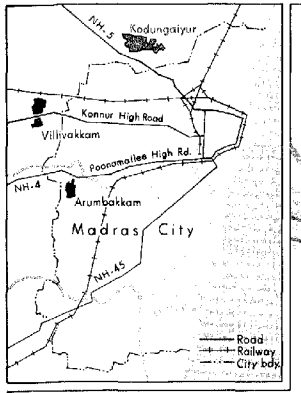
OTTERI
PULLAH

0 100 200 300 400
METERS
0 300 600 900 1200 1500
FEET

IBRD 12404
OCTOBER 1976

IBRD 12405
OCTOBER 1976

INDIA
Madras Urban Development Project
KODUNGAIYUR SITES AND SERVICES COMPONENT



Major roads
City roads & streets
Canals
Land use:
Residential
Commercial
Industrial
Institutional
Parks - open spaces

Kodungaiyur Sites & Services Component:
Project site boundary
Roads-right of way 20 feet or more
Land use:
Residential
Commercial
Small industry
Community facilities
Parks - open spaces
Cattle sheds
① Pre-school
② Primary schools
③ High schools
✚ Medical facilities

Thiruvalluvar Street
Sewage pumping station
CORPORATION SEWAGE FARM
Manali Road
Existing burial ground
Health & community center
Kodungaiyur Village Road
Madavaram High Road
G.N.T. Road
NH-5
Tandiarpet High Road
Erukanchery High Road
Madavaram High Road
Bridge

0 100 200 300 400
METERS
0 300 600 900 1200
FEET

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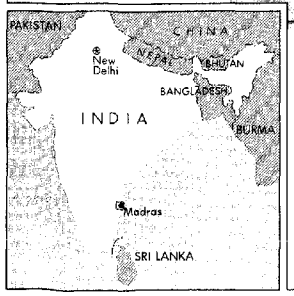
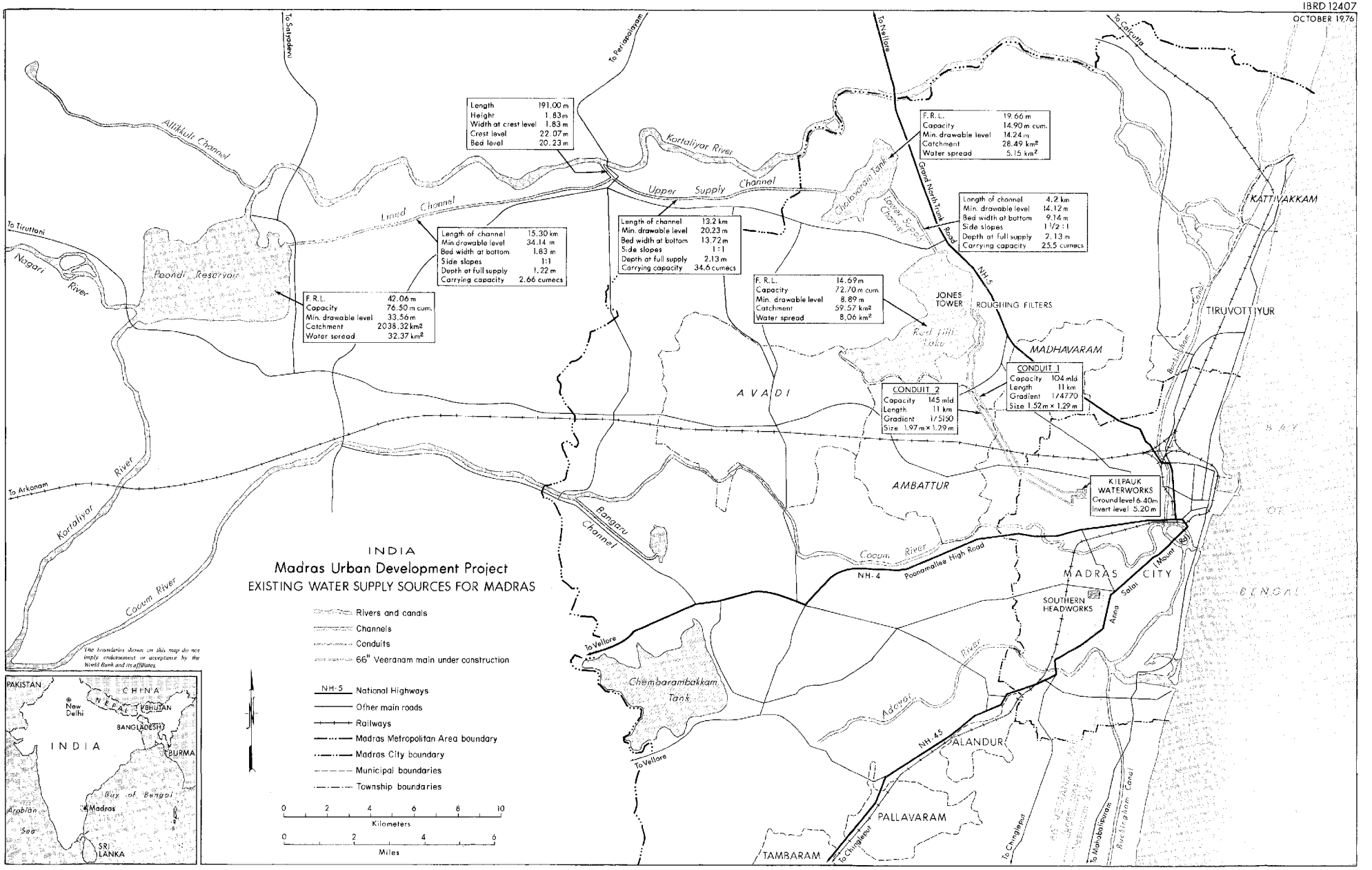
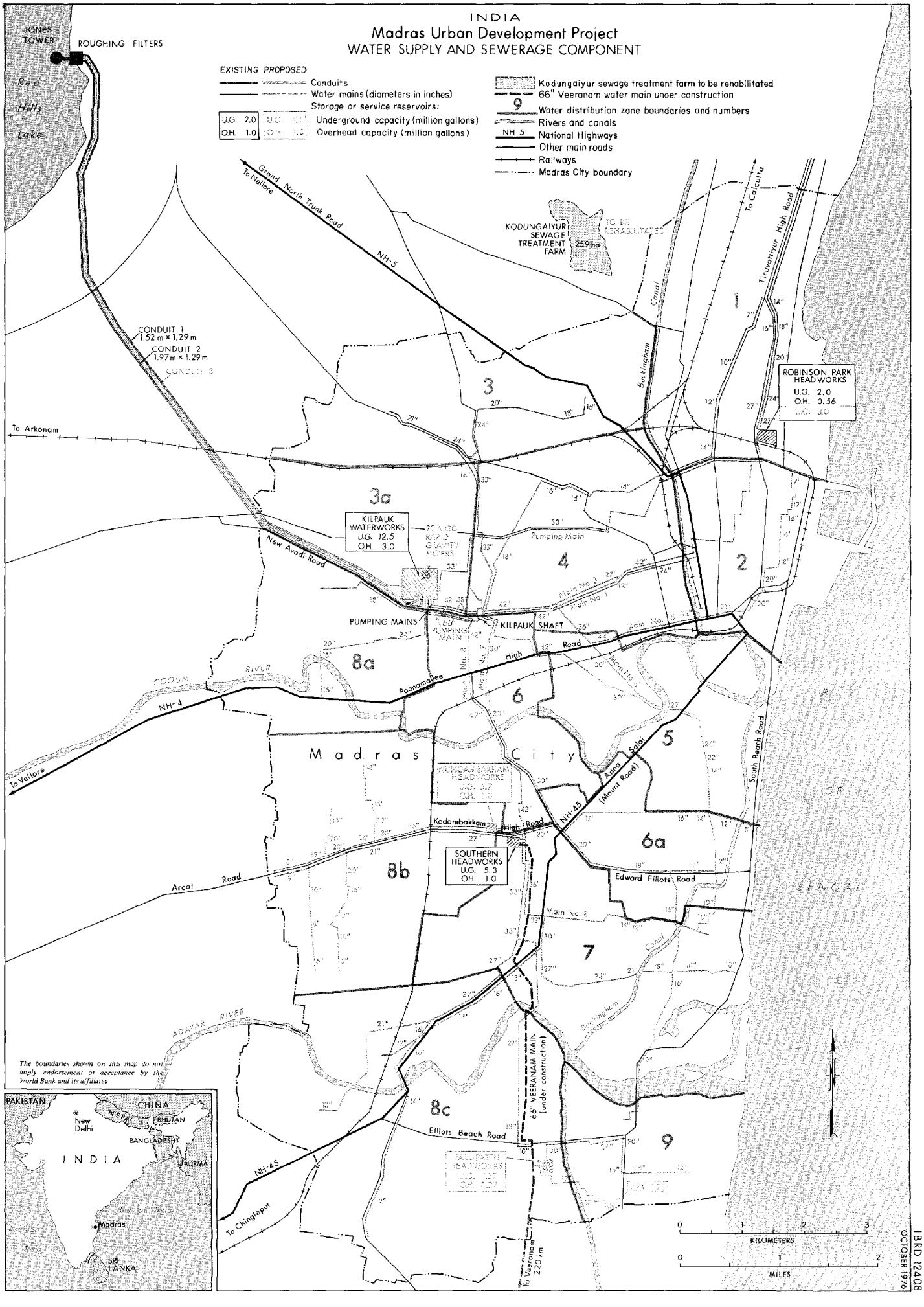


IBRD 12407
OCTOBER 1976





IBRD 12408
OCTOBER 1976