

DOCUMENT OF THE INTER-AMERICAN DEVELOPMENT BANK

BRAZIL

**SMALL DRAINAGE PROGRAM FOR THE PREFECTURE OF THE MUNICIPALITY
OF SAO PAULO**

(BR0077)

**PROJECT REPORT
4 DECEMBER 1986**

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ANNEXES

GLOSSARIO

ORGAOS OU ENTIDADES DO GOVERNO FEDERAL

BACEN	-	Banco Central do Brasil
BNH	-	Banco Nacional de Habitação
CEF	-	Caixa Econômica Federal
DNAEE	-	Departamento Nacional de Águas e Energia Elétrica
DNER	-	Departamento Nacional de Estradas de Rodagem
DNOS	-	Departamento Nacional de Obras e Saneamento
FAS	-	Fundo de Assistência Social
FDU	-	Fundo de Desenvolvimento Urbano do Banco Nacional de Desenvolvimento Econômico e Social
FIDREN	-	Fundo para Projeto de Drenagem e Saneamento
FINAME	-	Agência Especial de Financiamento Industrial do Banco Nacional de Desenvolvimento Econômico e Social
FINANSA	-	Programa de Financiamento para Saneamento
FIRCE	-	Departamento de Fiscalização e Registro de Capital Estrangeiro do BACEN
PGFN	-	Procuradoria Geral da Fazenda Nacional
PLANASA	-	Plano Nacional de Saneamento
SAREM	-	Secretaria de Articulação com Estados e Municípios SEPLAN
SEPLAN	-	Secretaria de Planejamento da Presidência de República
STN	-	Secretaria do Tesouro Nacional do Ministério da Fazenda
SUBIN	-	Secretaria de Cooperação Econômica e Técnica Internacional

ORGAOS OU ENTIDADES DO GOVERNO ESTUADUAL

BANESPA	-	Banco do Estado de São Paulo
CEDEC	-	Coordenadoria Estadual de Defesa Civil
CETESB	-	Companhia de Tecnologia de Saneamento Ambiental
CODEGRAN	-	Conselho Deliberativo da Grande São Paulo
CONSULTI	-	Conselho Consultivo de Desenvolvimento integrado da Grande São Paulo
DAEE	-	Departamento de Águas e Energia Elétrica de Estado de São Paulo
DERSA	-	Empresa do Desenvolvimento Rodoviário, S.A.
DER/SP	-	Departamento de Estradas de Rodagem do Estado de São Paulo
ELECTROPAULO	-	Eletricidade de São Paulo
EMPLASA	-	Empresa Metropolitana de Planejamento
SABESP	-	Companhia de Saneamento Básico do Estado de São Paulo

ORGAOS OU ENTIDADES DO GOVERNO MUNICIPAL

AR	-	Administração Regional
		BT: Butantã
		CL: Campo Limpo
		FO: Freguesia do O
		IG: Itaquera
		IP: Ipiranga
		LÁ: Lapa
		ME: São Miguel Paulista - Ermelio Matarazzo
		MG: Vila Maria - Vila Guilherme
		MO: Mooca
		PI: Pinheiros
		PR: Pirituba
		SA: Santo Amaro
		SE: Sé
		ST: Santana
		VM: Vila Mariana
		VP: Vila Prudente
		PE: Penha
		PU: Perus
		CS: Capela do Socorro
		GU: Guaianazes
		CV: Casa Verde

CET-	-	Companhia de Engenharia de Tráfego
CMTC	-	Companhia Municipal de Transportes Coletivos
COBES	-	Coordinadoria do Bem Estar Social
COHAB	-	Companhia Metropolitana de Habitação
DECOR	-	Departamento de Economia e Orçamento da SEMPLA
DEPLAM	-	Departamento Municipal de Planejamento da SEMPLA
DS	-	Departamento de Operações do Sistema Viário
EMURB	-	Empresa Municipal de Urbanização
FABES	-	Secretaria da Família e Bem Estar Social
FUNAPS	-	Fundo de Atendimento a População Moradora em Habitação Sub-Normal
IGF	-	Inspetoria Geral de Finanças da SP
PMSP	-	Prefeitura Municipal de São Paulo
SAR-ATOS	-	Assessoria Técnica de Obras e Serviços de SEGESP
SEHAB	-	Secretaria de Habitação e Desenvolvimento Urbano
SEMPLA	-	Secretaria Municipal de Planejamento
SEGESP	-	Secretaria Geral das Subprefeituras
SF	-	Secretaria das Finanças
SMT	-	Secretaria Municipal de Transportes
SOV	-	Superintendencia de Obras Viárias da SVP
SPV	-	Superintendencia de Projetos Viários da SVP
SVP	-	Secretaria de Vias Públicas
TES	-	Departamento do Tesouro da SP
TPCL	-	Cadastro para Lançamento do Imposto Territorial, Predial, de Conservação e Limpeza

mm	=	milímetros	=	0.04 pulgadas
cm	=	centímetros	=	0.39 pulgadas
m	=	metro	=	3.28 pies
Km	=	Kilómetro	=	0.62 millas
Km2	=	Kilómetro cuadrado	=	0.39 millas cuadradas = 100 hectáreas
l	=	litro	=	0.26 US galones
m3	=	metro cúbico	=	264 US galones = 35.3 pies cúbicos
m3/s	=	metro cúbico x segundo	=	22.82 MGD (millones US galones por día)
m3/s	=	metro cúbico x segundo	=	1000 litros x segundo = 86.400 m3/día = 31.54 Mm3/año
Kg	=	Kilogramo	=	2.2 libras (lb)
Ton	=	1000 Kg	=	2.200 libras (lb)
l/s/ha	=	litro por segundo por hectárea por acre	=	39.2 gals por minuto
mm/minuto de lluvia	=	167 l/s x ha.		

TASA DE CAMBIO

Tasa de cambio	=	14,02 Cruzados (C ^z por 1 US\$)
<u>Año Fiscal de Gobierno</u>	=	1o. Enero - 31 Diciembre
<u>Ciclo de Planificación</u>	=	5 años
<u>Presente Plan Quinquenal</u>	=	1985 - 1989

I. INTRODUCTION

A. Background Information on the Program

- 1.01 The current population of the Municipality of São Paulo, which is estimated to be 10 million inhabitants, accounts for 75% of the population of the Metropolitan Region (RMSP) and almost 30% of the State of São Paulo. The population growth on record has historically been one of the highest in the country. It is estimated that the number of inhabitants will reach 16 million by the year 2000.
- 1.02 Clearly, a population of that size that continues to increase rapidly creates urban pressures. Hence, what are known as "diseconomies of agglomeration" multiply in all areas of the urban system, giving rise to their more notorious effects in terms of: (i) inadequate basic services for the population, expressed in major shortages of, for example, drinking water, sanitary sewers, health posts, schools, etc., growth of which is unable to keep pace with needs; (ii) insufficiency of infrastructure services, reflected in problems of traffic congestion, inadequacy of public transportation, communications, electricity services, etc.; (iii) shortage of proper housing for large segments of the population; and (iv) an increasing deterioration in the environment, reflected especially in the pollution of watercourses, the atmosphere, the disappearance of green areas, etc.
- 1.03 With regard to the sanitation sector, the Municipality of São Paulo has been devoting considerable effort to increasing basic services such as drinking water and sanitary sewers as well as rainwater drainage and environmental hygiene works required for this rapid historical and projected population growth.
- 1.04 To date, the city of São Paulo is able to provide drinking water for more than 90% of the population. The Metropolitan Region of São Paulo has a US\$1.5 billion five-year investment program for basic sanitation works, including the execution of large-scale projects to increase the level of treatment of sewage from 12% as it now stands to 50% in 1990. This would benefit the city dwellers, São Paulo being part of the Metropolitan Region of São Paulo.
- 1.05 The Bank is, for its part, helping to partially cover needs that are the most pressing because of the shortage of basic services in São Paulo. A study of a sewerage program (BR-0074) is under way to that effect. That program aims at increasing the coverage of sanitary sewers from 50% to 65%. To do so, approximately 3,600 Km of networks, 186 Km of main collectors and 240,000 house connections will be built. The total cost is US\$408.0 million and the Bank will assist with a foreign currency loan of US\$163.0 million.
- 1.06 Despite efforts, the city is still unable to provide adequate coverage in terms of services and environmental control. One of the most

serious problems in this area is flooding, which occurs periodically because of inadequate micro- and macro-drainage works and the improper maintenance of existing ones. This precarious situation has negative effects on the health of the population and causes residents of the banks of brooks some measure of economic loss.

- 1.07 This happens because, in the specific case of the city of São Paulo, the problems referred to combine with a topography of small valleys and hills through which numerous watercourses flow. The pressure of urban development has provoked "bottlenecks" or soil impermeability in many of these catchment basins. Because rainwater drainage systems have not been expanded, numerous flood points are created, thereby affecting a large number of families each year.
- 1.08 A solution to these drainage problems in the numerous valleys of the city would also make it possible to put into condition one of the scarcest of urban resources for other uses, the land. Headway would thereby be made towards solving another problem linked to urban development, which is that of controlling and organizing the voluminous traffic of vehicles.
- 1.09 The scarcity of land is, in many cases, a crucial factor when considering the development of expressways or arterial streets in the city. It is therefore of the utmost importance that alongside environmental control measures, efforts seek to make full use of these valleys for development of the highway infrastructure. Both planning objectives will thereby be served at a minimal cost.
- 1.10 The program proposed in this document therefore includes the execution of both types of works, since a partial contribution would thereby be made to solving, simultaneously the problem of inadequate rainwater sewerage services, and improving traffic conditions in the city.

B. The Proposed Program

- 1.11 The proposed program under study in this document provides for the execution of priority microdrainage works in the Municipality of São Paulo. This would include the building of canals, galleries, and ways as well as the purchase of maintenance equipment for the drainage system. The total cost of the program has been estimated at the equivalent of US\$207.5 million. Of this amount, the Bank would contribute the equivalent amount of US\$77.5 million from its interregional capital, in foreign currency. The local contribution in the equivalent amount of US\$130.0 million would come from a loan from the Banco Nacional de Habitación (BNH) and from budgetary resources from the Municipal Prefecture of São Paulo, in equal parts.
- 1.12 The proposed program is a response to the most pressing needs and seeks to eliminate and/or diminish critical points of flooding that frequently occurs and causes much material loss, traffic interruptions, and in some cases, loss of human lives. The program would thereby help to improve the quality of life of approximately 1.8

frequently occurs and causes much material loss, traffic interruptions, and in some cases, loss of human lives. The program would thereby help to improve the quality of life of approximately 1.8 million people residing in the area of influence of the program, in other words, approximately 18% of the population of the municipality.

C. Status of the Program

- 1.13 This global multiple-works program is backed up with socioeconomic and engineering studies for the representative sample of the works that constitute the program. That sample consisted of four microdrainage projects that represent, in value, 39% of the total direct costs of the program. The engineering studies of that representative sample would make it possible to call for immediate bidding for the purchase of equipment and materials as well as the construction of works.
- 1.14 The cost estimate has taken into account all components of the program. It is based on updated costs of the PMSP for works of comparable magnitude and complexity. For the forecast regarding internal and external inflation and exchange rates, the Bank's indicators have been used. The execution of works under the program has been planned accordingly and the extent of those works, in terms of numbers of annual investment, is compatible with the technical and administrative capacity of the PMSP, and compares favorably with former experiences by the company in this type of program. It is also felt that the financial resources earmarked for the program would be effectively managed and that local matching resources would be forthcoming in due course. Consequently, no institutional or financial problems that might affect implementation of the program proposed in this document are anticipated.
- 1.15 As regards socioeconomic aspects, the microdrainage projects have been chosen in such a way as to include those areas that have top priority, where the impact of the works on the population is maximized. This is demonstrated in the cost-benefit analysis of the representative sample, that makes up the program. There, the benefits were quantified by estimating the value accruing to the buildings affected, for the canalization component, and the savings in the cost of operating vehicles and time savings to users, for the highway component of the program. It was confirmed, as a result of the economic analysis, that all projects under the representative sample have an internal economic rate of return of over 12%. Details of that economic analysis are given in chapter VI of this report.

D. Application and Priority

- 1.16 The loan application was submitted to the Bank, through communication from the Secretariat of Public Ways of the State of São Paulo, on March 5, 1986. The priority granted to the Program by the Secretariat of International Economic and Technical Cooperation (SUBIN) was transmitted to the Bank.

E. Missions

- 1.17 During the month of February 1986, the Bank sent an Orientation Mission to São Paulo to confer with the appropriate authorities of the PMSP regarding preparation of the documentation in support of the loan application. The corresponding Survey Mission was conducted between October 4 and 18 of this year.

F. Conclusions

- 1.18 This micro-drainage program for the Municipality of São Paulo is considered necessary in order to improve the living conditions of the people affected by floods and environmental problems in critical points of the city, and also to improve traffic conditions in the area of the program. Also, the program reviewed is considered to be duly justified from the technical, financial and economic standpoints, as discussed in further detail in the following chapters.

II. FRAME OF REFERENCE

A. Introduction

- 2.01 As noted in chapter I of this report, the problem of flooding in the Municipality of São Paulo, and particularly in its urban areas, has become one of the focal points of the agencies called upon to address this problem. This has translated into activities, at both the level of macrodrainage and microdrainage of the system, the latter being part of the objective of the project under study. Works at this microdrainage level would, further, make it possible to expand the highway network in the city. This is why the program also provides for the building of roads parallel to the canalization works.
- 2.02 Macrodrainage works are considered, in this case, to be those carried out by state agencies in the three main rivers affecting the urban part of the city: Tieté and its two tributaries, Tamandareí and Pinheiros. These works consist, essentially, of rectifying, expanding and deepening the river beds and building dams and other related works and pumping stations.
- 2.03 The microdrainage works also refer, in this case, to complementary works executed by the prefectures of the State of São Paulo in small brooks. These works are in the area of canalization and closed conduits in the brooks and/or small rivers that drain these catchment basins, openings or inlets to stormwater sewers, ditches or curbs, piping of 40 cms and more, as well as manholes.

B. Environmental Problems of the Municipality and City of São Paulo

- 2.04 The Municipality of São Paulo is one of the 38 into which the Metropolitan Region is divided. It covers an area of 1,370 km² and is home to 75% of the population of the Metropolitan Region of São Paulo (10 million inhabitants). It has a high rate of population growth, which one can expect to reach 16 million by the year 2000. The urban area, which is just over 900 km² occupies nearly 70% of the area of the municipality.
- 2.05 Rapid industrialization that swept the country after 1930 grew out of the City of São Paulo, which transformed this urban center into one of the largest in the country. That trend has quickened pace as time as passed.
- 2.06 Thus, from the standpoint of public finances, the city has the largest municipal budget in the country, and, also ranks fifth in comparative terms, after the Union and the States of São Paulo, Rio de Janeiro and Minas Gerais. The City of São Paulo is also accounts for 18% of the country's GNP and 20% of taxes brought in at the federal, state and municipal levels.

- 2.07 This enormous financial and industrial importance is such that the problems facing the city have huge repercussions at the national level. At the same time, the city's limitations, both in terms of the environment and the availability of land to be occupied have an effect that supersedes the parameters of the city.
- 2.08 Despite its substantial resources, they often fall short of meeting the needs of a large population, needs that translate into a demand for a large number and variety of services, such as transportation, sanitation, health, public utilities, etc.
- 2.09 In the area of sanitation, while drinking water coverage is high, much remains to be done as regards increasing the coverage of water treatment, and sewerage and environmental control and drainage services. With regard to this latter aspect, because of high damages incurred each year in the city during the high rainy season and the effects on the health of the population and the environment, drainage problems are significant at both the macro- and microdrainage levels. Thus, periodic and of times catastrophic floods cause tremendous loss and damage to property and result in the spread of epidemic diseases. A program that provides for the rational application of resources is, therefore, essential as it seeks to serve, on a priority basis, the most critical areas, and propose, to the extent possible, simple and economic solutions.
- 2.10 With the rapid pace of urban development and the disorganized pattern it has taken, the disruption caused by rains is a yearly occurrence with serious dramatic effects on vast areas that are subject to flooding, soil erosion and mudslides. These problems are especially exacerbated with improper occupation of the land. The beds are invaded by buildings that go up to the banks of the watercourses whereas marginal lands are divided up into lots without any ensurance for occupants, generally in the low-income category of infrastructure to guard against erosion or landslides.
- 2.11 Another major and systematically recurring problem is that not all drainage structures (canals, crossing, microdrainage, etc.) are subject to periodic maintenance by the responsible government agencies. This, with the access and sediments from the erosion and indiscriminate disposal of waste by the population further aggravates the problem of flooding. In addition, planning becomes difficult because of a faulty cadastre of drainage works. Because of this, the municipality loses control of part of its drainage system, in addition to which periods maintenance is rendered difficult.

C. Macrodrainage in the Municipality and City of São Paulo

- 2.12 The principal rivers that cross the city are Alto Tieté, Pinheiros and Tamanduateí. There are other rivers of importance in the Metropolitan Region of São Paulo; however, their drainage basins do not exert any influence on the city, as is the case of the Paraíba, Juquiá, Sorocaba and Jundiá rivers.

- 2.13 Macrodrainage in the City of São Paulo is the responsibility of the state government, through the Department of Water and Electric Energy (DAEE), in the Tieté and Tamanduateí rivers, and Electropaulo, in the Pinheiros river, since this latter river is also used for energy purposes.
- 2.14 Since macrodrainage control works have an influence on the areas affected by microdrainage, below is a brief description of the situation regarding the rivers and the works executed in them, even though some of these works are physically located outside the city.
- 2.15 It should be noted that with the works already executed and under way and those programmed up to 1993, the Government of the State expects to reduce the risks of flooding in these rivers.

1. Situation with regard to the Tieté river

- 2.16 The Alto Tieté basin is formed by the drainage area relative to the section of the Tieté river where the Pirapora dam is located. It drains a total area of 5,720 km² and reaches, entirely or partially, 34 of the 38 municipalities.
- 2.17 This basin is the most important of the catchment basins in the Metropolitan Area of São Paulo, not only because of its geographical size but especially because of the interrelationship of its rivers with the complex urban network, which results in serious sanitation and flood problems and because much of the water used or to be used for supplying the metropolis comes from existing or projected reservoirs.
- 2.18 The annual average flow of the river Tieté in Pirapora, that is to say, the natural available flow in the basin of the Tieté river, is 87/m³/s. Of this, nearly 50 m³/s cannot be used for supply and recreational purposes because of the high level of pollution. This natural flow can drop to 6 m³/s in mayor low water periods and can rise to 1,500 m³/s in major floods.
- 2.19 The river crosses the eastern and western region over an area of more than 120 km and has been subject to numerous interventions in four decades. Noteworthy here are the Pirapora, Edgar de Souza, Peña, Taiacupeba, Jundiaí and Ponte Nova dams. Also, the DAEE expanded the bed of the river Tieté thereby increasing its width and depth over a stretch of 12 km and increasing its capacity from 500 to 700 m³/s. Additionally, to reduce flooding on the banks of those rivers, especially on the stretch between Edgar de Souza and Peña, two floodgates have been built on the Edgar de Souza dam with a capacity of up to 1,200 m³/s.
- 2.20 At present, works are under way to expand the bed of the river Tieté in the following stretches.

Mouths of the Rivers

Flow m3/s

(1) From the River Aricanduva up to the river Tamanduateí	455
(2) From the River Tamanduateí to Pinheiros	728
(3) From the River Pinheiros to San Juan de Barueri	1,078
(4) From San Juan de Barueri to the Edgar de Souza dam	1,160

- 2.21 The bidding documents to widen and extend the depth of the bed of the Tieté river from 2.5 to 3 mts between the Edgard de Souza dam and the River Pinheiros over a 20 km stretch are being prepared. The estimated cost of the works is US\$150 million. At a later stage, the DAEE plans to further extend the width of that river bed on another 25 km stretch, which will increase the river's transportation capacity to 1,000 m3/s. The work for the first and second stages will take four years, from 1987 to 1990.

2. Situation with regard to the Tamanduateí river

- 2.22 From 1978 to date, the DAEE has been expanding the capacity of the river from 130 to 484 m3/s; 7.4 km have been canalized, from the mouth of the river Tieté up to the Ipiranga brook, and the 5 km stretch between that brook and the Dos Meninos river is under construction.
- 2.23 Works in progress by the DAEE in this river are intended to improve run off conditions through canalizations that would increase its capacity considerably. One can assume that São Paulo will be free from flooding from the Tamanduateí river, since under the works in progress, the hydraulic section of the new canal was outfitted to absorb 484 m3/s where it meets with the Tieté river (the current flow is 130 m3/s). The period of recurrence used for the design parameter was 500 years and a 70% basin urbanized was considered.
- 2.24 In some stretches of the Tamanduateí river, works have already been completed, mainly from where it meets the river Tieté to the Ipiranga brook, over a length of 7.4 Km. An upstream stretch of 5 km, up to the Dos Meninos river, is under construction.

3. Situation with regard to the Pinheiros river

- 2.25 This river is fully canalized and is operated and maintained by ELETROPAULO, which has two elevating stations of 27/m3/s to reverse the flow of water and to take the water from the Tieté river to the Billings reservoir and then to the Das Pedras reservoir, which is used for hydroelectric power production in Cubatão through use made of a difference in elevation of 700 m at the Santista descent.
- 2.26 ELECTROPAULO has been expanding pumping capacity in the river. It has increased that capacity from 270 to 320 m3/s at the Traicao and Pedreiras stations, and conducted the waters to the Billings reservoir. In the flood season, the Tieté river is isolated from the Pinheiros river and therefore flooding does not occur on its banks.

D. Microdrainage in the Municipality and City of São Paulo

- 2.27 The Prefecture of the Municipality of São Paulo (PMSP) has full responsibility for all of the projects, works and maintenance of the watercourses that flow within the municipality, through its Secretariat of Public Ways, which is responsible for planning, executing and supervising all public canalization works with respect to watercourses and complementary services.
- 2.28 The PMSP finances its works with internally generated funds and through loans from the Banco Nacional de Habitación (BNH), through a special credit line known as the Fund for Drainage and Sanitation Projects (FIDREN - Fondo para Proyectos de Drenaje y Saneamiento).
- 2.29 For purposes of project preparation, construction, operation and maintenance of the drainage works and to provide the population with a more immediate and effective service, the city has been divided into 21 Regional Administrations. The total area of the existing brooks and small rivers in those Regional Administration is approximately 1,552 km in which 54 principal basins are located, with more than 20 m³/s at the mouth of the receiving watercourse. Details are given in Appendix II-2.
- 2.30 Of the 1,552 km of brooks in the entire Municipality of São Paulo, 1,000 km are located in the currently urbanized area, and the rest, essentially in the area of protection of the springs. The PMSP has been canalizing the brooks and/or small rivers that have greater capacity, particularly those that are located in the lower sections that drain the entire catchment area. Their design flow for rain with a 25-year return frequency varies from 20 to 260 m³/s. It is estimated that 40%, that is to say, 400 km within the urbanized area, corresponds to small brooks or tributaries of small rivers, with flows under 20 m³/s and that therefore canalization and piping are not necessary, save for some exceptions, when the extent of urban development and intensity of land use justify it.
- 2.31 Below is a table on the situation regarding the microdrainage system in the Municipality of São Paulo:

<u>Brooks</u>	<u>Length in Kilometers</u>		
	<u>Municipality</u>	<u>Area</u>	<u>Urbanized area and area of protection of springs</u>
Total length of brooks	<u>1,552</u>	<u>1,000</u>	<u>552</u>
Brooks that cannot be canalized because flows are under 20 m ³ /s	600	400	200
Brooks canalized with flows between 20 and 260 m ³ /s	352	350	-
Brooks to be canalized	600	250	

- 2.32 To date, of the 600 km that can be canalized in the urban area of São Paulo, the Prefecture has already executed works on a total of approximately 350 km, which represents 58% coverage. The remaining 250 km, located in 36 of the 54 brooks referred to earlier, show approximately 300 critical flood points. There is a total of approximately 2.5 million people in the area of influence of these brooks. The area of influence of these 300 points, which still need to be controlled, covers 85,300 has.
- 2.33 At present, because of the shortage of equipment, the Prefecture is taking great pains to do the maintenance work on 1,000 km of brooks in the urban area, the 350 km that are lined and the 650 km still not lined, through the General Secretariat of Subprefectures. Each year, it maintains and cleans approximately 120 km of brooks and, on contract, another 180 km. In other words, a total of 300 km have been taken care of. This is considered unsatisfactory since the ideal coverage targeted should be close to 40%, in accordance with the parameters established by MPSP.
- 2.34 Because the garbage collection and disposal service does not reach the entire urban area, the PMSP, through three private firms that are engaged in such activities, collect approximately 72% of garbage from homes and 60% of industrial trash. Under its short- and medium-terms plans, the PMSP plans to extend that service for garbage collection and disposal to 80% in 1989 and to 90% after 1991.
- 2.35 While the level of service in the area of garbage collection, could be improved, it is among the highest in the major cities of Latin America. During 1986, the "Refuse Collection Rate", for garbage collection and disposal, the cleaning of brooks, small pipes and inlets to stormwater sewers that can paid for jointly with the invoice of the real state and urban territorial tax (impuesto predial y territorial urbano - IPTU) would reach the equivalent of US\$17.6 million in 1986.

E. The Environmental Control and Flood Program in the Municipality of São Paulo

1. Background

- 2.36 The environmental control and flood program of the City of São Paulo is governed by Deliberation 1 of October 10, 1983, of the Deliberative Council of Greater São Paulo (Consejo Deliberativo del Gran São Paulo - CODEGRAN), which establishes the guidelines for the entire Metropolitan Region.
- 2.37 That Deliberation, which considers solving the problem of flooding as a priority, approved the basic guidelines for a short- and medium-term plan to combat and control flooding, both at the level of macrodrainage and microdrainage.
- 2.38 From the standpoint of Macrodrainage, this Program considers 18 activities, five of which have been executed in their entirety, and

another five of which are under way. Studies on eight have either been completed or are in the works.

- 2.39 Among the principal works completed is the lateral canal and floodgates of the Edgard de Souza dam, extension of the depth of a stretch of the Tieté river, the operation of the Penha dam, an increase in the pumping capacity of the Pedreira station in the Pinheiros river and conclusion of the works on the Tamanduateí river.
- 2.40 With regard to works under way, note should be made of the dredging of the Tieté and Pinheiros rivers; canalization of the Tamanduateí river up to the Oratorio creek, including clearing works at the crossing of the Ribeirão Dos Meninos; and expansion of the canal of the Tieté river, between the crossing of the Pinheiros and Tamanduateí rivers.
- 2.41 As regards works under study for future execution, noteworthy are those relative to the dikes and drainage on the Anhanguera, Casa Verde, Bandeiras and Cruzeiro do Sul bridges in the Tieté river; improvement of the telemetric hydrology network, maximization of the existing hydraulic structures connected to flooding aspects; incorporation, at the level of the Special Committee coordinating preparation of the Bill on land use, of the government bodies and municipal Prefectures in charge of preventive and supervisory action in attempts to combat flooding, and the conclusion and operation of the Jundiá and Taiacupeba dams.
- 2.42 As regards Microdrainage, the Program plans to strengthen activities for maintenance of 1,000 km of existing brooks in the area; establishment of an emergency program to control the situation regarding those points that require more immediate action and for which simple solutions may be identified; and canalization of 250 km of brooks pending construction.
- 2.43 Maintenance activities in the area of drainage are intended to prevent the disposal of detritus in the watercourses, either through educational campaigns or through the proper operation of garbage collection services, in addition to meeting the need to set up drainage and erosion control structures on lots or in earthworks.
- 2.44 The emergency flood control program, included under the microdrainage activities, also provides for measures to prevent or alleviate damage to the flooding of watercourses that could be considered minor in terms of magnitude. The purpose of the proposed work in this field is to minimize disruptions caused by floods, erosions and landslides through the coordinated action of several organs that have responsibilities with regard to this problem and thereby install develop a whole set of structures, not considered permanent, but that would make it possible to prepare for flood problems that repeatedly occur at the same points during the rainy season.
- 2.45 With regard to the proposed works for the canalization of 250 km still pending construction in the brooks, works for controlling the following expenses in the urban area, are proposed:

<u>Brooks</u>	<u>Urban Area</u> (km)
To canalize, in flows between 20 and 260 m ³ /s	250
16 subject to canalization in the next four years	58
6 with interference with neighboring municipalities	24
Others subject to canalization in the medium- and long-term	168

- 2.46 With regard to the area subject to canalization in the next four years, one part, extending over an area of approximately 43 km, would constitute the program to be financed by the IDB. The remaining part, 15 km, would be executed by the Prefecture of São Paulo with internally generated resources.

F. The Transportation Sector in the Municipal Prefecture of São Paulo

1. Background

- 2.47 The expansion of the City of São Paulo has historically taken place through highways that linked it to other cities and regions such as Rio de Janeiro, Santos, Campinas and Sorocaba. A feature of this urban development pattern is that it has a small number of structural roads set up around the principal pole, which is the City of São Paulo.
- 2.48 The exiting highway system reflects a lack of continuity in many of its main roadways, giving rise to insufficient highway connections between neighborhoods on the periphery and between the large avenues that start in the central area of the city. This situation is aggravated by the nonexistence of complementary highways in areas that are as yet unoccupied. In this context, lands adjacent to brooks that are not canalized present themselves as a good alternative to build new main highways. These could be built at the same time that the respective brooks are canalized thereby increasing the benefits of the works and reducing the costs as compared to if they were to be built individually.

2. The existing transportation system

- 2.49 The transportation system for the City of São Paulo is made up of various modes of ground transportation (highway, railroad and metro).

(a) The highway system

- 2.50 The highway system is composed of federal, state and municipal highways. The federal and state highways form the principal interstate, interregional and intermunicipal connections. The municipal highways serve all of the internal traffic of the municipality and provide linkages with the neighboring municipalities.

- 2.51 The federal highways are the responsibility of the Departamento Nacional de Estradas de Rodagem - DNER (National Highway Department), which takes charge of building, operating and maintaining the three federal highways connecting the Municipality of São Paulo: Presidente Dutra (São Paulo-Rio de Janeiro); Fernão Dias (São Paulo-Belo Horizonte) and Regis Bittencourt (São Paulo-Curitiba).
- 2.52 The state highways are built by the Highway Development Company (Desarrollo Rodoviario, S.A. - DERSA). The Department of Highways of the State of São Paulo is responsible for operating and maintaining those highways.
- 2.53 The municipal highway network is made up of expressways, main arteries, connecting highways, secondary and local highways. The Municipal Prefecture of São Paulo (PMSP) has full responsibility for all of the municipal network as regards plans, projects, works, maintenance and operation.

(b) Railroad system

- 2.54 The railroad system consists of federal and state lines. The PMSP does not participate in building, maintaining and operating the system. The federal lines are built and maintained by the Federal Railroad Network (Red Ferroviaria Federal, S.A. - RFSA), which operates the cargo and passenger transportation service for long distances. Operation of the suburban passenger transportation services is in the hands of the Companhia Brasileira de Trens Urbanos (CBTU). The suburban system consists of three lines with 46 stations and a total of 169 km.
- 2.55 The state lines are built, maintained and operated by the Ferrovia Paulista (FEPASA) which operates both the cargo and passenger service. The suburban system has two lines with 29 stations and a total of 52 km.

(c) Metro system

- 2.56 The State of São Paulo is responsible for operating and maintaining the metro system. It is operated by the Metropolitan Company of São Paulo (METRO), which is connected with the Secretaria de Negocios Metropolitan's. METRO currently operates two lines with 28 stations and a total of 25 km.

(d) Air system

- 2.57 Commercial air transport has two main airports: Congonhas within the Municipality of São Paulo, and Cumbica, within the Municipality of Guarulhos.

3. Daily transportation demand

- 2.58 The daily demand for passenger transportation in the Municipality of São Paulo was distributed according to the various modes of transport in 1983, in accordance with the figures of the following table. As may be observed from that table, there is a preponderance of public transportation (64.3%) within the total travel, in which buses account for 50.7% of travel.

Distribution of Daily Demand for Transportation
in the Municipality of São Paulo - 1983

<u>Type of Transportation</u>	<u>Travel per Person per Day</u>	
	<u>Absolute Numbers</u>	<u>Percentage</u>
METRO		
North/south line	837,000	6.01
East/west line	392,000	2.81
Total	1,229,000	8.82
Ferrovía		
Fepasa	106,500	0.76
RFFSA	560,000	4.02
Total	660,500	4.78
Omnibus		
CMTC	1,448,100	10.39
Contracte	4,473,100	32.11
Intermunicipal	1,145,700	8.22
Total	7,066,900	50.72
Taxi	320,000	2.30
Private transportation		
Vehicles	4,500,000	32.30
Others modes of transportation	150,000	1.08
Total	13,932,400	100.00

4. The municipal highway network

- 2.59 The highway network for the Municipality of São Paulo is classified on the basis of criteria that take into account the main characteristics relating to traffic, land use, in other words: volume, composition and operation of traffic and distance of travel. The description of types of roads may be found in Appendix II-3.

- 2.60 In response to these criteria, the highway network may be divided into three groups of highways, each of which has its corresponding subcategories, as shown in the following table:

<u>Municipal Highway Network</u>	<u>Expanse (km)</u>
Primary Network	<u>635</u>
. Expressway	145
. Main Artery I	179
. Main Artery II	311
Secondary Network	<u>1,955</u>
. Connecting highway/Auxiliary I	363
. Connecting highway/Auxiliary II	628
. Secondary highway	964
Total	<u>2,590</u>

5. Program and guidelines for the municipal highway sector

- 2.61 In 1982, SEMPLA prepared the Second Integrated Development Master Plan. That plan included basic guidelines and objectives of the municipality to be discussed by the community. Once accepted, the details of the corresponding plans would be outlined. Specifically, with regard to the highway system, the need to expand to give continuity to the primary highway network was recognized as was the need to service neighborhoods on the periphery. While these criteria still apply, they have been slow to put into practice, because of budgetary restrictions.
- 2.62 Subsequently, in June of 1983, a series of studies were conducted and identified together as the Program of Highway Works (PROVIA) to render compatible highway needs and municipal and metropolitan transport and urban development plans.
- 2.63 In 1985, SEMPLA prepared the Master Plan for the Municipality of São Paulo 1985/2000. This plan is now being discussed by the appropriate authorities and its approval would provide strong impetus and support for the program that is the subject of this study.

III. THE PROGRAM

A. Program Goals and Objectives

- 3.01 The program has the multiple purpose of building canals and culverts and public roads in certain sections where overflowing streams cause frequent flooding in the respective areas of influence; and to improve vehicle traffic conditions in the area. The specific program objectives would be:
- (a) environmental improvement of urban São Paulo;
 - (b) a substantial reduction in flooding, with benefits from this and other sources accruing to approximately 1.8 million PMSP inhabitants (18% of the Greater São Paulo population);
 - (c) reduction of traffic tie-ups in the areas surrounding creeks.
- 3.02 The goals to be accomplished by the program are:
- (a) canalization of roughly 18% of the area within the municipality's urban zone (250 km) where creeks need to be contained by building 43 km of canal and culverts to expand, realign and improve 12 sections of the principal creeks that drain the area's three major rivers;
 - (b) improvement of traffic conditions through the construction of 41 km of public roads along the creeks, thus relieving bottlenecks in the respective areas of influence by affording faster, safer and uninterrupted mobility;
 - (c) an increase in the annual maintenance coverage of the 1,000 km of creeks in the urban area from the present 30% to 35%, through the purchase of equipment to maintain those located in the PMSP, thus raising such coverage from 120 to 175 km.

B. Program Description (see map in Annex III-1)

- 3.03 The program includes the lining of roughly 27 km of open channels in seven creek areas, plus 16.5 km of box culverts in another five sections, and construction of approximately 41 km of public roads on both sides of the creeks, or overlying the culverts. This canalization work is expected to reduce some 60 of the current 300 points or areas where flooding occurs annually during the rainy season (December to March) in the Municipality of São Paulo.
- 3.04 The technology used to design the various components comprising the representative sample is appropriate for the City of São Paulo. Those components represent extensions of canals and public roads built by the prefecture in the past two decades. Where the dimensions of the terrain permit, the canals would be trapezoid in shape, lined with

reinforced concrete and/or, in some cases, stone gabions covered with water and asphalt. When the strip of land is too narrow because of the numerous existing buildings, box culverts will be designed with reinforced concrete and, where this is not possible, enclosed galleries will support the overlying public road construction.

- 3.05 The geometric design of the public roads takes into consideration available physical space; the volume and composition of anticipated traffic; and the need to make the characteristics of the new roads consistent with the ones they will interconnect. In the preliminary project stage, the SVP submits studies to the Traffic Engineering Company (CET) which attempts to identify and remedy possible shortcomings from the standpoint of traffic engineering. The paving specifications are based on the flexible paving dimension manual used by the municipal prefecture of São Paulo. In terms of projected demand, paving is scheduled for four types of traffic: heavy, medium, light and peripheral.
- 3.06 The program is complemented by the purchase of equipment for canal maintainance, representing a replacement of about 20% of the units used for this purpose. It consists of: 8 draglines; 12 backdiggers; 8 carterpillar tractors; 40 dumptrucks; 4 trailers; and 4 hydraulic power shovels, with a total value of US\$4.5 million equivalent. This equipment will enable the Subprefecture General Secretariat (SEGESP) to increase its canal maintenance activities from the present 120 km to approximately 175 km a year (see paragraphs 4.33 et sq. of this report).
- 3.07 The representative sample, described in detail in Annex IV-1, identifies more specifically the nature of the works anticipated for construction under the program.

C. Program Cost and Financing

1. Cost

- 3.08 The total cost of the program is estimated as US\$207.5 million equivalent, distributed in accordance with the following sources of financing and investment categories:

Total Cost of the Program by Category of Investment and Source of Funds
(In US\$ thousands)

<u>Category of Investment</u>	<u>IDB Loan</u>	<u>Local</u>		<u>Total</u>	<u>%</u>
	<u>IC</u> <u>Foreign</u> <u>Exchange</u>	<u>BNH</u>	<u>Conterpart</u> <u>FMSP</u>		
I. <u>Engineering and Administration</u>	-	-	18,500	18,500	8.9
1.1 Studies and designs	-	-	5,500	5,500	
1.2 Administration and supervision	-	-	13,000	13,000	
II. <u>Direct Costs</u>	64,620	49,000	13,280	126,900	61.2
2.1 Canalizations	45,120	29,000	8,280	82,400	
2.2 Public thoroughfares	15,000	20,000	5,000	40,000	
2.3 Maintenance equipment	4,500	-	-	4,500	
III. <u>Associated Costs</u>	-	16,000	16,000	32,000	15.4
3.1 Land, rights and easements	-	16,000	16,000	32,000	
IV. <u>Finance Charges</u>	12,880	-	17,220	30,100	14.5
4.1 Interest	12,105	-	15,350	27,455	
4.2 Credit fee	-	-	1,870	1,870	
4.3 Inspection and supervision	775	-	-	775	100.0
Total	77,500	65,000	65,000	207,500	100.0
Percent	37.4%	31.3%	31.3%	100%	

2. Analysis and distribution of program budget

3.09 The cost estimate was prepared by the São Paulo Municipal Prefecture and the Bank using October 1986 prices. The Bank finds the methodology and criteria used for preparing the estimate to be reasonable. An analysis of the costs in each category follows:

(a) Engineering and Administration (US\$18,500,000)

3.10 This category, representing 8.9% of the total program cost, includes the following subcategories:

(i) Studies and designs (US\$5,500,000), representing the anticipated cost of hiring consultants or national consulting firms to complete the technical and execution projects needed for program works.

(ii) Supervision and administration (US\$13,000,000), cover the costs of the executing unit to be set up for this program, together with those chargeable to the Highway Works Secretariat for supervising execution of the program execution projects and works. It also includes the fees of a specialized consulting firm that will advise the executing unit on the program.

(b) Direct costs of construction (US\$126,900,000)

3.11 The direct construction cost, which represents 61.2% of the program cost, was determined on the basis of budgets updated to October 1986 for the four projects in the representative sample, plus another four detailed budgets covering four canalization works packages. For the remaining projects, the prefecture used October 1986 unit costs for the volumes of works, based on preliminary designs available for the various projects. Some of them lie upstream from recently built canals for which the real costs are available, and the corresponding price adjustment has been made in those figures. The cost of the 12 canalization works and public roads is US\$122,400,000 equivalent, including the corresponding contingencies and cost escalation, since this is a global multiple-work program.

3.12 Also included are US\$4.5 million for the purchase of equipment to maintain and clean the canals in São Paulo's drainage system. The estimated cost for both the small drainage works and the maintenance equipment is considered reasonable.

(c) Associated costs (US\$32,000,000)

3.13 This category represents 15.4% of the program's total estimated cost and includes the expenses of expropriating approximately 2,600 buildings located on the land where 10 of the 12 canalization works and public roads of the program will be built. At two of them, Tiquatira and Cabuçu de Baixo, no expropriation will be necessary.

(d) Financing charges (US\$30,100,000)

3.14 Based on a possible IDB loan of US\$77.5 million in foreign exchange from the interregional capital fund (IC), this category, which represents 14.5% of the total program cost, includes interest on the loan in foreign exchange (IC) accruing during the execution period; the credit fee; and the inspection and supervision charge. It also covers interest on the loan from the BNH, the Drainage and Sanitation Fund (FIDREN) equivalent to US\$65.0 million, and a 1% commission on payments made with those resources.

3. IDB financing

- 3.15 The Bank will contribute the equivalent of US\$77.5 million in foreign exchange from the interregional capital resources, representing approximately 37.4% of the total cost of the proposed program. The corresponding percentage of financing is consistent with Bank policies (GN-33-1) for loans in the transportation sector (30%) and in the basic sanitation sector (40%) to group A countries, which include Brazil.
- 3.16 Resources of the Bank loan will be used for partial coverage of materials and the direct construction cost (51%) with the corresponding contingencies and escalation; all of the costs for maintenance equipment; interest accruing during the execution period; and the contribution to the inspection and supervision fund.
- 3.17 It is proposed that the prospective Bank loan be subject to the following basic conditions:

<u>AMOUNT</u>	US\$83.0 million
Amortization period	20 years
Grace period	4 years
Physical start of works	2 years
Disbursement period	4 years
Interest rate	Variable
Credit fee	1.25%
Inspection and supervision	1.0%

4. Local counterpart contribution

- 3.18 The local counterpart funds, equivalent to US\$130,000,000 (62.3% of the total program) would come from internal resources of the São Paulo Prefecture and loans from the National Housing Bank (BNH) in equal parts, i.e., US\$65,000,000 each. The feasibility and timeliness of those contributions are discussed in Chapter V of this report.
- 3.19 Those counterpart resources would be used to cover 49% of the direct construction costs; all of the remaining investment categories; and the respective contingencies and escalation, plus financing charges on the BNH loan and the credit fee for the IDB loan.

3.20 The terms for the BNH financing appear below:

(a) National Housing Bank (BNH)

Loan amount:	US\$65,000,000
Currency:	Local (Cruzados)
Amortization period:	18 years
Grace period:	4.5 years
Disbursement period:	4 years
Interest rate:	10.5% per annum
Service commission:	1.0% of the amounts disbursed

IV. EXECUTION OF THE PROGRAM

A. Executing Agency

- 4.01 Execution of this program would be the responsibility of the PMSP Public Highway Secretariat (SVP), through an executing unit that would be set up to manage the program. Establishment of that unit would be a condition precedent to the first disbursement from the Bank loan. ^{1/} The unit will have a basic staff of five, plus support from SVP personnel assigned to the program, an estimated 75 persons.
- 4.02 The SVP has the necessary technical and administrative capability to carry out the proposed program as envisaged. It also has had long experience in the execution of similar projects. Nevertheless, the prefecture lacks experience in handling programs financed by international agencies. Accordingly, it is recommended that, within six months after the loan contract is signed, the SVP engage the services of a specialized firm with experience in managing this type of program to work with the executing unit in the administration thereof. ^{2/} The detailed composition of the executing unit and the terms of reference for the specialized firm appear in Annex IV-1 to this report.

B. Status of Program Preparation

- 4.03 The PMSP has the necessary designs to issue the call for bids on the projects comprising the representative sample. These were reviewed by the Bank and were found to be satisfactorily drawn up. The PMSP also has a detailed schedule for preparation of the other projects covering program works: it assigns priority in accordance with the execution program, so as to ensure timely availability of the designs and bidding documents for the purchase of materials and construction of program works.

1. Representative sample

- 4.04 The representative sample used to assess this program was selected from projects available at the time of the analysis mission's visit. The sample consists of four canalization and road projects representing 39% of the program's direct costs. The channels are approximately 16 km in length, i.e. 37% of the estimated total 43 km slated for construction; and the length of the public roads for the four projects is 14.5 km, representing 35% of the total 41 km scheduled. Annex IV-1 includes a description of the projects in the representative sample.

^{1/} See Resolution.

^{2/} See Recommendations.

C. Construction Work Selection Criteria

4.05 As noted earlier, the City of São Paulo has a total of 36 water basins with approximately 750 km of creeks that can be channeled. The projects in the sample -as well as those yet to be chosen for the program financed by the Bank- were selected from that universe. In order to ensure, insofar as possible, that the works that will be included in the program are those having highest priority within the potential universe of basins targeted for improvement, a process for the selection and prioritization thereof has been followed. It is described in greater detail in chapter VI of this document, but the final criteria are listed below:

- (i) Must belong to basins with design volumes in excess of 20 m³/sec, in accordance with a rainfall cycle of 25 years.
- (ii) Must satisfy priority requirements from the standpoint of the following:
 - (a) Basins with relatively high present population density.
 - (b) Basins with a relatively large number of families affected by floods.
 - (c) Basins in which the scheduled construction consists of primary or secondary expressways or freeways that are completely integrated and supplement the existing highway network.
- (iii) They must have a demonstrable socioeconomic return rate of more than 12%, based on the methodology used to evaluate projects in the representative sample.

D. Procurement of Goods and Services

1. Purchase and contracting procedures

4.06 In the acquisition of equipment, material and other goods for the program and in the contracting of works wholly or partially financed by resources of the prospective Bank loan, the system of international public bidding would be used in all cases in which the value of such procurement or contracts exceeds US\$200,000 equivalent. That procedure is substantially similar to the one agreed upon with the Government of Brazil for other operations. 1/

2. Plan of public bidding for the procurement of goods

4.07 In the procurement of goods and equipment required for program execution, the PMSP plans to conduct no more than two international tenders amounting to approximately US\$4,500,000, exclusive of

1/ See Annex IV-3.

contingencies and price escalation. A list of the public bidding packages follows, showing the estimated value of each one scheduled for the first year.

	<u>Unit</u> <u>Amount</u>	<u>Year 1</u>		<u>Year 2</u>		<u>Total</u> <u>(US\$000)</u>
		<u>First half</u>		<u>Second half</u>		
		1	2	1	2	
1. Equipment for maintenance of the São Paulo stormwater drainage system (trucks, trailers, caterpillar tractors and hydraulic power shovels)	46	2,000	-	-	-	2,000
2. Equipment for maintenance of the São Paulo stormwater drainage system (backdiggers and draglines)	<u>20</u>		<u>2,500</u>	-	-	<u>2,500</u>
Totals	66	2,000	2,500	-	-	4,500

3. Plan for public bidding on construction contracts

- 4.08 It is planned to hold 12 international tenders amounting to approximately US\$122,400 thousand, including contingencies and price escalation, for execution of the civil works. The schedule for such bidding, the value thereof in US\$000 and the dates for receipt and award of bids, and start and completion of the corresponding works appear below:

<u>Bidding Package No.</u>	<u>Total Cost (US\$000)</u>	<u>Opening of Bids</u>	<u>Closing of Bids</u>	<u>Start of Works</u>	<u>Completion of Works</u>
1/87	10,020	04/87	06/87	07/87	07/88
2/87	1,900	04/87	06/87	07/87	07/88
3/87	6,770	07/87	09/87	10/87	10/88
4/87	5,360	09/87	11/87	12/87	11/88
5/87	18,270	11/87	01/88	02/88	04/90
6/87	11,100	12/87	02/88	04/88	01/90
1/88	18,510	01/88	03/88	04/88	04/90
2/88	17,950	03/88	05/88	06/88	07/90
3/88	5,010	04/88	06/88	07/88	10/89
4/88	4,920	05/88	07/88	08/88	04/90
5/88	10,280	07/88	09/88	10/88	07/90
6/88	12,210	07/88	10/88	10/88	10/90

E. Plan of Execution

- 4.09 According to the preliminary execution plan for the project (PPEP) ^{1/} it would be executed within a period of four years from the effective date of the prospective loan contract. This term is considered ample, given the advanced status of the designs, the experience of the PMSP Public Highway Secretariat, and that of the specialized firm to be engaged to monitor program works plus the capability of the contracting firms and timely availability of resources for the financing thereof.
- 4.10 The activities in the initial critical path for execution of the project call for signature of the prospective loan contract and compliance with the conditions precedent for eligibility for disbursement.
- 4.11 Other critical activities are: bidding on construction of the Itaquera canals, creeks H and G, which would be completed in the third quarter of the fourth year of program execution. The cycle of bidding on construction would require an estimated 26 weeks, which is considered reasonable and meets Bank requirements in this area. Accordingly, it is recommended that the deadline for physical commencement of works be set at 24 months from the effective date of the prospective loan contract. ^{2/}

F. Schedule for Investment and Use of Funds (See Annex IV-5)

- 4.12 The resources of the prospective Bank loan and the local counterpart funds from both PMSP and the FIDREN (BNH) would be disbursed within the period of four years from the effective date of the loan contract. According to the PPEP, the program investment schedule would be as summarized below:

(In US\$000 or equivalent)

	<u>Year 1</u>	<u>Year 2</u>	<u>Year 3</u>	<u>Year 4</u>	<u>Total</u>	<u>%</u>
IDB Loan (IC)	12,640	24,910	22,400	17,550	77,500	37.4
PMSP	14,200	24,800	13,800	12,200	65,000	31.3
FIDREN Loan (BNH)	14,200	24,800	13,800	12,200	65,000	31.3
	<u>41,040</u>	<u>74,510</u>	<u>50,000</u>	<u>41,950</u>	<u>207,500</u>	<u>100.0</u>
	=====	=====	=====	=====	=====	=====
Percentages	19.8	35.9	24.1	20.2	100.0	

^{1/} See Preliminary Execution Plan and Activity Schedule in Annex IV-4.
^{2/} See Resolution.

G. Land Procurement Status

- 4.13 No expropriation is required for the canal and public road construction at Tiquatira and Cabucu creeks. The PMSP has already approved legislation for expropriation at eight of the other ten creeks, involving strips of land ranging from 20 to 90 meters in width. The prefecture has yet to issue the corresponding decrees to expropriate the strips of land at G and H creeks. Annex IV-6 indicates the expropriation costs for the project.
- 4.14 An estimated total of 2,600 buildings must be expropriated in the sites affected by project construction. Legislation exists in Brazil governing all expropriation procedures, and the PMSP Department responsible for the application thereof has expropriated some 7,000 properties in the last nine years. The average number of properties expropriated per year of close to 800 has dropped to 564 because few properties were expropriated during the five-year period (1981-1986) owing to the Prefecture's lack of financial resources to undertake large-scale works.
- 4.15 The most important steps are: once expropriation is determined by the Prefecture, its Expropriation Department (DESAP) prepares the draft decree for public use and the other elements necessary for expropriation, such as expropriation plans; inspection by experts; photographs; a description of the area to be expropriated; and the corresponding evaluation. The necessary topographical maps are delivered to DESAP by the Public Highway Secretariat. After expropriation of the buildings in the public interest has been declared by the Prefect's decree, the amount corresponding to the evaluation is deposited at the court in the name of the property owner, who is thereby summoned to appear before DESAP. If the subject agrees with the price, an agreement is drawn up which is then approved by the judge. If the subject of expropriation refuses the offer, DESAP presents the corresponding judicial expropriation suit, declaring the urgency thereof and requiring legal possession of the building. The average time elapsing between the start of action and legal possession has been two to three months. Expropriation itself is slower and may take up to three years, but the only item subject to question is the amount of indemnification, not the intrinsic merits of the expropriation. Nevertheless, after legal possession is authorized by the Court, the Prefecture has the right to start construction work.
- 4.16 The situation is complicated in practice if the land is occupied by "favelas" (shantytowns), tenements or improvised housing. In such cases, the municipality arranges for relocation of the occupants, using the staff and resources of the Housing Secretariat (SEHAB) and the São Paulo Metropolitan Housing Company (COHAB). The average time between the start of this action and actual departure of residents from the site has been five to nine months. This aspect is discussed in the following section.

- 4.17 In order to avoid possible delays in construction, it is recommended as standard Bank policy that, prior to the call to bid or the start of construction, as the case may be, the Prefecture submit evidence to the Bank that it has legal possession and other pertinent rights to the land where construction will take place.

H. Relocation of Families

- 4.18 In addition to the 2,600 privately owned buildings that would be expropriated, the program will affect some 4,500 low-income families of squatters living in very substandard housing--some of which is located on property owned by the Municipality of São Paulo--who must be relocated and/or compensated. The relocation of these people has not been included in the cost of the program since it is impossible to define relocation costs precisely, because the favela population varies from day to day and, depending on the alternative applied, the cost for this group of families could range from US\$4 million to US\$30 million. The population in question occupies three different types of housing, commonly termed "substandard":

- (a) The "favela," defined as a group of shanties built with substandard improvised material on lands that lack all or part of the necessary urban infrastructure and social equipment.
- (b) The "cortiço," (tenement), defined as a collective housing unit, i.e., a number of housing units on a single lot, with excessive occupancy rates and a shortage of plumbing and sanitary facilities.
- (c) The "casas precárias," (improvised housing), built by the occupant himself using makeshift construction methods and materials that flaunt the laws governing urban land use.

- 4.19 As noted further on, the PMSP has had broad experience in this area, having handled approximately 420,000 persons in this category through the São Paulo Metropolitan Housing Company (COHAB) and some 50,000 through the Housing Secretariat. It is estimated that in 1985, some 55% of São Paulo's urban population (approximately 5,500,000) occupy substandard housing. The PMSP has been devoting special attention to this widespread societal problem and has set up a number of housing programs for low-income population.

1. São Paulo Metropolitan Housing Company (COHAB)

- 4.20 COHAB is a mixed company, most of whose capital is owned by the PMSP. Its principal purpose is to plan and carry out low-cost housing projects and programs to eliminate favelas, tenements and other substandard housing. Established by Municipal Law in November 1965, COHAB had built 91,150 housing units accommodating approximately 420,000 individuals, by the end of 1985.

- 4.21 For the three-year 1986/88 period, PMSP plans to carry out a global housing program through COHAB that by December 1988 will have built a total of 102,404 housing units, 17,000 of which would be for the population occupying substandard housing and having an income equivalent to 1 to 3 times the minimum wage (COHAB Favela Elimination Subprogram). ^{1/} All 17,000 units will be completed by December 1987. At the present time, COHAB has all of the land necessary to build the 102,404 housing units scheduled and has already contracted for--or is in the process of contracting--constructions of 79% of those units.
- 4.22 The Favela Removal Subprogram, to be financed by the PMSP, will include a new item in its 1987 budget amounting to approximately US\$73 million for that purpose. This is the first time that resources would be transferred from the municipal budget to COHAB, enabling it to serve families with income representing one to three times the minimum wage. Up to now, COHAB has used funds from the National Housing Bank (BNH) to handle families with incomes of more than three times the minimum wage.
- 4.23 Low cost modular housing units, with provision for future expansion, will be built. COHAB would turn them over to the PMSP, which will determine distribution priorities. Distribution will not be free of charge: each family will pay in accordance with its means, and COHAB has a complete mechanism to determine the size of monthly payments in accordance with family income. COHAB does not take part in the selection of families nor their transfer from the "favela" or "cortiços" to the new home: this is handled by the PMSP Housing Secretariat.

2. Housing Secretariat (SEHAB)

- 4.24 The Housing Secretariat (SEHAB), through its Low-Cost Housing Superintendency (HABI) is responsible for serving the population segments with incomes between 0 and 5 times the minimum wage who live in favelas, tenements and improvised housing and who are in emergency situations or extreme need, such as the risk of housing collapse or flooding, scheduled public works, or eviction from rental property and tenements. When shantytowns occupy scheduled public work sites, construction is not started before defining the precise relocation plan that would be adopted for favela residents. To define the plan, a socioeconomic survey is made of the affected families to define the various alternatives that could be adopted to vacate the project area.

^{1/} The minimum monthly wage in Brazil is 800 cruzados, equivalent to roughly US\$60 at the present exchange rate.

- 4.25 SEHAB is funded by resources from the PMSP budget and has a number of programs for the population living in substandard housing:
- (a) Urban development of favela areas: The purpose is to ensure the population of certain favelas legal possession of the area by parceling of the land, building infrastructure, financing construction materials, and providing access roads and internal traffic facilities.
 - (b) Favela improvement: This project seeks to improve living conditions in the shantytowns without changing the status quo, as a result of minimal collective infrastructure works.
 - (c) Housing service: This attempts to serve the population whose lives are endangered or the inhabitants of land where public works are scheduled by granting financial assistance and building of wooden sheds as temporary quarters, plus assistance in the transfer from one place to another. For 1987, attention is scheduled for approximately 26,000 families.
 - (d) Provision of land and housing: This consists of offering lots for self-built homes to low-income families with SEHAB financing through its "Fund for the Population Living in Substandard Housing" (FUNAPS); it includes purchase of the lot and construction materials. For 1987, FUNAPS has sufficient resources to finance some 3,000 houses.
- 4.26 Finally, mention should be made of a bill submitted by the Prefect to the São Paulo Municipal Assembly, granting the private sector certain benefits in the construction of buildings in urban São Paulo. The benefit consists of increasing the coefficient of land utilization (the ratio between the constructed area and the size of the lot), in exchange for which the builder undertakes to provide housing for needy sectors.
- 4.27 PMSP agreed with the Bank that it would relocate and/or indemnify the low-income population affected by program works, without taking them far from the places where they now live. Minimum-size lots would be provided that allow for future expansion of the constructed area occupied by modular housing. The housing units would be constructed insofar as possible at sites with services. The prices of the houses will be largely subsidized by the PMSP budget, since each family will pay in accordance with its possibility of doing so. In special instances, an indemnity may be paid in place of the assignment of housing. The relocation and/or indemnification will be part of the schedule for executing of program works in order to avoid a recurrence of occupation by squatters.

4.28 Consequently, the prospective loan contract will include a recommendation that, prior to issue of each call to bid or to the start of construction, as the case may be, the PMSP must submit to the Bank the relocation and/or indemnification plan for the occupants of substandard housing affected by the works; the corresponding execution schedule; and proof of availability of funds necessary for the execution thereof. In addition to considering the aspects indicated in the preceding paragraph, that plant will have to include an analysis of the economic and social situation of the affected communities and families, as well as a quantification of their personal and community property. The criteria must also be presented on how the relocation areas were selected. The affected families and communities must take part in the decisionmaking regarding those areas after the various alternatives for the relocation have been presented. (See Section VII of Annex A). Likewise, each year during the execution of the program the borrower will be required to submit annual reports on the situation of the families relocated. ^{1/}

I. Supervision by the PMSP

4.29 Program supervision and administration by the São Paulo Municipal Prefecture (PMSP) would be conducted by the executing unit that reports to the Public Highway Secretariat (SVP). The executing unit would have a basic staff of five, plus support from a consulting firm that specializes in monitoring construction, as well as the staff assigned by the PMSP -particularly those from the Highway Work Superintendency- who would complete the supervision and administration activities.

J. Advance of Funds

4.30 To ensure that the borrower has the necessary funds to finance the various activities scheduled with Bank resources, it is recommended that a revolving fund be set up for the prospective loan, consisting of up to 10% of the overall amount. This mechanism would provide funding for timely coverage of the obligations stemming from the various program components.

K. Operation and Maintenance of the Drainage and Road Systems

4.31 The São Paulo Municipal Prefecture (PMSP) carries out maintenance activities and cleaning of the creeks, both lined (350 km) and unlined (650 km), within the urban area of the municipality, through the Subprefecture General Secretariat (SEGESP). In addition, roughly 550 km of streams within the municipality, for which canals have not been built or lined, are located in the area for protection of the streams that supply the PMSP with water (see Annex IV-7).

^{1/} See Recommendations.

- 4.32 The activities for maintenance and repaving of the highway network are also performed by SEGESP through regional administration offices with specialized staff and equipment, including asphalt factories. Given the efficiency of the Prefecture's highway maintenance operations; the limited amount of program construction as compared with the total length of São Paulo's highway network; and the good upkeep conditions of the various roads observed during visits made by the analysis mission, it is reasonable to conclude that the new roads will be satisfactorily maintained.
- 4.33 For adequate maintenance and operation of the municipality of São Paulo's hydrographic system and highway network, it is recommended that the prospective loan contract include a clause whereby the PMSP undertakes to ensure that: i) the construction executed under the program will be managed, operated and maintained in accordance with generally accepted technical standards; and ii) it will submit to the Bank, throughout the ten years following completion of the canalization works and public roads and within the first quarter of each calendar year, an annual maintenance system for São Paulo's highway and stormwater drainage systems; a detailed report on performance in the same areas for the previous year; and the degree of operating efficiency, plus the status of maintenance of those systems, at the end of the previous year. 1/

L. Inspection and Supervision by the Bank

- 4.34 The Bank will supervise execution of the program through its Field Office in the Federative Republic of Brazil.

M. Ecological and Environmental Aspects

- 4.35 The program is designed to control some 60 flood areas in the 12 hydrographic basins of the Prefecture of São Paulo and to reduce traffic bottlenecks in the areas to be benefited. The canals to be enlarge and lined, and the public roads on the banks thereof, will avoid the proliferation of squatters and shanties in the lower parts of these valleys. It will avoid or reduce the incidence of waterborne disease resulting from flood, such as leptospirosis, typhoid fever, helminthiasis, etc. It will also have the advantage of keeping people, particularly children in those areas (representing approximately 43 km), from coming in contact with the highly polluted water in the streams where canals are to be built, as a result of the relatively low intake of waste water by SABESP. This will prevent many people from throwing solid waste into the canals, particularly the closed galleries, thus reducing future cleaning and maintenance expenses for those streams. At present, the PMSP has given three private firms the concession for collecting and disposing of 72% of household waste and 60% of the industrial waste generated by the city of São Paulo, estimated as 12,100 tons a day: it is collected and taken to six sanitary fills, three incinerators and three compounding plants.

1/ See Recommendations.

- 4.36 Thanks to the SABESP project (BR-0074) in whose financing the Bank would collaborate in order to raise the impoundment of wastewater in the RMSP, it is planned to collect part of the wastewater that now drains into various streams, including: the Moóca, Itaquera, Tiquatira, Gamelinha, Jaguare and Cabuçu de Baixo. In these sections, whose total length is 16.9 km, a substantial volume of the wastewater would be intercepted, most of which would be taken to the treatment plants now operating at Leopoldina and Pinheiros, and the one at Barueri which would go on stream in 1987. This would reduce the pollution level in the Tietê, Pinheiros, Tamanduateí and Aricanduva rivers.

N. Ex post Evaluation

- 4.37 To determine the program's socioeconomic impact, an agreement was reached with the PMSP authorities whereby, at the end of the third year following the last disbursement of the loan, they would present an ex post evaluation report on the program to the Bank, using the same methodology that was adopted for the ex ante evaluation described in Chapter VI. That evaluation would be predicated on the initial baseline data indicated in Appendix III (Annex A to the loan contract), which must be submitted to the Bank within 18 months of the date the loan contract is signed. 1/

1/ See Recommendations.

V. THE BORROWER, EXECUTING AGENCY AND GUARANTOR

A. Institutional Aspects

1. Borrower, executing agency and guarantor

- 5.01 The borrower and executing agency will be the City of São Paulo, with the guarantee of the Federative Republic of Brazil.

2. Nature and functions

- 5.02 The City of São Paulo, which is a territorial unit in the State of São Paulo, is politically, administratively and financially independent. The city is governed by the City Council (Câmara de Vereadores), which is the legislative branch, and by the Prefect, or Mayor, who is head of the executive branch.

- 5.03 The City Council is composed of 33 counsellors, all of whom are elected by direct vote. The most important powers of the Council, as they relate to the program under study, are: (i) to legislate city taxes; (ii) to vote on the annual and pluri-annual budgets; and (iii) to debate applications for and the granting of loans and credit operations.

- 5.04 The Prefect and Deputy Prefect are also elected by direct vote for a four-year term of office.

3. Organization and administration of the Prefecture

- 5.05 The organization chart in Annex V-1 shows that 16 City Secretariats in the Prefect's executive branch, and there are, in addition, three autonomous agencies and six municipal enterprises. The Prefect has set up a working group whose mandate is to make recommendations on administrative reform to provide for a more modern and efficient organizational structure. Annexes V-1a through V-5 show the organization charts of the Secretariat for Finance, the Accounting Department, the Secretariat for Planning, the Secretariat for Public Roads and the General Secretariat for Sub-Prefectures, all of which are related to the program under study. The executing unit of the IDB/PMSP Program will be established in the Secretariat for Public Roads.

Most important among the Prefecture's basic functions are:

- (i) financial administration and planning;
- (ii) education and culture;
- (iii) housing and urban development;
- (iv) health and sanitation;

(v) assistance to minors and social assistance in general; and

(vi) transportation.

- 5.06 An executing unit, or technical administrative unit, will be established to ensure proper coordination, execution and control of Program activities; it will be responsible directly to the Secretary for Public Roads (see chapter IV).

4. Personnel

- 5.07 As of September 30, 1986, a total of 121,105 people were on the city employment roll: 103,908 on active duty, and 17,197 considered not active. Of the inactive employees, 15,654 were retired, while 1,543 were on loan to the State and elsewhere.

- 5.08 The composition of city employees by administrative department was as follows:

Department	30-IX-86 No. of Employees
Office of the Prefect	2,802
General Secretariat of Sub-Prefectures	16,342
Secretariat for Planning	245
Secretariat for Housing and Urban Development	795
Secretariat for Administration	1,510
Secretariat for Education and Social Welfare	48,375
Secretariat for Finance	3,733
Secretariat for Health	19,640
Secretariat for Transportation	417
Secretariat for Legal Affairs	1,065
Secretariat for Public Roads	763
Secretariat for Services and Works	2,385
Secretariat for Culture	2,522
Secretariat for Supplies	1,800
Secretariat for Social Defense	1,514
Subtotal, Active Employees	103,908
Inactive Personnel (retired and on loan)	17,197
Total	<u>121,105</u>

- 5.09 The table below shows the overall numbers of city personnel over the last few years:

	<u>Active</u>	<u>Inactive</u>	<u>Total</u>
1982	89,143	10,490	99,633
1983	92,033	13,048	105,081
1984	97,276	14,105	111,381
1985	105,861	14,992	120,853
1986 (September)	103,908	17,197	121,105

5. Financial administration

- 5.10 The organization charts of the Secretariat for Finance and, in greater detail, of the Accounting Department are shown in Annexes V-1a and V-2. The responsibilities of the Secretariat for Finance are to: (i) settle, collect and verify city taxes and rates; (ii) oversee services and maintain tax records; (iii) coordinate the work of budget execution; (iv) monitor execution of budgetary spending; (v) provide treasury services; and (vi) keep the accounts.
- 5.11 The basic regulations on financial management stem from the Constitutions of the Republic of Brazil and of the State of São Paulo, and the Law on the Organization of Municipalities. The current accounting system is operated in conformity with Federal Law No. 4320 of March 17, 1964.
- 5.12 The records of both the Accounting Department and the Treasury Department are electronically processed on terminals connected to the central computer of PRODAM, the public data processing corporation. Net worth, financial and budget statements are produced annually, along with monthly financial statements and fortnightly budget execution reports. The systems in use and the existing financial and accounting organization are deemed to be adequate.

6. Internal and external audit

- 5.13 The Secretariat for Finance has an internal audit unit called the Office of the Inspector General of Finance. This unit conducts inspections and audits of all bodies and entities directly and indirectly administered by the city, looking at all aspects of finance -accounts, finances, assets and budget- and also investigates bidding and contracting.
- 5.14 The external financial and budgetary audits and the external verification of the annual accounts of the Prefecture are conducted by the Court of Accounts and the City Council. The Court of Accounts is a subsidiary of the Council. Its primary functions are to verify and give its opinion on the accounts rendered by the Prefecture; evaluate transfers of funds collected by the State and by the Federal Government; and conduct financial and budgetary audits of city agencies.

5.15 Each year, by March 31 at the latest, the Court of Accounts must receive from the Prefecture the Statement of Assets and Liabilities, and the Financial and Budgetary Statements, and within 90 days, must give an opinion on them, which it then forwards to the Council. The Council in turn has 90 days in which to discuss the statements and approve or reject them. The statements for 1985 were approved by both the Court of Accounts and by the City Council.

5.16 For the Program under study, it is recommended that during execution, the financial accounts be submitted to the Bank with opinions from the Secretariat of the National Treasury. 1/

B. Historical Analysis of the Financial Condition of the City of São Paulo

1. Summary of budget execution

5.17 The city's annual budget is its principal accounting tool used for financial verification of its activities. In this paragraph, we shall discuss the general conclusions drawn from the analysis of the budget execution for 1982-1985 and the adjusted 1986 budget while in subsequent paragraphs, the various items will be addressed in more detail. The figures for the adjusted 1986 budget represent 9 actual months and three estimated months. The method for conversion into dollars used in the financial analysis contained in the present report was as follows: (i) nominal values in local currency of each year were converted to cruzados at constant value of mid-1986, and (ii) the values in constant cruzados were converted to U.S. dollars at the rate of CR13.84 = US\$1.00.

(In millions of US\$ equivalents)

<u>Budget</u>	<u>Amounts executed</u>				<u>Adjusted</u>
	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>Budget</u>
					<u>1986</u>
1. <u>Current Income</u>	927	742	655	751	940
Less: current expenses	<u>722</u>	<u>666</u>	<u>629</u>	<u>766</u>	<u>919</u>
2. <u>Net Savings, Current</u>					
<u>Income</u>	205	76	26	(15)	21
Less: <u>capital costs</u>					
-repayment debt	61	76	105	70	126
-investments and other	<u>269</u>	<u>184</u>	<u>158</u>	<u>198</u>	<u>241</u>
3. <u>Surplus (deficit)</u>	(125)	(184)	(237)	(283)	(346)
4. <u>Capital revenues</u>	<u>125</u>	<u>184</u>	<u>237</u>	<u>283</u>	<u>346</u>

1/ See Recommendations.

- 5.18 The table above shows that in the period 1982-1986, there was a progressive decline in the city's capacity to realize net savings on current income: savings fell from US\$205 million equivalent in 1982 to US\$26 million in 1984, and in 1985 dropped even further to a negative US\$15 million. It is estimated that in 1986, there will be net savings of US\$21.0 million. This situation may be attributed largely to lower rates of collection of city taxes as a result of inflation. The city therefore had to borrow externally and internally to meet its capital costs.
- 5.19 As will be discussed when dealing with the financial projections, this situation will improve when the city's collections of its own revenues increase. Such a change is already making itself felt in 1985-86.

2. Analysis of funds

- 5.20 The City of São Paulo draws its funds from two main sources: (i) current income, consisting of taxes, rates, duties, miscellaneous capital, revenues on property, industry and services, and current transfers; and (ii) capital revenue, consisting of bond issuances, loans and capital transfers. The breakdown of these funds is as shown in the table below:

<u>Funds</u>	<u>Executed</u>				<u>Estimated</u>
	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
1. <u>Millions US\$</u>					
Current income	927	742	655	751	940
Capital revenues	125	184	237	283	346
<u>Total</u>	<u>1,052</u>	<u>926</u>	<u>892</u>	<u>1,034</u>	<u>1,286</u>
2. <u>Percentages (%)</u>					
Current income	88.1	80.1	73.4	72.6	73.1
Capital revenues	11.9	19.9	26.6	27.4	26.9
<u>Total</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>

- 5.21 Current income represented the largest portion of all city funds during the period under examination. While in absolute terms, in 1986, current income recovered its 1982 level, it dropped in relative terms from 88.1% of funds used in 1982 to 73.1% in 1986. However, capital resources increased in relative and in absolute terms over the same period, because of internal and external borrowing.

3. Current income

- 5.22 The table below shows current income over the period 1982-1986, with the principal tax sources:

<u>Current Income</u>	<u>Executed</u>				<u>Estimated</u>
	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
1. Millions US\$					
Land tax	188	141	103	87	124
Tax on services	208	181	170	192	254
Rates	77	55	41	35	42
Sales tax	311	269	256	296	417
Other income	143	96	84	141	103
<u>Total</u>	<u>927</u>	<u>742</u>	<u>654</u>	<u>751</u>	<u>940</u>
2. Percentages (%)					
Land Tax	20.2	19.0	15.8	11.7	13.2
Tax on services	22.5	24.4	26.0	25.6	27.0
Rates	8.3	7.5	6.3	4.6	4.5
Sales tax	33.5	36.2	39.1	39.4	44.4
Other income	15.5	12.9	12.8	18.7	10.9
<u>Total</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>
3. Indices					
Land tax	100	75.0	55.1	46.6	65.8
Tax services	100	87.0	81.7	92.3	121.8
Rates	100	72.2	53.2	45.4	55.3
Sales tax	100	86.5	82.4	95.2	134.1
Other income	100	66.7	58.5	98.0	72.0
<u>Total</u>	<u>100</u>	<u>80.0</u>	<u>70.6</u>	<u>81.0</u>	<u>101.4</u>

5.23 The following conclusions may be drawn from analysis of the tables given above:

- (i) Total current income fell from a high of US\$927 million equivalent in 1982 to a low of US\$654 million in 1984 (a 29.4% drop). A recovery began in 1985 and 1986, but it is estimated that only in 1986 will the 1982 level be exceeded slightly (US\$940 million).
- (ii) It was the taxes that are exclusively city taxes (i.e., the land tax, the tax on services, and rates) that experienced the greatest proportional reduction, from 51.0% of the total in 1982 to 41.9% in 1985 and 44.7% in 1986. During the same period, the sales tax, of which the State takes a share,

became relatively more important, rising from 33.5% of total current income in 1982 to 44.4% in 1986. Other income, consisting of many smaller items of income, such as revenues on property, industry and city services, also fell in relative importance during the period under examination.

- (iii) The land tax experienced one of the largest declines during the period. The index fell from 100.0 in 1982 to 46.6 in 1985. The decline is even greater when compared with the highest level of collections (US\$247 million), which occurred in 1978, as opposed to US\$87 million in 1985. The chief reason for this decline in real terms was the adoption of a policy of adjusting this tax every year and setting real estate values at levels lower than the valuation of the property and lower than the rate of inflation. The percentage rate of tax remained constant, but the taxable base -the valuation of the real property- became less and less current each year. As will be discussed below, this tax will experience the largest increase in 1987, because of the accumulated lag in valuations, which must be corrected.
- (iv) Taxes on services belong exclusively to the city; collections remained practically steady, and will improve during the period. This is tax on service enterprises and self-employed professionals of all types. The tax base works in two ways: the system of pre-payment, collected by the taxing authorities on the basis of a "municipal tax value unit" (UFM), and the system of individual payment. The former applies to personal work or physical persons, and establishes fixed values for the UFM at the beginning of the tax year, for the different categories of services. The value of the UFM is updated on January 1 of each year. These values have fallen as the result of the fact that actual inflation was higher than anticipated when the UFM was updated each year. The system of individual payment applies to service enterprises, and is based on actual taxpayer bills, which vary according to the economy and prices in the country. The latter system parallels the actual rate of inflation, while the former requires sufficient updates to ensure that the values do not decline. It is for this reason that a slight drop in the index has occurred, from 100 in 1982 to 92.3 in 1985. It is anticipated that it will improve to 121.8 in 1986, as the result of a better economy and a moderate recovery in the value of the UFM. In 1987, the UFM will be updated more significantly.
- (v) Taxes on services also showed a decline in annual collections in the period. This was due to the system of calculation, which is done on the basis of the UFM which, as discussed in the preceding point, has suffered a decline in real terms due to the fact that it was adjusted less than inflation.

- (vi) Sales tax is a State tax of which the city receives a percentage. It is similar to what in other countries is called the "value added tax", since it taxes not the total value of the item but rather the net difference between the input and the output. The State of São Paulo receives 80% of all sales tax collections, with 20% going to the cities. Of the amount going to all cities in the State, the City of São Paulo received a 34.0% share in 1985 and 31.8% in 1986. This percentage has been falling almost constantly over the last ten years, because of the relatively faster growth of the other cities in the State. The index shows that this tax fell from 100 in 1982 to 95.2 in 1985, and it is estimated that it will rise to 134.1 in 1986. That is to say, the decline in collections in the city's assigned portion of this tax was only minimally due to inflation and mainly to changes in the State economy and changes in the participation rate or percentage received by the city. It should be stressed that the economic recovery of 1985 and 1986 was the principal reason for the higher level of collections of this tax for the City Treasury.
- (vii) "Other income" suffered a major decline between 1982 and 1984, with the indices standing at 100 and 58.5 respectively. This was also due to the impact of inflation, which adversely affected the real value of tax collections. The higher amounts collected in 1985 may be attributed in large part to financial income received from the temporary placement of excess funds at the high rates of interest obtained during the year.
- (viii) Contribution for improvements. Although the Constitutions in effect since 1946 expressly provide for such a tax, it has not in fact been collected since there is no law to enact and regulate these contributions for improvements. As part of the analysis of the proposed operation, the Bank and the authorities of the Prefecture of the City of São Paulo examined in detail the implications of the current tax laws. These do not, for now, allow for the funding of the works included in the Program through taxes such as the contribution for improvements or other direct collection mechanisms levied on users and beneficiaries. Despite this, a bill is now before the National Congress that, if approved, would give the Federal, State and Municipal Governments guidelines for levying this tax. A bill is also before the "Câmara de Vereadores" of the City of São Paulo that would institute the contribution for improvements in the city, to be used exclusively for paving works. However, this is considered to be constitutionally debatable, since there is no federal enabling legislation.

4. Capital revenues

- 5.24 Almost all of the city's capital revenues consist of domestic and foreign credit operations; the remainder comes from sales of goods and real property, and intergovernmental capital transfers. The table below shows the source of capital funds during the 1982-1986 period:

<u>Capital revenues</u>	<u>Executed</u>				<u>Estimated</u>
	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
<u>1. Millions US\$</u>					
Long-term credit					
-Domestic	106	61	55	112	158
-Foreign	-	39	83	73	62
<u>Total</u>	106	100	138	185	220
Short-term credit and other	19	84	99	98	126
<u>Total capital revenue</u>	125	184	237	283	346
<u>2. Percentages (%)</u>					
Long-term credit					
-Domestic	84.8	33.2	23.2	39.6	45.7
-Foreign	-	21.2	35.0	25.8	17.9
<u>Total</u>	84.8	54.4	58.2	65.4	63.6
Short-term credit and other	15.2	45.6	41.8	34.6	36.4
<u>Total capital revenue</u>	100.0	100.0	100.0	100.0	100.0

- 5.25 It will be seen from this table on capital revenues that the amounts executed rose progressively from US\$125 million in 1982 to US\$283 million in 1985 -an increase of 126%. It is estimated that by the end of 1986, capital income will have grown even further to US\$346 million, or a 180% increase.
- 5.26 Two-thirds of income executed in 1985 came from medium- and long-term credit operations, for a total equivalent to US\$185 million. Most of the remaining funds are in short-term debt.
- 5.27 As a result of the increase in capital income from credit operations, the city continued to increase its long- and short-term debt, as discussed in the section on liabilities.

5. City expenditures

5.28 Expenditures as registered by budget execution are shown below, broken down by category of current and capital expenditures.

<u>Expenditures</u>	<u>Executed</u>				<u>Estimated</u>
	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>
<u>1. Millions US\$</u>					
<u>Current expenditures</u>					
-Personnel	337	337	305	383	568
-Third party services	185	151	141	164	154
-Interest on debt	73	69	71	99	59
Other expenditures	127	109	112	120	138
<u>Total current expenditures</u>	<u>722</u>	<u>666</u>	<u>629</u>	<u>766</u>	<u>919</u>
<u>Capital spending</u>					
-Investments	213	115	90	135	186
-Expropriations	14	24	35	20	39
-Amortizations	61	76	105	70	126
-Other expenditures	42	45	33	43	16
-Total capital expenditures	330	260	263	268	367
<u>Total outlays</u>	<u>1,052</u>	<u>926</u>	<u>892</u>	<u>1,034</u>	<u>1,286</u>
<u>2. Percentages (%)</u>					
<u>Current expenditures</u>					
-Personnel	32.1	36.4	34.2	37.1	44.2
-Third party services	17.6	16.4	15.8	15.9	12.0
-Interest on debt	6.9	7.4	8.0	9.6	4.6
-Other expenditures	12.0	11.8	12.5	11.5	10.7
<u>Total current expenditures</u>	<u>68.6</u>	<u>72.0</u>	<u>70.5</u>	<u>74.1</u>	<u>71.5</u>
<u>Capital spending</u>					
-Investments	20.2	12.4	10.1	13.1	14.5
-Expropriations	1.3	2.6	3.9	1.9	3.0
-Amortizations	5.8	8.2	11.8	6.8	9.0
-Other expenditures	4.1	4.8	3.7	4.1	1.2
-Total capital expenditures	31.4	28.0	29.5	25.9	28.5
<u>Total expenditures</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>	<u>100.0</u>

5.29 The following conclusions may be drawn from the historical table above on spending by the city:

- (1) Total spending fell by 15.2% between 1982 and 1984, from US\$1,052 million in 1982 to US\$892 million in 1984. This was due chiefly to the reduction in the city's own funds during

the period. By 1985, total spending almost returned to 1982 levels, and in 1986, it is estimated that expenditures will exceed 1982 levels by 22%. This is occurring simultaneously with an increase in receipts of city revenues. However, throughout the entire period from 1982 through 1986, it became necessary to increase borrowing in order to finance this level of spending.

- (ii) Capital costs were the most affected by the reduction in available funds. They fell in absolute terms from US\$330 million in 1982 to US\$263 million in 1984 (a 20.3% drop), and it is estimated that the level in 1986 will be similar to 1982 levels. Capital costs fell as a proportion of total spending from 31.4% in 1982 to an estimated 28.5% in 1986. The most significant reduction was in investments in public works, facilities and equipment, which fell from 20.2% of total spending in 1982 to an estimated 14.5% in 1986.
- (iii) Current expenditures experienced a less marked drop during the period, falling from US\$722 million in 1982 to a low US\$629 million in 1984 (a 12.9% decline). However, they rose again in 1985 and 1986 to US\$766 million and an estimated US\$919 million respectively. Personnel costs remained almost unchanged between 1982 and 1984, but rose significantly in 1985 and 1986. The increase in 1985 was due mainly to the increase in the number of city employees, which jumped from 111,381 at the end of 1984 to 120,853 at the end of 1985. By contrast, the major portion of the cost in 1986 was essentially in wage increases, for the number of employees as of September 30, 1986 totalled 121,105.

The contraction in current spending was mainly in third-party services, which fell as a percentage of total expenditures from 17.6% in 1982 to 12.0% in 1986.

- (iv) Interest and commission paid on the debt remained steady between 1982 and 1984, but rose in 1985 largely because of the increase in domestic rates of interest. When the Cruzado Plan was implemented in 1986, these rates fell appreciably.
- (v) The most significant of all other current expenditures are economic subsidies, chiefly to the Municipal Mass Transportation Company.

6. The city's financial statements

- 5.30 The city's public accounting system includes the annual statement of assets and liabilities and net worth. The accounting system used in Brazil does not register all public goods and assets, but excludes those available for public use such as streets, highways, rainwater drainage systems, etc. Although the assets related to these public

goods are not registered on the books, the liabilities are in fact recorded, and as a result, the city's net worth may temporarily show a negative balance until the liabilities are cancelled. Such was the case with the city's net worth statement at the close of 1985, in contrast to previous years when it was positive. In essence, this net worth statement shows funds available, accounts receivable, part of the assets and the liabilities. The net worth statement for 1985 was approved by the Court of Accounts and the city's legislative chamber. It is from this net worth statement that we shall take the items discussed below, in order to examine the city's financial obligations and the status of its accounts receivable.

(a) Total liabilities

- 5.31 At the close of 1985, total liabilities were the equivalent of US\$1,162.4 million, of which US\$134.5 million were short-term liabilities and US\$1,027.8 million long-term (US\$734.3 in loans and US\$293.5 in miscellaneous liabilities). The makeup and characteristics of these liabilities are discussed in the following paragraphs.

(b) Long-term liabilities - loans

- 5.32 As mentioned when capital revenues were discussed, the city is using third-party funds to finance its capital expenditures, by means of internal and external borrowing.
- 5.33 These liabilities had the following structure as of December 31, 1985:

(In US\$ millions)

<u>Long-term liabilities - loans</u>	<u>31-XII-85</u>	<u>%</u>
<u>Internal debt</u>		
-Loan contracts	206.2	28.1
-Securities issuances	<u>168.3</u>	<u>22.9</u>
-Total internal debt	374.4	51.0
<u>External debt</u>		
-Loan contracts	359.9	49.0
<u>Total long-term debt</u>	<u><u>734.3</u></u>	<u><u>100.0</u></u>

- 5.34 As of December 31, 1985, 51% of the long-term loans were of domestic origin and 49% from foreign resources.

(c) Internal debt

- 5.35 The internal debt is for loans from Brazilian banks and financial institutions, and for issuances of municipal securities, as shown below:

(In US\$ millions)

<u>Domestic loan contracts</u>	<u>31-XII-85</u>	<u>%</u>
BNH	180.0	48.1
Banco do Brasil	2.2	0.6
CEESP	15.8	4.2
CEF	6.6	1.8
FINAME	1.6	0.4
Total	206.2	55.1
<u>Total municipal securities</u>	168.3	44.9
Total internal debt	<u>374.5</u>	<u>100.0</u>

- 5.36 55.1% of the internal debt was entered into by contract. Most of the loans (US\$180 million) are owed to the BNH (National Housing Bank). These are FIDREN funds to finance the rainwater drainage systems, such as those that will be used to finance the works of the IDB/MSP Program under study in the present Report. Other funds went to financing the São Paulo Subway System, general infrastructure works, highways and urban studies and projects.
- 5.37 Funds from the CEESP (Economic Fund of the State of São Paulo); CEF (Federal Economic Fund); Banco do Brazil and FINAME, a fund of the National Development Bank, were used to finance sanitation and transportation works and education and health sector activities.
- 5.38 These loans have a long-term maturity, generally 18 years. Current repayments will end in the year 2006. By contrast, public bond issues from the City Treasury are redeemed after an average of two years.
- 5.39 The financial policy applied by the city in recent years has been: (i) domestic loans entered into by contract have been repaid in full on their repayment dates; and (ii) securities have been redeemed, but new bonds have been issued simultaneously to pay for the first set of redemptions. In other words, bonds have been 100% refinanced.

(d) External debt

- 5.40 All the external debt was contracted pursuant to Federal Law No. 4131, which regulates entry and exit of funds in and out of the country. For most of these loans, the city itself was the direct

borrower, but in other cases, it received foreign funds through a Brazilian financial institution. The table below shows the breakdown of creditors and amounts of the close of 1985:

(In US\$ millions)

<u>External Debt</u>	<u>31-XII-85</u>	<u>%</u>
SANWA Bank Ltd.	111.4	31.0
Bank of Montreal	31.8	8.8
Eurobraz-European Brazilian Bank	23.3	6.5
Barclays Bank Int. Ltd.	5.0	1.4
Banque Européene pour l'Amérique Latine (BEAL)	5.0	1.4
Merrill, Lynch Int. Bank	2.5	0.7
Banco do Brasil	132.7	36.9
Banco Do Comercio E ind. de São Paulo (COMIND)	40.0	11.1
Banco del Estado de São Paulo (BANESPA)	8.2	2.2
Total	359.9	100.0

- 5.41 The majority of these loans are related to the financing for the São Paulo Subway Transportation System and the urban redevelopment of surrounding areas. The repayment periods for foreign loans are shorter than for domestic loans -five to six years, on average- and the loans will fall due in 1992. The loan from the Banco do Brasil is for a refinancing of an external loan, as explained below. The debt with BANESPA consists of external funds borrowed by the Bank and subsequently reloaned to the City of São Paulo.
- 5.42 The financial policy that the city is applying to the external debt is governed by Federal Government regulations. Between August 1983 and the end of 1985, these repayments were refinanced in their entirety by the Banco do Brasil, which has become the city's creditor for the amounts falling due, and which has assumed responsibility for payment obligations abroad. During 1986, the city paid 15% of the external loans falling due, and refinanced the remaining 85% with the Banco do Brasil. The debt of US\$132.7 million as of December 31, 1985 owed to the Banco do Brasil is the accumulated balance payable under these regulations (Notices Nos. 030 and 09 of the Ministry of the Treasury of the Federal Government). The exception to this policy is the debt with BANESPA, which the city has repaid on each repayment date.

(e) Miscellaneous liabilities

- 5.43 In fiscal 1985, the net worth statement showed two major items of long-term debt that had not previously been recorded, in the amount of US\$293.5 million. The first represents the liabilities of three

independent entities that have a relationship with the city, for the equivalent of US\$95.1 million as of December 31, 1985. The other liability is for court judgements that have ordered the city to pay US\$198.4 million for expropriations.

(f) Financial short-term liabilities

- 5.44 Total short-term liabilities were US\$134.5 million as of December 31, 1985. Outstanding balances payable from fiscal 1985 and earlier years were the major category here. The remaining items were Treasury Bills for anticipated revenues, and miscellaneous creditors.

(g) Accounts receivable

- 5.45 Taxes, rates, fines and other amounts not received during the fiscal year of origin are recorded as accounts receivable in the net worth statement. Once recorded in the books, extrajudicial collection procedures are begun and a computerized notification is issued. The taxpayer is thereby warned that he must make the payment, on pain of legal proceeding and seizure of his property if the overdue amounts are not paid. As of December 31, 1985, the accounts receivable totalled US\$127.6 million, but fell to US\$96.1 million as of September 30, 1986. Collections rose appreciably during the first nine months of 1986, to 11.2% of outstanding accounts receivable, and full repayments represented 21.7% of the balance. The reduction in accounts receivable was due to a tax amnesty granted to those who regularized their accounts in July and August 1986; discounts were given and debts of less than Cz 20.00 (twenty cruzados), the equivalent of US\$1.45, were forgiven. No analysis of the age of the balance is available, but it is known that it contains amounts from several fiscal years. The information available shows that reductions in the balance as the result of repayments have been greater in recent years than actual collections. This is due to the fact that some tax settlements were incorrect and had to be changed in the books. The conclusion therefore is that these balances are merely an indication and not fully representative of actual accounts receivable. The city continues its efforts to reduce these accounts.

(h) The city's liquidity position

- 5.46 The preceding analysis of liabilities and flow of budgetary funds in recent years shows that current fiscal funds were not sufficient to meet all repayments on the public debt, and that part of the debt, particularly the internal bonds and external loans, had to be refinanced. The external loans were refinanced by the Banco do Brasil, which made the payments abroad as they fell due.

7. Conclusions drawn from the historical financial analysis of the City of São Paulo

- 5.47 It is concluded that during the period 1982-1986, the city's capacity to save on current account declined so that it could invest in public

works. This situation may be attributed chiefly to the lower level of collections of taxes as a result of inflation. Consequently, the city was obliged to borrow both at home and abroad in order to meet its capital costs. The repayments on the external debt were medium-term (five to six years), as opposed to the internal debt, where the repayment schedules are longer (around 18 years).

- 5.48 This financial situation has reduced the city's cash position over the period under study, and has forced it into refinancing, particularly of the external debt, with the support of the Federal Government.
- 5.49 As will be seen from the discussion of the financial projections, the increase in the collection of city taxes, which began in 1985-1986, will continue to improve in 1987 and subsequent years, and city finances will recover the investment capacity that characterized earlier years, such as the five years between 1977 and 1981.

C. Local Contribution - National Housing Bank (BNH)

- 5.50 As stated earlier, the local counterpart contribution to the IDB/MSP Program will be made through a contribution of US\$65,000 thousand in São Paulo City Government funds and US\$65,000 thousand in a long-term loan from the National Housing Bank (BNH).
- 5.51 The BNH is an independent bank owned by the Federal Government; its purpose is to finance national-level urban development and sanitation activities, and to grant home purchase loans. It informed the analysis mission that the Program under study has priority for financing.
- 5.52 Given below is a table of the movement of funds over the last fiscal year and financial projections for 1986-1989, including possible financing for the IDB/MSP Program. This will give an idea of the National Housing Bank's capacity to provide its share of the local contribution to the Program.

Source and Use of Funds
BNH
(In US\$ millions equivalent)

<u>Source</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>1988</u>	<u>1989</u>
Time and service fund	753	1,278	1,355	1,436	1,522
Loans and interest	1,092	663	875	1,103	1,229
Reserves	499	378	34	36	37
Government transfers	110	220	468	437	463
Third party funds	(299)	(635)	27	28	30
External loans	175	108	186	-	-
Real property bonds	51	109	-	118	100
Other	77	99	101	103	105
Total	2,458	2,220	3,046	3,261	3,486
<u>Use</u>					
Placements-loans	1,413	1,156	1,856	2,002	2,159
Operating costs	168	164	189	192	197
Repayment external loans	88	98	113	113	113
Interest	79	69	75	71	61
Special obligations	576	595	591	636	682
Social fund	-	137	222	246	273
Total	2,324	2,219	3,045	3,260	3,485

5.53 Loan placements during 1985 totalled the equivalent of US\$1,413 million, and in 1986, will amount to US\$1,155 million. For each of the three years 1987-1989, the average will be US\$2,000 million per year. The loan needed for the local contribution to the IDB/MSP Program will amount to US\$65,000 thousand, to be disbursed over four years. This figure represents a minimal percentage of the BNH's total loans each year. It is therefore considered that the financing is well within the financial capacity of the BNH, that it fits into the goals of its loan policies, and that it has the necessary priority.

5.54 Prior to the first disbursement, the borrower must demonstrate to the Bank that the BNH has agreed to participate in the financing of the local contribution, in an amount not less than the equivalent of US\$65,000. 1/

D. Financial Projections for the City of São Paulo

5.55 The financial projections in the Statement of the Source and Use of Funds for the period 1986-1995, together with the hypotheses and bases used for drawing them up, are given in Annexes Nos. V-6 through

1/ See Resolution.

V-8. The base used are actual 1985 values, while 1986 estimates are given on the basis of 9 actual months and three estimated months.

- 5.56 Current revenues would rise from the equivalent of US\$750.7 million in 1985 to US\$940.8 million in 1986 and US\$1,203.8 in 1987, or annual increases of 25.3% and 28.0% respectively. Such increments are considered feasible, since they would mean levels similar to those achieved in the past (US\$1,041 million in 1978), when inflation had not yet eaten away at city funds. An increase in city funds for 1987 and 1988 that is any larger than this will depend on a hike in land taxes, as would result from the update in the property appraisals approved in a city law passed in 1986. City rates will also see a significant increase because of an update in the basis for calculation (UFM), proposed in the same land tax bill. Collections of the tax on services had already been increasing as a result of the continuous increase in third-party activities. Despite this, 1987 will see a new increase as the result of the update of the UFM, which is the basis for calculation for the self-employed professional workers responsible for paying this tax. Collections of current revenues will continue to increase by 5.9% per year during the 1988-1995 period, as a result of the normal growth in the total number of taxpayers and the level of the economy.
- 5.57 Current expenditures rose significantly in 1985 and 1986, chiefly because of higher personnel costs, which increased 25.5% in 1985 and 48.3% in 1986. In the 1987-1995 period, it is estimated that current expenditures will grow at an annual average of 2.9%, to meet the higher operating and maintenance costs that ensue from the investments in works and equipment. Total current expenditures are estimated to increase from US\$765.6 million in 1985 to US\$1,318.5 in 1995.
- 5.58 In 1985, current expenditures exceeded current revenues by US\$14.9 million; it is estimated that income will exceed expenditures by US\$21.4 million in 1986. The estimated increase in current revenues for 1987, accompanied by a moderate increase in current expenditures, will main a surplus of US\$198.9 million in current revenues. It is anticipated that for the subsequent years in the projection period, the City of São Paulo will maintain its capacity to realize net savings on current income, ranging from US\$224.4 million in 1989 to US\$582.8 million in 1995.
- 5.59 Capital costs had fallen to a low of US\$267.7 million in 1985, chiefly as the result of the decline in the capacity to realize savings on current account. In 1986, the level of capital expenditures rebounded to US\$367.1 million. In 1987, the proposed budget raises this level to US\$417.9 million, and includes expenditures for the IDB/MSP Program. Investments in works, equipment and facilities, estimated at a total of US\$304.2 million in 1987, includes, in addition to the IDB Program, major investments in the education, health, sanitation and transportation sectors. For

the remainder of the period, investments in public works are estimated to be at an average level of US\$200 million per year. Other capital costs include expropriations and repayment of the debt. The category of expropriations will bear a high cost in 1987-1990, as the city makes an effort to bring its current obligations up to date.

- 5.60 The proposed financial policy on repayments is similar to the one applied in 1986: in other words, repayments will be made on internal debts as they fall due -with the exception of securities, which will be totally refinanced- and partial refinancing of the external debt will continue until full repayment is made by 1995.
- 5.61 It is anticipated that credit operations will be required, in addition to the IDB Program, in order to finance the Capital Expenditures Plan included in the projections. This financing will be required in 1987-1990.
- 5.62 The projections show that if the main hypotheses regarding the growth of current income and partial financing of the external debt come to pass, then the city should have no problems in providing the counterpart funds for the IDB/MSP Program. During the Program execution period, surpluses in current income should be US\$240 million per year, and the local counterpart to be paid by the city would be at the most US\$24.8 million in 1988, or 9% of the annual current surplus.

E. Administrative and Financial Viability

- 5.63 It is considered that the funds allocated to the Program will be efficiently administered. There will be an appropriate executing unit that will ensure proper coordination, execution and monitoring of the Program activities. The Unit will use the existing organizational structure in the city government and will receive specialized technical assistance from a national engineering firm.
- 5.64 Financial projections indicate that the local contribution to the Program, which will be made by the city, will depend on an increase in the city's resources, particularly those that belong entirely to it, and will also depend on a continuation of the present policy, which means partial refinancing of the city's debt, with the support of the Federal Government.
- 5.65 The remaining portion of the local counterpart funds, which will come from a National Housing Bank loan, is felt to be viable from the standpoint of the volume of funds handled by the Bank, according to its financial projections.

VI. SOCIOECONOMIC EVALUATION

A. Introduction

- 6.01 This chapter summarizes the major background data and findings of the socioeconomic evaluation of projects selected as representative of the program under review. The major aspect to be emphasized in this regard is the multiple-purpose nature of the proposed works, which combine an attack on environmental and flooding problems in the basin selected with an attempt to improve traffic conditions in the project area. These benefits are independent of each other and have thus been quantified separately, as described in the following sections. Certain costs are nevertheless common to both the highway and canalization works, simply because both occupy the lower valleys of the basins affected. Hence the use made of land and the rechanneling of stream and creek beds exemplify the type of construction that would have to be used in both cases, irrespective of the exclusive selection of one or the other by the project. It is therefore expedient to establish the soundness of the project featuring both objectives for which financing is requested, as well as the profitability of the individual components. A brief description of the methodology used for this purpose follows.
- 6.02 In a multiple-purpose project with common benefits or costs, it is well to analyze the various components separately. The following alternative projects are defined for this purpose: (i) a least-cost project limited to solving the environmental and flooding problem in the areas neighboring the streams i.e. project calling for drainage facilities alone; (ii) a least-cost project to handle only the traffic problem in the areas near the streams, which would be the project for roads alone; and, finally, (iii) a joint least-cost project is considered that satisfies both objectives at the same time. The rule for proper decision-making is therefore to select the alternative of the three listed that offers the greatest net present value. In this particular instance, however, the nature of the works is such that the project featuring roads alone is practically tantamount to the joint project, given the obvious need to drain the area where the road is built. Accordingly, this report will limit its evaluation to the one consisting of drainage alone, as well as the joint project.
- 6.03 The methodology for quantifying benefits described further on concentrates on evaluating the canalization works by estimating the increase in rentals of the neighboring properties. In assessing the roads, the usual methodology for urban transport projects is used, computing benefits resulting from savings in vehicle operating costs and savings in users' time. Certain potential benefits and costs that are difficult to quantify are thus omitted, including: (i) the additional land made available for urban development as a result of

rechanneling the streams. By way of example, the density (housing/ha) in flooded areas is known to represent approximately half that of the rest of the basin, and it would be possible to anticipate an increase in density induced by the project, but the lack of data on implied elasticity precludes an evaluation in this regard; (ii) works execution in many cases implies the removal of numerous shantytowns (favelas). To the extent that adequate compensation is made, it could be anticipated that this group of families would neither win nor lose as a result of the project. It is nevertheless possible that flaws in the relocation process might create some distortion in this respect. Only at the ex post level would it be possible to establish the accuracy of the neutrality assumed by this analysis; and (iii) in terms of the highway works per se, as such, no consideration was given to the benefits resulting from a lower accident rate and reduced environmental pollution, or to the possible increase in induced traffic prompted by the lower transportation cost for users.

B. Selection Criteria and Dimensioning of the Program

- 6.04 The project conceptualization process used by the São Paulo Prefecture started by identifying of water basins with marked recurrence of flooding. Although statistics on this factor are unreliable, field studies identified some 300 flood points in the city. The scope of the project in this respect was limited to the most important water basins within the entire city area. Those rated as having a minimum design flow of 20 m³/sec, 1/ comprise 36, affecting a total area of roughly 85,300 ha. About 10 basins were excluded either because canalization work is under way or because they affect neighboring municipalities or are located upstream of other basins that have not yet been canalized. Finally, the program universe would consist of works in 26 basins encompassing 16,500 ha.
- 6.05 Thereafter the prefecture began establishing priorities in terms of multiple criteria in order to dimension a program in keeping with its financing ability. An examination of the characteristics of the basins proposed by the prefecture for the program made it possible to establish a casuistic correlation between the probability of being selected and: (i) the type of road to be constructed (preferably selecting arterial roads as a proxy for the volume of traffic to be affected); (ii) the number of families affected by flooding (according to data for a 1983 rainy season); and (iii) measurement of the degree of development of the area (density or total population). Since these indicators are generally correlated with anticipated project benefits, explicit prioritization criteria were set forth in

1/ This flow corresponds to a rainfall cycle of 25 years.

the contract for the selection of projects in the context of a multiple-works program. 1/

- 6.06 It is superfluous to cite the additional need for a satisfactory cost-benefit analysis, given the wide variation anticipated in project benefits for each basin, which stems from the individual characteristics of each in terms of environmental and traffic problems. Furthermore, with an investment cost ranging between US\$5 and US\$19 million for each basin, the value of this type of study cannot be underestimated. The works to be included in the program must definitely satisfy the minimum 12% rate of return in accordance with the methodology established.

C. Economic Costs of Investment and Maintenance

- 6.07 This section presents the principal cost data for both investments and maintenance used in this socioeconomic evaluation. The calculation is presented for the joint project and also for the situation whereby execution would be limited to the works necessary for stormwater drainage. Table 6.1 summarizes the principal data. The total cost of the works to be executed in the four basins of the sample amounts to US\$82.9 million at October 1986 financial prices. This value represents 38% of the total cost of construction under the program. In contrast with the table of costs for the program in chapter III of this report, the data included here consist of: (i) all of the basic costs of civil works for canalization, paving, bridges and surface drainage; (ii) in addition, the total cost resulting from expropriation; (iii) unlike the previous table cited, here we include the estimated cost for relocation of the shantytown dwellers now living in the valleys that will be affected by the construction; 2/ (iv) to the foregoing total, the engineering and administration cost (11.6%), prorated according to the cost of each project in the sample, are added, with an additional 12% for physical contingencies. Following the usual methodology, the economic calculations omit future cost escalation and the financing charges.

1/ Another key variable normally used as a criterion for selection or prioritization is the level of investment expenditures by the beneficiaries. In this particular case, however, many of the cost estimates are dubious; moreover, no preliminary traffic studies are available to establish the denominator of that coefficient.

2/ In the basins of the sample, this cost amounted to roughly US\$9 million, using the highest-cost alternative for the relocation of some 2.000 families.

Table 6.1

Economic Costs of the Project
(in October 1986 US\$000)

<u>Basin</u>	<u>Joint Project</u>		<u>Project of Drainage Only</u>		<u>Maintenance</u>		<u>1/</u>
	<u>Financ. prices</u>	<u>Econ. prices</u>	<u>Financ. prices</u>	<u>Econ. prices</u>	<u>Econ. Canals</u>	<u>Prices Roads</u>	
Lauzane	10,046	8,022	7,468	5,798	-178	73	
Morro do "S"	32,827	26,713	25,321	20,236	-341	119	
Itaquera	28,836	23,143	21,139	16,502	-279	98	
Moóca	11,153	9,274	7,279	5,931	-121	99	
Total	82,861	67,153	61,207	48,467	-919	389	
	=====	=====	=====	=====	=====	=====	

1/ Expressed in present (1986) values.

- 6.08 Economic computation of costs also requires conversion of the market prices used for budgetary purposes so that they will accurately reflect the real opportunity cost entails by the resources used for the project. To this end, conversion factors were estimated for border market prices by category of inputs, as follows: (i) in the case of directly imported materials and equipment, the factor is 1.0, since customs duties do not apply here; (ii) for national materials and equipment, factors of 0.87 and 0.80, respectively, were used, resulting from discounting various taxes applied to this type of goods in Brazil as computed in other recent projects analyzed by the Bank; (iii) for skilled labor, the factor is 0.73, the result of applying a standard conversion factor (0.87) to the wage budgets, discounting certain internal transfers (income and social security taxes); (iv) in the case of unskilled labor, the factor is 0.59, given the rural wages in the areas from which São Paulo attracts this type of labor; and (v) finally, in the case of land expropriation, the standard conversion factor (0.87) was used.
- 6.09 The net result of valuing the resources at their opportunity cost is to reduce the market price cost by approximately 19%. This brings the total economic cost of the projects in the sample to roughly US\$67 million.
- 6.10 The following columns of table 6.1 present the cost estimates when construction is limited to the necessary works for the stormwater drainage of the basins. For this purpose, as compared with the costs of the joint projects, the following were deducted: (i) a large proportion of the paving costs entailed by the construction of

arterial roads; in every case, the required budgets are maintained for removal, replacement and/or upgrading of existing smaller roads necessary for the canalization works; and (ii) in all cases, the total expropriation amounts necessary in the project area are reduced significantly (between 30% and 60%) when the strips of land required for the highway works are smaller. In economic terms, the total cost of these drainage projects would be about US\$48.5, representing an average 72% of the joint-project cost. As indicated further on, the benefits of the drainage works, are applied directly to these budgets.

- 6.11 The cost difference between the joint project and that of drainage alone represents the marginal cost of building the proposed arterial roads. This cost is different from the one required by a project exclusively aimed at improving traffic conditions in the basins under review. In fact, in this latter situation, construction of adequate drainage to protect the roads would be equally necessary. Furthermore, the drainage works required for this purpose would be identical to those contemplated for the joint project. Accordingly, it is estimated that: (i) the cost of the project including arterial roads alone is equal to that of the joint project; and, consequently, (ii) the marginal cost of the stormwater drain project is zero.

D. Least-Cost Analysis

- 6.12 In principle, the budgets cited satisfy the condition of representing least-cost solutions for the proposed objectives. In the specific case of the Morro do "S" and Itaquera canals, the direct result of an analysis of alternatives was adoption of trapezoid sections at a cost approximately 20% below that entailed by using rectangular sections. In both situations, the open canal costs less than the closed one. This alternative was not applied to the Lauzane and Moóca canals, since the scheduled works represent continuations or affluents of existing canals where, for technical reasons having to do with the runoff of water and emptying of garbage, continuity must be maintained in the principal design parameters. Similarly, for the arterial roads the parameters established by the Prefecture of São Paulo were used, which take into account anticipated volumes of traffic, the types of vehicles, etc., correlating the specifications used with the construction costs. In addition, estimates of alternatives were presented that compared the use of rigid vs. flexible pavement and it was found that the latter would entail unit costs of less than around 40%.
- 6.13 It should also be noted that the concept of a joint design of the drainage and arterial road construction was reviewed in terms of the complementarity of both. Special emphasis was placed on evaluating the trade-off between building an open canal with roads on either side, which would entail higher costs for expropriation and earthwork, versus construction of a closed canal where stormwater drainage would be situated underneath the roads. The final solution

adopted in each case reflects the best alternative, taking into account the specific topography of the basin, availability of land, type of road to be built, etc. ^{1/}

- 6.14 In terms of creek maintenance costs, economic savings are equivalent to about US\$11,000 per km/yr. This is the result of the substantially lower need for equipment than is now used to remove of sediment and litter and for works to protect and widen the natural channels. Expenditures for cleaning and water intake repairs remain constant, with or without the project. Net savings for the group in the sample would amount to roughly US\$0.9 million, as indicated in table 6.1.
- 6.15 Annual economic costs equivalent to US\$4,000/km/lane/year were computed for road maintenance, consisting essentially of patching and resurfacing in 12 years at an economic cost of US\$49,000/km. In terms of present value, this incremental cost is roughly US\$389,000 for the group of projects during the analysis horizon; a breakdown for each basin appears in table 6.1.

E. Benefits Resulting from Canalization Works

- 6.16 The canalization of creeks and streams has an impact on numerous factors that affect the quality of life of families living nearby. Perhaps the most noteworthy is elimination of the harm caused by flooding in the areas immediately adjacent to these creeks, including damage to houses and property, local traffic bottlenecks, and the interruption in traffic using roads in flooded zones, with the consequent loss of time for the persons affected thereby.
- 6.17 In addition, however, the presence of these streams has a negative effect on environmental conditions in a much wider area than that directly affected by floods. The dubious sanitary conditions in many of these places contribute to bad odors, possible waterborne disease, and in some instances the proliferation of rats. Those factors are generally the result of relative low sanitary sewer system coverage (50% for all of São Paulo) and the absence of an effective garbage collection system. It is nonetheless evident that poor runoff in these creeks contribute to a worsening of population health conditions.
- 6.18 Another important factor in the extended impact of improved creek conditions lies in the simultaneous need to make land available for construction. In many cases, this land is now unlawfully occupied

^{1/} In part, this joint solution analysis discards certain alternatives associated with the type of materials to be used for canalization work (gabions, stone, plain concrete, or earth), the shorter useful life of which would adversely affect traffic by requiring frequent interruptions to repair or replace the canal walls.

because of the disorganized development resulting from the heavy pressure of encroaching population in urban areas. Furthermore, these squatters are persons with very low incomes, whose extreme poverty conspires to bring down property values in the neighborhood.

- 6.19 One possible method that could be used to quantify such benefits would be to examine and assign individual values to each of the elements cited above. Due to the inherent difficulty of measuring some of them; the quantities of information that would be needed; and particularly because of the availability of a socioeconomic survey on the rentals paid for housing and the determinants thereof, however, we have chosen to include all those benefits under the heading of property values in the area of influence. This methodology and its principal findings in each instance are discussed below.
- 6.20 For purposes of economic analysis, a dwelling may be considered as an indivisible combination of its various components: e.g., type of building, construction materials, size, number of rooms, etc. A dwelling may also be defined in terms of the characteristics of the street and district where it is located, primarily: access to public utilities (electricity, gas, telephone, and its like), schools and hospitals; proximity of work centers, etc. All of these elements are evaluated by the users and potential buyers of homes in deciding where to live, where to build, the type of housing to be purchased, etc. From the market standpoint, the price of the housing -or the rental a family pays- summarizes the marginal value of the various features. In addition, under certain conditions of consumer rationale, competitiveness of the housing market, and transparency of information, the rental figure usually reflects the families' maximum willingness to pay for a specific dwelling.
- 6.21 If we accept that premise, willingness to pay for each of the individual housing features may be established by using the technique of "hedonic prices." This simply correlates the rentals posted for a group of dwellings with qualitative and quantitative indicators of their principal characteristics. The primary hypothesis of such evaluation is therefore that, "ceteris paribus," housing located near an unchanneled creek will rent for less than dwellings elsewhere. Accordingly, the project will have the effect of raising rentals in the surrounding area, thus reflecting the anticipated benefits.
- 6.22 Annex VI-1 discusses the basic data used to verify this hypothesis: here we simply summarize the main conclusions. Suffice it to say, however, that a socioeconomic survey covering some 2,000 representative families living in 21 of São Paulo's water basins was used. Based on that survey, the following were established: (i) the area of influence for each canalization work in the representative sample; (ii) the unit benefits anticipated; and (iii) the total benefits expected from this source. These factors are discussed below.

6.23 Table 6.2 summarizes the principal parameters governing the computation of socioeconomic benefits. The possible universe that would be affected by projects in the sample was predefined as the area comprising the basins or subbasins that would be affected by canalization works. It amounts to some 4,500 ha, taking into account exceptionally the case of Itaquera, where the canal would be down-stream from the basin, making the total area to be drained in the future practically 5,000 ha. Accordingly, only the area to be drained directly in this stage is included. Similarly, in the case of Moóca where this stage of canalization is located upstream of the basin, only the latter sector would be part of the universe subject to effects from this source. ^{1/}

6.24 Based on the socioeconomic survey cited above, and pursuant to the methodology used, the sphere of influence of the canalization works is defined as the area in which rental prices of housing are affected by proximity to the stream or creek. Thus, on balance, little more than 54% of the total area of basins in the sample would increase in value as a result of the project. Considering the 1980 census data and recent projections, in 1985 some 113,000 families lived in the area scheduled for betterment.

Table 6.2
Summary of Benefits from Drainage Works

<u>Basin</u>	<u>Total Aasin Area(ha)</u>	<u>Area of Influence Size(ha)</u>	<u>Families 1985</u>	<u>Growth (% p.a.)</u>	<u>Housing Value (Cz\$/mo.)</u>	<u>Present Value Benefits (US\$ 000)</u>
Lauzane	485	267	15,423	2.3	106	5,513
Morro do "S"	2,321	1,277	55,704	6.7	106	28,220
Itaquera	1,512	862	36,288	3.5	106	13,559
Moóca	172	36	5,642	2.8	106	808
Total	4,490	2,442	113,057			48,100
	=====	=====	=====			=====

6.25 Based on the econometric procedures cited in Annex I, an incremental value for rentals has been established at Cz\$106 monthly per housing unit. Depending on the basin, this represents increments of between 6% and 25% of present rentals paid in the zones surveyed.

6.26 Taking into account all these elements and: (i) the construction timetable, calling for those at Lauzane and Moóca to take nearly two years and those at Itaquera and Morro do "S" three years; (ii) an

^{1/} The low-living area, where canals have already been built, drains about 78 ha more than the number of ha considered here.

analysis horizon of 20 years; (iii) the population growth rates indicated in table 6.2, based on recent projections of density; and (iv) a 12% discount rate, benefits from this source amounted in the aggregate to more than US\$48 million. Naturally, these amounts vary in direct proportion to the size of the area of influence, becoming much lower in the case of Moóca (US\$0.8 million) and higher at Morro do "S" and Itaquera.

F. Benefits from Road Construction

- 6.27 The proposed highway construction in the valley where canals would be built is designed mainly to extend or connect São Paulo's existing arterial grid. This is expected to improve traffic conditions by providing access to new routes that will allow vehicles to move under less congested conditions. The resulting economic benefits are summarized, as for any type of highway project, by quantifying: (i) savings of fuels, lubricants, maintenance, etc. for the vehicles affected, basically the result of operation at more efficient speeds stemming from the increased capacity of the highway network; and (ii) users' time savings, which represent the principal source of benefits from modern highway projects, simply because of the greater number of persons usually affected by such works. As is customary, the evaluation here was limited to the savings of time for people traveling to work, an economic cost equal to 50% of the opportunity cost of labor.
- 6.28 A detailed description of the methodology, bases and assumptions used to establish those benefits appears in Annex VI-2. It should be noted here, however, that traffic counts and origin/destination surveys conducted in the areas of each road to be constructed were used to determine present traffic flows and projections up to the year 2000. At the same time, average operating speed was established for each section of the road. With this simulated introduction of the new road, traffic in the grid was rerouted to minimize travel time between each starting point and destination. For the most part, faster operating speeds were achieved throughout the network with the consequent savings in users' time. The vehicle operating costs, in accordance with the speed used, may be used to estimate the savings in fuel, etc. for the traffic affected.
- 6.29 The brief explanation above shows that the type of benefit measured here results mainly from the detour of traffic that would occur when the new road section is added, as well as from increased speed of the vehicles when they no longer have to travel through crowded streets. Other types of benefits generally associated with paving were not taking into account since they were believed to be either negligible in amount or difficult to quantify. Suffice to say that: (i) an improvement in traffic conditions allows safer vehicle operation, thus avoiding material damage and human casualties resulting from accidents; and (ii) a new road has a favorable impact on a broad urban zone of influence, allowing such benefits as better access to

newly urbanized areas, or helping to densify existing ones. This induced growth and the benefits thereof are not considered in this analysis. The major findings of the study on each road in the representative sample are described in the following paragraphs. 1/

6.30 The road over the Lauzane stream would be 2.64 km long, with a capacity of 4,000 vehicles an hour. It is estimated that in 1986, total traffic on the highway network in the neighborhood of this construction would amount to some 73,000 vehicles (93% of which would be automobiles), and that figure would increase to almost 97,000 by the year 2000. With the project, this type of feeder road is expected to attract traffic of an average 20,000 vehicles a day in the segment between Avenida Imirin and Avenida Cons. Moreira Barros and 9,800 vehicles between that intersection and Av. Zumkeler. Most of this traffic would be detoured from Caetano Alvares, a secondary artery in the Av. Imirim area that is used by an average 35,000 vehicles a day. At the same time, the new road would reduce rush hour bottlenecks on a segment of Av. Zumkeler that has daily traffic of some 10,000 vehicles. Present speeds on those segments are 29 km/hr and 13 km/hr, respectively, which would be stepped up to 32 km/hr on Av. Caetano Alvares and 28 km/hr on Av. Zumkeler. The economic benefits from this rerouting of traffic, considering all of the segments in the network, would amount to about US\$1,640 a day from savings in vehicle operating costs, rising to US\$4,700/day by the year 2000. At the same time, savings in users' time amount to 830 hours a day with a total value of US\$840/day. Those savings would increase to 3,600 hours, amounting to US\$3,600/day, by the year 2000. 2/

6.31 The 6.1 km road over the Morro do "S" stream would affect a daily volume of traffic in excess of 200,000 vehicles, which is expected to reach 330,000 by 2000. By attracting some 15,000 a day between the Estr. Itapecírica and Av. G. Gronchi, plus another 33,000 from that intersection to its terminal point at Avenida João Dias, this construction would greatly relieve the congestion on Estrada Itapecírica, which the Morro do "S" alternative practically parallels. At present, 25,000-40,000 vehicles use the various Itapecírica segments in the area of Morro do "S" every day, and although traffic moves slowly (about 25 km/hr during rush hours), even now, the rapid growth of the area of influence (particularly in the Campo Limpo sector) is expected to result in a marked increase in bottlenecks. By the year 2000, the most important stretches -those

1/ Annex IV-2 contains the new basic numerical findings and diagrams of the road grid analyzed in each instance.

2/ The average value of one hour's time varies from one project to another as well as over a period of time, depending on the distribution of traffic between automobiles and buses.

between A. Elias Mass and Rua das Belezas- will be virtually saturated, slowing traffic to a snail's pace of 8 km/hr at the rush hour. With construction of Morro do "S", present speeds would rise to 32 km/hr and 24 km/hr by the year 2000. The resulting benefits from vehicle operating costs (VOC) would rise from the existing 1986 level of US\$531/day to US\$5,544/day by 2000. The daily time savings for users would be 563 and 6,300 hours, respectively, representing US\$912/day in 1986 and US\$9,800 day in 2000.

- 6.32 Construction of a 4.6 km primary artery is proposed at Itaquera and Itaqueruna creeks, with a capacity for 4,000 vehicles/hour. These routes constitute the natural extension of Av. Imperador (10,000 vehicles/day), linking it to Av. Marechal Tito (18,000 vehicles/day) and thus making it the alternative of choice to connect traffic to or from the city's Penha, Central and western districts with those in the east: Itaim, Guaianazes, Suzano and São Miguel. On its main segment, the route is expected to attract about 9,000 vehicles at 1986 traffic levels and 15,000 by the year 2000. The detoured traffic would eliminate congestion on the present route between those points of origin and/or destination, and relieve anticipated traffic congestion on Av. São Miguel (19,000 vehicles at present), while partially removing some bottlenecks on this route in the Av. Nordeste area (with 23,000 vehicles in 1986, this section will be saturated in 2000). The present crosstown route between Av. Imperador and Av. São Miguel (18,600 vehicles) is also expected to undergo some easing of the saturation forecast for 2000. Unlike the previous instances, this rerouting of traffic results in a net loss as compared with vehicle operating costs under present traffic conditions, 1/ although this is primarily due to rerouting non rush hour traffic in the same way as for the rush hours. 2/ When the project starts to operate (1990), however, benefits from this source would amount to US\$806/day, rising to US\$3,360/day in 2000. The total number of daily hours of users' time saved amounts to 110 in 1986, rising to 4,900 in 2000: the corresponding benefits would be US\$318/day and US\$7,950/day, respectively. 3/

- 6.33 The road to be build over the Mõoca stream -with an hourly capacity of 8,000 vehicles and a length of 1.9 km between Rua José Antonio Fontes and Estrada Casa Grande- would connect Anhaím Mello (15,500 vehicles a day in 1986) and Av. Sapopemba, which now constitute the

1/ It should be remembered that the purpose of rerouting traffic is to minimize travel time, not operating costs.

2/ See Annex VI-2 for comments on this methodology.

3/ The apparent high growth rates of these benefits result from the relatively small benefits generated by rerouting traffic in 1986, which reach levels comparable to those of other projects only in subsequent years with the emergence of various bottlenecks in the highway network under review.

main link between the central and peripheral areas of the city, particularly the district of São Mateus. As a result of the project, traffic tie-ups would be reduced on Av. Oratorio (20,000 vehicles/day and average speeds of only 11 km/hr) and other main cross streets: Estrada Casa Grande (8,000 vehicles/day) and Rua Francisco Fett (10,000 vehicles/hr and speeds of 10 to 13 km/hr). Savings in the vehicle operating costs would yield benefits equivalent to US\$1,580/day under 1986 traffic conditions. By the year 2000, that figure would climb to US\$5,800/day. Users' time savings would amount to 1,300 and 6,400 hours a day in the years cited, equivalent to US\$1,700/day in 1986 and US\$7,500/day in the year 2000.

- 6.34 Table 6.3 summarizes the major results for each basin in the sample and indicates the amount of benefits in terms of present value, taking into account: (i) the year each road starts operating in accordance with the schedules established; and (ii) the assumption that the benefits are constant starting in the year 2000 in regard to saturation points anticipated in certain sectors so that new projects changing the present computations would be required at that time. In terms of present value for the overall sample, benefits are estimated at US\$64 million, 41% of which are associated with reduced vehicle operating cost.

Table 6.3
Summary of Benefits from Road Construction

Road	VOC Savings (US\$/day)		Savings of Time (Hours/day) 1/		Present Value of Benefits (US\$ 000)		
	1986	2000	1986	2000	COV	Time	Total
Lauzane	1,646	4,701	827	3,632	7,060	5,076	12,136
Morro do "S"	531	5,544	563	6,306	6,940	12,310	19,250
Itaquera	-217	3,366	111	4,892	3,879	9,687	13,566
Moõca	1,579	5,826	1,327	6,430	8,346	10,530	18,876
Subtotal	3,538	19,436	2,828	21,260	26,224	37,603	63,827
	=====	=====	=====	=====	=====	=====	=====

G. Summary of Results

- 6.35 Table 6.4 summarizes the principal flows of cost and benefits quantified for projects in the representative sample. They showed that in every case, simultaneous execution of the drainage and road construction works provides projects with profitability ranging from 18% to 30%, considerably higher than the 12% required by the Bank. These return rates in turn represent net flows equivalent to some

1/ Excluding truck operating time, which is included in the computation of vehicle operating cost (VOC) savings.

US\$26 million for Morro do "S" and between 11 and 12 million for each of the other projects, thus resulting in a total US\$59 million in benefits for the sample.

- 6.36 The same table establishes the advantage of the joint project over that of drainage work alone. The latter, although profitable per se in three of the four cases examined, present net benefits that fall considerably short of those for the joint project. This is obviously the result of the significant marginal contribution of road construction, which adds net benefits on the order of US\$49 million for the profits in the sample.

Table 6.4
Summary of Results
(present values, US\$ 000)

	<u>Lauzane</u>		<u>Morro do "S"</u>		<u>Itaquera</u>		<u>Moóca</u>		<u>Total</u>	
	<u>Joint Project</u>	<u>Drainage Alone</u>	<u>Joint Project</u>	<u>Drainage Alone</u>	<u>Joint Project</u>	<u>Drainage Alone</u>	<u>Joint Project</u>	<u>Drainage Alone</u>	<u>Joint Project</u>	<u>Drainage Alone</u>
t costs	6,671	4,822	21,304	16,138	18,052	12,872	7,675	4,909	53,703	38,741
ce costs	-105	-178	-222	-341	-181	-279	-22	-121	-530	-919
values	5,513	5,513	28,220	28,220	13,559	13,559	808	808	48,100	48,100
per. costs	7,060	-	6,940	-	3,879	-	8,346	-	26,224	-
f time	<u>5,076</u>	<u>-</u>	<u>12,310</u>	<u>-</u>	<u>9,687</u>	<u>-</u>	<u>10,530</u>	<u>-</u>	<u>37,603</u>	<u>-</u>
Benefits	17,649	5,513	47,470	28,220	27,125	13,559	19,684	808	111,927	48,100
its	11,082	869	26,389	12,423	9,255	966	12,030	-3,979	58,755	9,360
	30.7	14.7	24.4	20.5	18.1	13.1	28.8	-6.3	23.9	15.1
ost ratio	2.7	1.2	2.3	1.8	1.5	1.1	2.6	0.2	2.1	1.1

- 6.37 In terms of the structural benefits, it is found that in the aggregate, 43% of the total computed results from enhanced property values resulting from the drainage works. Of the benefits connected with vehicle traffic in the small basins (Lauzane and Moóca), 40% of the total come from savings in vehicle operating costs as compared with a mere 15% in the larger basins. This is the result of the greater relative incidence of users' time savings in those cases. Finally, except in the case of Itaquera, anyone of the three benefits assessed is alone adequate to justify the joint project. This contributes significantly to the high profitability rates posted.
- 6.38 The foregoing factors also bear witness to the high margin of safety in the results obtained. For example, the benefit/cost indicators are 1.5 in the case of Itaquera and more than 2.3 in the remaining instances. In addition, as is evident in Table 6.5, only in the extreme case of completely overlooking any benefit resulting from enhanced property values would rates lower than 12% be obtained in the Morro do "S" and Itaquera basins (10.9% and 8.7%, respectively).
- 6.39 Table 6.5 also presents the results of delaying each of the projects. It shows that if start-up is delayed by one year, there would be a loss of net present value amounting to some US\$3.3 million as compared with the current actual value. It is therefore concluded that the starting date is optimal in all individual cases.
- 6.40 The aggregate results cited lead to the conclusion that the project selected for the sample satisfy the minimum profitability requirements established by the Bank. This conclusion was further confirmed by means of a sensitivity analysis. In addition, the timeliness of the projects was found to be optimal.

Table 6.5

Sensitivity Analysis (Internal rates of return)						
	<u>Lauzane</u>	<u>Morro do "S"</u>	<u>Itaquera</u>	<u>Moóca</u>	<u>Total</u>	<u>Elasticity IRR/Parameter</u>
Base cost:	30.7	24.4	18.1	28.8	23.9	
Investment cost + 25%	25.4	20.5	14.7	24.0	19.8	-0.69
Improved property values ^{1/}						
-25%	28.5	21.5	16.0	28.6	21.7	+0.37
-100%	21.9	10.9	8.7	27.8	14.5	+0.39
Growth rate of affected properties						
-50%	30.0	21.3	16.8	28.7	22.1	+0.15
Value of time						
-25%	28.9	23.2	16.7	25.7	22.3	+0.27
-100%	23.3	19.4	11.7	14.6	16.9	+0.29
Benefits VOC savings						
-100%	19.8	21.6	15.8	18.0	19.1	+0.20
Cost of postponing projects by one year (in net present value)	883	1,490	260	684	3,356	-

H. Analysis of Distributive Impact

- 6.41 A quantification follows of the changes in income flows for the three economic agents affected by the project: the private low-income group; other private groups; and the public sector. The low-income line used for this purpose is the one agreed upon between the Bank and Brazil, which in August 1986 amounted to Cz\$10,139.7 per capita per year.
- 6.42 In respect to the expenditures resulting from investments and maintenance of both roads and canals, the only surplus accruing to the low-income private sector is the wage difference for unskilled labor that is implicit in computation of the shadow prices. This

^{1/} Equivalent to the same percentage of reduction in the number of dwellings affected.

transfer represents 28% of the wages budgeted for such labor. In the specific case of canal maintenance, the flow is negative since less labor would be contracted for this purpose as a result of the project. As indicated in Table 6.6, the transfers involved in such outlays amount to some US\$2.2 million in present value.

- 6.43 To distribute the benefits resulting from savings in vehicle operating costs, the following assumptions were used: (i) in the case of automobiles, the benefits go to the owners thereof, who do not belong to low-income groups; 1/ (ii) a survey was conducted on bus users, classifying them by minimum income levels, and it was found that 86% of bus riders are from the low-income groups; 2/ (iii) for trucks, the participation of low-income families in the entire city was used (59% as explained in the preceding paragraph); (iv) it should be noted that the foregoing values apply to users' private savings, which exceed the economic savings quantified in the preceding sections as a result of the several taxes which the government applies to the various inputs. Accordingly, this last sector has a net outlay less taxes.
- 6.45 In the case of the benefits quantified by the reappraisal of properties, it is expected that they will be transferred to a significant extent to the owners of those homes. We have no information, however, in the project area to define the distribution of those owners by income levels. 3/ Consequently, this component was not included in the following calculation, reflecting only the impact of the highway component. 4/
- 6.46 The net result is that benefits accruing to the private sector amount to some US\$132.3 million, of which US\$19 million go to low-income groups. When those figures are added to the costs previously quoted, the resulting coefficient of distributive impact would be 16%, representing a transfer on the order of US\$21.2 million to low-income sectors from projects in the sample.

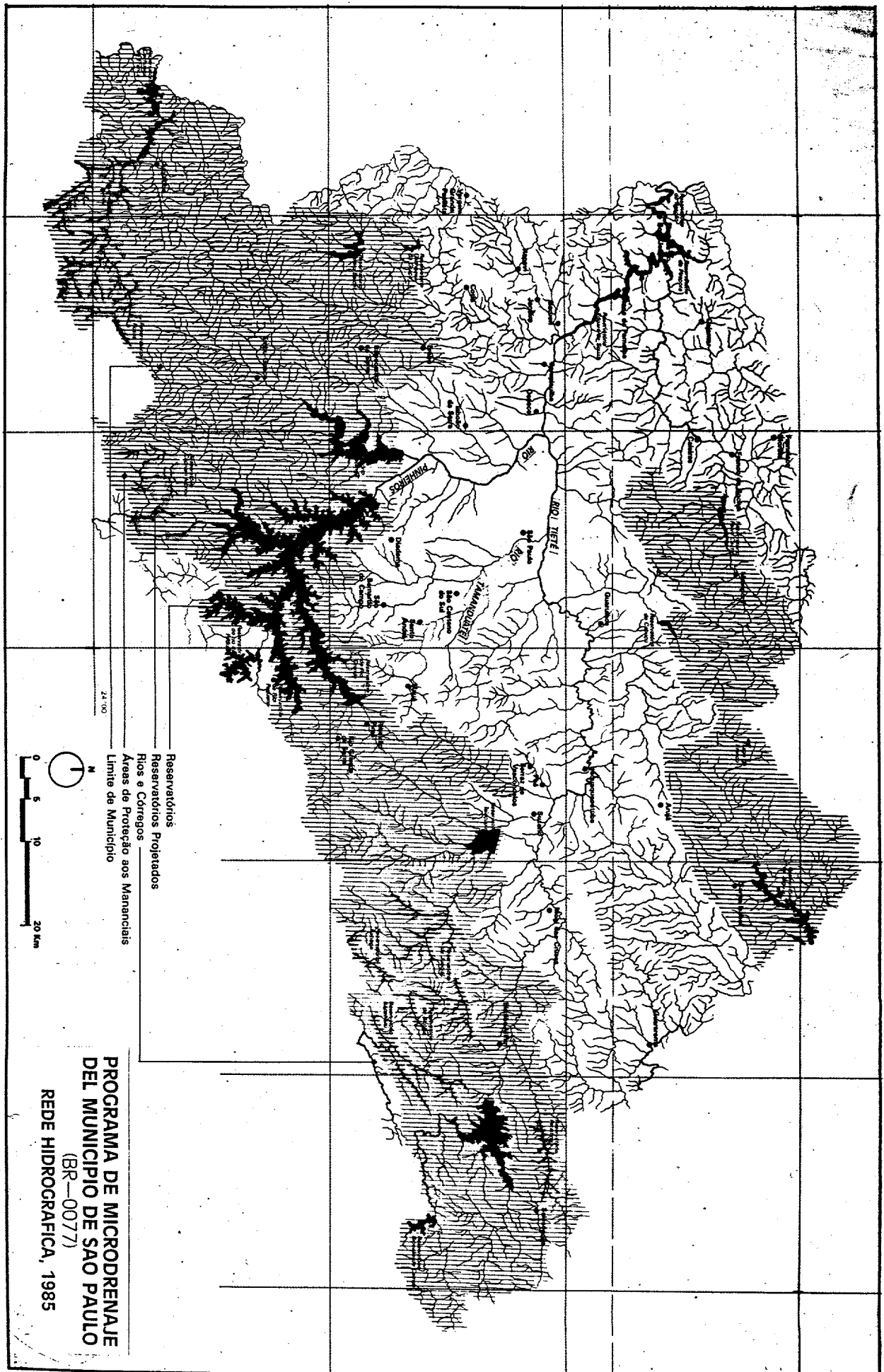
-
- 1/ The minimum income for acquisition of a vehicle would be about Cz\$7,200 a month, practically double the low-income level (per family/month) cited above.
- 2/ In this case and in the one involving trucks, it was assumed simplistically that all benefits accrue to the users or owners of the freight.
- 3/ The socioeconomic survey only gathered information on renters of the homes in the service area. In addition, there are no tabulations in this regard from the recent population census.
- 4/ In aggregate terms, the impact of only 67% of the cost of the project has been reflected in the calculation.

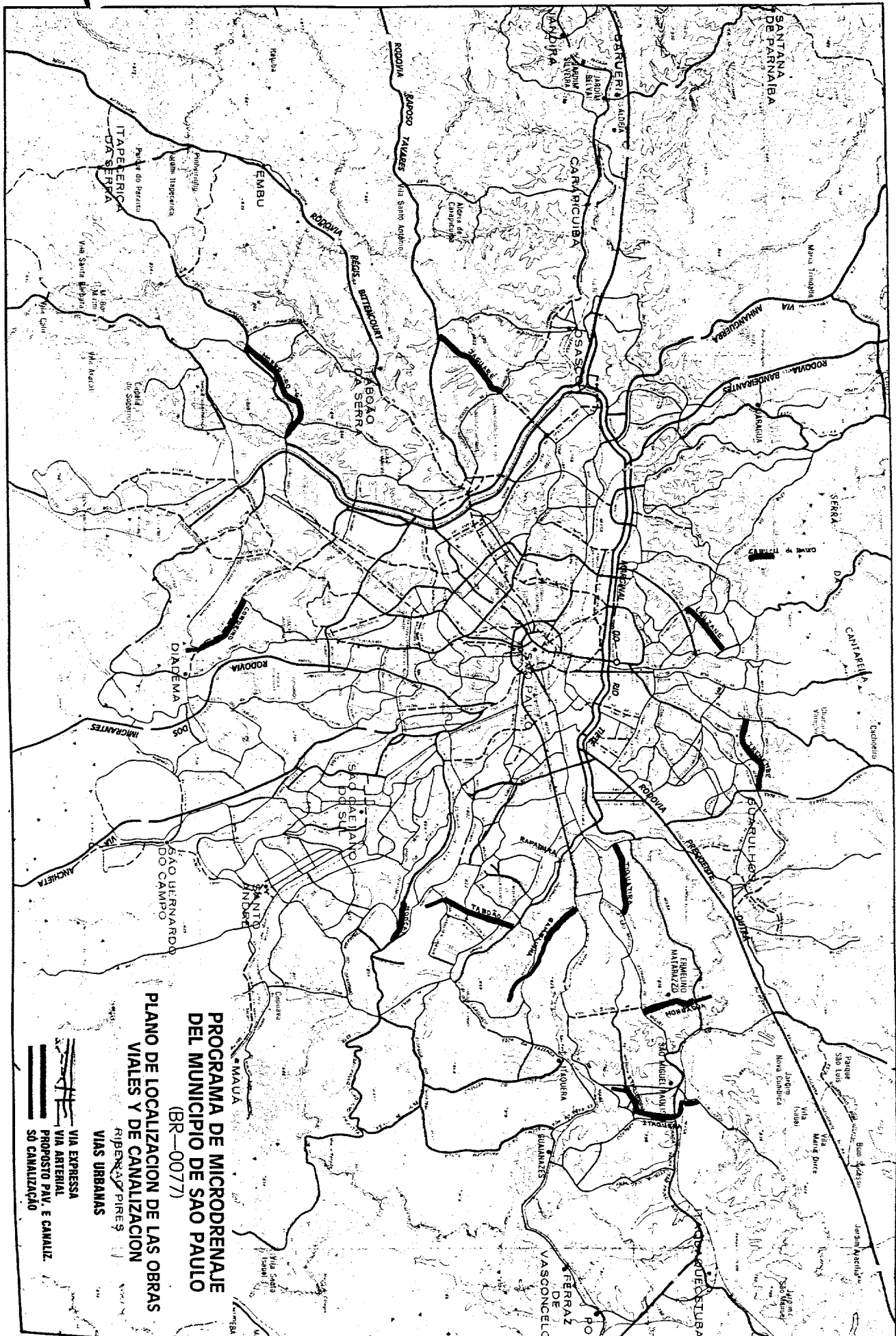
Table 6.6
Summary of Distributive Impact ^{a/}
(Present values, US\$000)

<u>Item</u>	<u>Low- Income</u>	<u>Other Private</u>	<u>Total Private</u>	<u>Public Sector</u>	<u>Net Economic</u>
Investment	2,148	0	2,148	-55,851	-53,703
Maintenance					
- Canals	-4	0	-4	923	919
- Roads	24	0	24	-413	-389
Subtotal, costs	2,169	0	2,169	-55,342	-53,173
Vehicle operation					
- Automobiles	0	38,501	38,501	-17,978	20,523
- Buses	4,077	664	4,741	- 1,308	3,433
- Trucks	1,709	1,642	3,351	- 1,082	2,269
Savings of time					
- Automobiles	0	22,220	22,220	0	22,220
- Buses	13,230	2,154	15,384	0	15,384
Subtotal, benefits	<u>19,017</u>	<u>65,181</u>	<u>84,197</u>	-20,368	<u>63,829</u>
Total	<u>21,185</u>	<u>65,181</u>	<u>86,366</u>	-75,710	<u>10,656</u>

Distributive impact coefficient: 34%

^{a/} These figures refer to the representative sample, which represents 38% of the total anticipated cost of the program.





RELACION DE LAS PRINCIPALES CUENCAS HIDROGRAFICAS
DEL MUNICIPIO DE SAO PAULO

- | | |
|----------------------|---------------------|
| 1. Jaguaré | 28. Meninos |
| 2. Pirajussara | 29. Oratorio |
| 3. Morro S. | 30. Mooca |
| 4. Ponte Baixa | 31. Parque de Mooca |
| 5. Sao José | 32. Cassandoca |
| 6. Rio das Pedras | 33. Tatuapé |
| 7. Olaria | 34. Aricanduva |
| 8. Zavuvus | 35. Tiquatira |
| 9. Polí | 36. Mongagua |
| 10. Cordeiro | 37. Jacu |
| 11. Agua Espraiada | 38. Itaquera |
| 12. Triacao | 39. Agua Vermelha |
| 13. Ubeiraba | 40. Lageado |
| 14. Sapateiro | 41. Itaim |
| 15. Iguatemi | 42. Cabucú de Cima |
| 16. Verde | 43. Novo Mundo |
| 17. Corujas | 44. Apereiba |
| 18. Vila Hamburguesa | 45. Vila Guilherme |
| 19. Tiburtino | 46. Carandirú |
| 20. Agua Preta | 47. Mandaqui |
| 21. Sumaré | 48. Cubucú de Baixo |
| 22. Pacaembú | 49. Guarapiranga |
| 23. Anhanguera | 50. Cougo |
| 24. Anhangabaú | 51. Pirituba |
| 25. Aelimacao | 52. Rib. Vermelho |
| 26. Ipiranga | 53. Cintra |
| 27. Moinho Velho | 54. Embu |

TABELA 8 - OFERTA DE CANALIZAÇÃO DE CORREGOS NO MUNICÍPIO DE SÃO PAULO,
POR ADMINISTRAÇÃO REGIONAL - 1984.

AR	CORREGO EXISTENTE (m)	CORREGOS CANALIZADOS (m)	%
BT	117.400	33.382	28
CL	73.400	1.790	2
FO	142.765	33.048	23
IG	282.650	5.557	2
IP	64.400	32.795	51
LA	30.350	27.636	91
ME	74.800	2.504	3
MG	37.700	18.870	50
MO	43.800	30.020	69
PE	65.896	8.708	13
PI	30.000	22.925	76
PP	242.660	17.555	7
SA	90.580	22.140	24
SE	11.200	11.017	98
ST	80.559	17.282	22
VM	63.350	46.315	73
VP	100.600	20.387	20
TOTAL	1.552.110	351.931	23

FONTE: Diagnóstico Regionalizado de Infra-Estrutura
do Município - SEMPLA

ANO : 1985



QUADRO VII - EXTENSÃO E NÚMERO DE PONTOS DE ENCHENTE NA ÁREA DE INFLUÊNCIA DO PROJETO (*)

PROJETO	ÁREA DE INFLUÊNCIA(ha)	ÁREAS INUNDÁVEIS (ha)	Nº DE PONTOS DE ENCHENTE
Córrego Tiquatira	512	6	1
Córregos Aricanduva	625	175	8
Córrego Gamelinha	1.470	138	7
Córrego Itaquera/Itaqueruna	687	47	7
Córrego Morro do "S"	1.725	32	10
Córrego Jaguaré	1.125	37	4
Córrego Lauzarne	1.175	106	6
Córrego Cordeiro	487	19	3
Córrego da Moóca	250	18	1
Córrego Taboão	575	82	1
Córrego Cabuçu de Baixo	481	43	2
Córrego Tremembé	2.337	150	8
Córrego Mongaguá	675	8	2

TOTAIS: 12.124 861 60

FONTE: Setor de Infra-Estrutura - 100% 6,8%
SEM-LA.

(*) Estimativa calculada a partir do "Plano Diretor de Combate às Enchentes" - PMSP, 1985.

TABELA 11- ÁREAS ATINGIDAS POR ENCHENTES NO MUNICÍPIO DE SÃO PAULO, POR ADMINISTRAÇÃO REGIONAL - 1984.

AR	ÁREAS (em ha)						
	Área total de AR (ha)	Áreas Inundáveis			Porcentagem sobre a área da AR		
		Com Invasão de residências	Outras	TOTAIS	Com Invasão de residências	Outras	TOTAIS
BT	5.000	33,52	19,66	53,18	0,67	0,39	1,06
CL	8.700	79,16	12,41	91,57	0,91	0,14	1,05
FO	5.730	72,45	3,26	75,71	1,26	0,06	1,32
IG	12.300	100,35	39,98	140,31	0,82	0,32	1,14
IP	3.200	195,12	-	195,12	6,10	-	6,10
LA	3.060	57,27	33,43	90,70	1,87	1,09	2,69
ME	4.800	120,30	5,04	125,34	2,51	0,11	2,62
MG	3.930	152,52	2,50	155,02	3,88	0,06	3,94
MO	4.430	244,96	69,77	314,73	5,45	1,55	7,00
PE	5.200	267,31	-	267,31	5,14	-	5,14
PI	2.700	21,88	16,94	38,82	0,81	0,63	1,44
PP	5.600	64,83	1,50	66,33	1,16	0,03	1,19
SA	53.400	135,56	-	136,56	0,26	-	0,26
SE	2.800	85,79	27,83	113,62	3,06	0,99	4,05
ST	7.500	199,70	33,47	232,74	2,66	0,44	3,10
VM	4.940	19,70	45,35	65,35	0,40	0,92	1,32
VP	2.600	60,89	42,13	103,02	2,34	1,62	3,96
TOTAL	135.950	1.911,86 (84,39%)	353,57 (15,61%)	2.265,43	1,41%	0,26%	1,67%

FONTE: Diagnóstico regionalizado de infra-estrutura do Município - SEMPLA - 1985.
ANO : 1985

TABELA 10: EFEITOS DAS ENCHENTES NO MUNICÍPIO DE SÃO PAULO, POR ADMINISTRAÇÃO REGIONAL - 1984.

AR	Nº DE PONTOS CRÍTICOS DE ENCHENTE	Nº DE RESIDÊNCIAS ATINGIDAS	POPULAÇÃO ATINGIDA	Nº DE RESIDÊNCIAS COM DESABRIGADOS	Nº DE INDÚSTRIAS E GRANDE COMÉRCIO ATINGIDOS
BT	16	159	795	107	09
CL	23	116	580	29	-
FO	20	296	1.480	27	-
IG	29	148	740	-	-
IP	13	1.548	7.740	69	83
LA	12	18	90	-	-
ME	21	244	1.220	66	-
MG	15	3.214	16.070	304	131
MO	14	677	3.385	200	-
PE	20	1.942	9.710	1.597	-
PI	16	21	105	01	-
PP	12	148	740	86	-
SA	21	985	4.925	161	49
SE	10	1.572	7.860	-	231
ST	25	99	495	07	-
VM	22	284	1.420	15	-
VP	11	58	290	02	16
TOTAL	300	11.529	57.645	2.671	536

FONTE: Diagnóstico regionalizado de Infra-estrutura - SEMPLA

ANO : 1985

TABELA 9- PROGRAMA DE LIMPEZA DE CORREGOS NO MUNICÍPIO DE SÃO PAULO,
POR ADMINISTRAÇÃO REGIONAL - 2º SEMESTRE DE 1985.

AR	CORREGO E XISTENTE (m)	PROGRAMA- DO (m)	EXECUTADO (m)	FORA DA PRO- GRAMAÇÃO (m)	TOTAL (m)	%
BT	117.400	3.690	3.690	1.250	4.940	4,21
CL	73.400	7.760	7.760	1.900	9.660	13,16
FO	142.765	8.290	8.290	1.050	9.340	6,54
IG	282.650	15.100	9.900	450	10.350	3,66
IP	64.400	6.360	6.330	300	6.630	10,30
LA	30.350	1.680	1.680	650	2.330	7,68
ME	74.800	14.759	13.159	350	13.509	18,06
MG	37.700	10.050	9.200	550	9.750	25,86
MO	43.800	2.700	2.700	920	3.620	8,26
PE	65.896	11.200	5.650	1.000	6.650	10,09
PI	30.000	1.310	1.310	-	1.310	4,37
PP	242.660	5.000	2.800	2.400	5.200	2,14
SA	90.580	6.000	5.250	-	5.250	5,80
SE	11.200	500	500	-	500	4,46
ST	80.559	15.950	15.950	4.400	20.350	25,26
VM	63.350	2.156	1.756	5.800	7.556	11,93
VP	100.600	5.020	5.020	1.050	6.070	6,03
TOTAL	1.552.110	117.525	100.945	22.070	123.015	7,93

FONTE: Plano Diretor de Combate às Enchentes - PMSP
ANO : 1985

DESCRIÇÃO DOS TIPOS DE VIAS

Dada a heterogeneidade do sistema viário, necessário se torna uma descrição de cada um dos tipos de vias.

Via Expressa

São vias por onde se escoam grandes fluxos de tráfego, atingindo em determinadas horas do dia valores da ordem de 1500 a 2000 veículos equivalentes por faixa de tráfego por hora.

Para tanto, tem pista dupla com canteiro central e duas ou mais faixas por sentido e suas interseções são geralmente em desnível, o que permite a condição de fluxo ininterrupto. Os acessos normalmente são efetuados com controle parcial ou total de forma a garantir um elevado padrão de fluidez nesse tipo de via.

Servem ao tráfego de média e longa distância, ou seja, as viagens que se verificam nessas vias tem extensão situada em geral de 3 a 30 km e o tipo de tráfego é preferencialmente de passagem de forma que as origens/destinos das viagens não se registram em atividades localizadas lindeiras às vias.

Permitem velocidades médias de percurso elevadas da ordem de 50 a 80 km/h e são utilizadas preferencialmente por automóveis, caminhões e ônibus rodoviários, de empresas, de turismo, etc. exceto os ônibus urbanos.

Via arterial I

São vias com grandes fluxos de tráfego em certas horas do dia, registrando valores da ordem de 1000 a 1500 veículos equivalentes por faixa por hora. Possuem necessariamente pista dupla, canteiro central, duas ou mais faixas por sentido e suas interseções são em nível controladas através de semáforos.

Tais vias operam, portanto, na condição de fluxo interrompido e próxima ou no nível de saturação nas horas de pico face aos fluxos registrados nelas.

Servem comumente ao tráfego de médias distância, cuja maioria das viagens tem extensão entre 3 e 15 km e o tipo de tráfego que a utiliza é preferencialmente de passagem, 70 a 90%.

As velocidades médias de percurso se situam entre 30 a 50 km/h na maioria dos casos e são largamente utilizadas por automóveis e ônibus urbano.

Via Arterial II

São vias que apresentam um fluxo de tráfego considerável da ordem de 700 a 1000 veículos equivalentes por faixa nas horas de "rush". Este fato, menor fluxo é uma das características básicas que diferencia este tipo de via da arterial tipo I.

Além disso, podem apresentar pista dupla ou simples, nesse caso, apresentando uma largura bastante significativa (12 a 20 metros) e, geralmente mão única de direção. As principais interseções são controladas por semáforos.

Servem ao tráfego de média distância, viagens com extensão de 3 a 15 km, e o tipo de tráfego que a utiliza é na maioria de passagem, 60 a 80%. As velocidades se situam em torno de 30-50 km/h e são largamente utilizadas por automóveis e ônibus.

Via Coletora/Auxiliar I

São vias por onde se escoam fluxos consideráveis de tráfego, atingindo valores da ordem de 400 a 700 veículos equivalentes por faixa por hora. Tem a função de canalizar o tráfego até o sistema principal e/ou auxiliar o sistema principal proporcionando um alívio no carregamento do mesmo além de também servir ao tráfego local.

Tem pista simples, em geral, mão única de direção e largura da ordem de 10 a 15 metros. Servem preferencialmente, ao tráfego de média distância, cujas extensões das viagens variam entre 3 e 15 km. e são utilizadas maciçamente por auto e ônibus. As velocidades se situam em torno de 30 km/h.

Via Coletora/Auxiliar II

Nesse tipo de via o tráfego já é bem menor, da ordem de 200 a 400 veículos equivalentes/faixa por hora e este fato é o que diferencia basicamente este tipo em relação ao anterior.

Tem a mesma função de canalizar o tráfego em direção à rede primária e/ou auxiliá-la além de servir também ao próprio tráfego local.

Tem pista simples, comumente mão única e largura de 8 a 12 metros. Servem ao tráfego de curta e média distância, viagens com até 15 km e são utilizadas preferencialmente por automóveis. As velocidades se situam em torno de 30 km/h.

Via Secundária propriamente dita

São vias que permitem ligações entre vias componentes da rede primária servindo ao tráfego de média e curta distância, ou seja, a maioria das viagens com extensão até 15 km. Constitui-se muitas vezes em mais uma opção de acesso ao sistema principal, sendo entretanto caracterizada por apresentar um fluxo bem reduzido (até 200 veíc. equivalentes por faixa por hora).

Podem apresentar pista simples ou mesmo dupla, com canteiro e duas ou mais faixas por sentido, porém são identificadas por apresentar em qualquer hora do dia um baixo volume, o que frequentemente vem realçar a ociosidade dessas vias. Muitas vezes, apresentam uma descontinuidade em relação ao sistema existente, o que em parte justifica o seu baixo volume de tráfego.

Há uma mescla de tráfego local e de passagem, sendo que no tocante às velocidades de percurso há uma grande faixa de variação, em geral, de 20 a

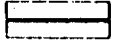
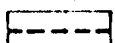

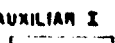

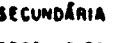

60 km/h. As altas velocidades são devidas à presença de vias de alta capacidade de tráfego operando em baixos volumes e as baixas velocidades pela presença nesse grupo de vias com pista simples e outras características que determinam redução da velocidade.

Rede Local

A rede local é formada pelas demais vias locais de pequeno porte, não identificadas no cadastro municipal. Tais vias apresentam um tráfego reduzido (até 200 veículos equivalentes/faixa por hora) e servem quase que exclusivamente ao tráfego local gerado pelos moradores da área.

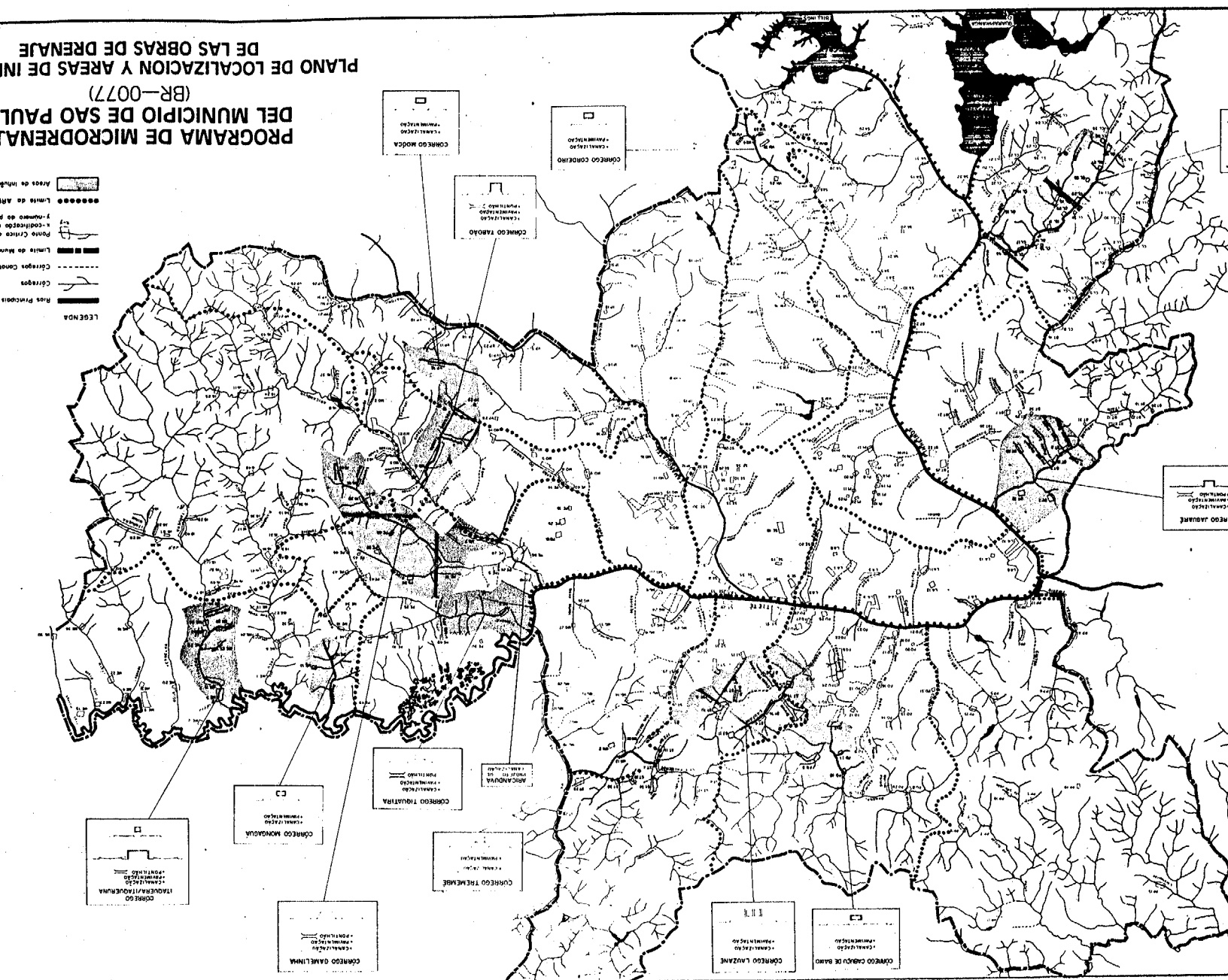
O quadro a seguir apresenta um sumário dos critérios utilizados na desagregação da rede viária municipal, proporcionando uma visão global da classificação viária.

VIÁRIA
BÁSICO

TIPO DE VIA	INDICADORES							EXEMP DE V
	(A)	(B)	(B)	(A)	(B)	(B)	(C)	
	INT. DE FLUXO (VEIC./EQ/FAIXA)	TIPO DE TRÁFEGO	EXT. DA VIAGEM (Km)	CARACTERÍSTICAS FÍSICAS	VELOCIDADE	USO DO SOLO LINDEIRO	COMPOSIÇÃO DE TRÁFEGO	
EXPRESSA 	ELEVADA (1500 - 2000)	PAS. 90-100% LOCAL 10-0%	MÉDIA - LONGA DISTÂNCIA (3 - 30)	PISTA DUPLA 2 OU + FAIXA / PISTA INTERSEÇÕES SEMAF.	ELEVADA (50 - 80)	ATIVIDADES QUE NÃO GERAM TRÁFEGO	AUTO CAMINHÕES	AV. MARGIN AV. 23 DE
ARTERIAL I 	ELEVADA (1000 - 1500)	PAS. 70-90% LOCAL 30-10%	MÉDIA DISTÂNCIA (3 - 15)	PISTA DUPLA 2 OU + FAIXA / PISTA INTERSEÇÕES SEMAF.	MÉDIA (30 - 50)	ATIVIDADES QUE NÃO GERAM TRÁFEGO	AUTO ÔNIBUS E CAMINHÕES	AV. PAULIS AV. RESOU AV. DO ES
ARTERIAL II 	MÉDIA (700 - 1000)	PAS. 60-90% LOCAL 40-10%	MÉDIA DISTÂNCIA (3 - 15)	PISTA DUPLA OU SIMPLES INTERS. PRINCIPAIS SEM.	MÉDIA (30 - 50)	ATIVIDADES QUE NÃO GERAM TRÁFEGO	AUTO ÔNIBUS E CAMINHÕES	AV. PEOR DE MOR AV. B. L. AN
COLETORA / AUXILIAR I 	MÉDIA (400 - 700)	PAS. 50-70% LOCAL 50-30%	MÉDIA DISTÂNCIA (3 - 15)	PISTA SIMPLES INTERS. PRINCIPAIS SEMAFORIZADAS	MÉDIA (20 - 40)	ATIVIDADES QUE GERAM TRÁFEGO	AUTO ÔNIBUS	R. PAMPL AL. SANT R. AUGUS
COLETORA / AUXILIAR II 	MÉDIA (200 - 400)	PAS. 40-70% LOCAL 60-30%	CURTA - MÉDIA DISTÂNCIA (ATÉ 15)	PISTA SIMPLES INTERS. PRINCIPAIS SEMAFORIZADAS	MÉDIA (20 - 40)	ATIVIDADES QUE GERAM TRÁFEGO	AUTO ÔNIBUS	R. ARTUR R. PINHE R. FREI CA
SECUNDÁRIA PROP. DITA 	BAIXA (ATÉ 200)	PAS. 40-70% LOCAL 60-30%	CURTA - MÉDIA DISTÂNCIA (ATÉ 15)	PISTA SIMPLES OU DUPLA INTERS. PRINC. SEMAF.	MÉDIA (20 - 40)	ATIVIDADES QUE GERAM TRÁFEGO	AUTO ÔNIBUS	R. PEDRO TAQUA R. TUCUN
LOCAL 	BAIXA (ATÉ 200)	PAS. 0-10% LOCAL 100-90%	CURTA DISTÂNCIA (ATÉ 3)	PISTA SIMPLES INTERS. PRINCIPAIS SEMAFORIZADAS	BAIXA (ATÉ 20)	ATIVIDADES QUE GERAM TRÁFEGO	AUTO	R. DIOGO MOREI

os A, B e C mostram evidenciar a importância do indicador para a classificação viária, sendo: A - MUITO IMPORTANTE
B - IMPORTANTE
C - POUCO IMPORTANTE

PROGRAMA DE MICRODRENAJ
DEL MUNICIPIO DE SAO PAUL
(BR-0077)
PLANO DE LOCALIZACION Y AREAS DE IN
DE LAS OBRAS DE DRENAJE



PROGRAMA DE MICRODRENAJE PARA LA MUNICIPALIDAD DE SAO PAULO
(BR-0077)

TERMINOS DE REFERENCIA
PARA LA CONTRATACION DE SERVICIOS DE ASESORIA Y SUPERVISION
CON UNA FIRMA CONSULTORA

I. OBJETIVOS

A. Objetivo General

El objetivo general de la contratación de la Firma Consultora o Consorcio es que el Programa de Microdrenaje de la ciudad de Sao Paulo sea ejecutado con la debida diligencia y de acuerdo con eficientes normas técnicas y financieras.

B. Objetivos Específicos

La Firma Consultora o Consorcio a contratarse será responsable por el cumplimiento oportuno y diligente de las actividades principales que se indican a continuación, trabajando integradamente con el personal de la Unidad Ejecutora dependiente de la Secretaría de Vías Públicas (SVP) de la Prefectura Municipal de Sao Paulo (PMSP).

1. Revisión de Planos y Documentos de Licitación

Teniendo en cuenta los diseños básicos y/o ejecutivos y documentos técnicos preparados por la Unidad Ejecutora (UE) con la colaboración de consultores individuales y los ajustes convenidos, efectuará:

- a) El reconocimiento completo de los sistemas de drenaje y vial en las 12 cuencas hidrográficas de Sao Paulo donde se ha identificado las obras a ser ejecutadas, para familiarizarse con cada uno de los subsistemas y el área de influencia y los componentes del programa propuesto.
- b) La revisión de los indicados diseños básicos y/o ejecutivos, documentos técnicos, documentación de apoyo y antecedentes.
- c) La elaboración de los planos y documentos completos para todas las licitaciones de adquisición y construcción que garanticen la cabal ejecución del programa.
- d) En el rubro anterior se incluirán, sin estar restringidos, los estudios complementarios y

comprobatorios de topografía, mecánica de suelos, geología, estructurales, y de hidrología.

2. Administración de Contratos de Bienes y Servicios, Control y Supervisión de las Obras.

Las siguientes serán las responsabilidades y tareas principales:

- a) La programación, supervisión y seguimiento sistemático y periódico técnico-financiero de la ejecución de cada uno de los componentes del proyecto de microdrenaje, hasta que hayan sido total y satisfactoriamente finalizados.
- b) La actualización periódica de los calendarios de ejecución e inversiones.
- c) La licitación, contratación de proveedores del equipo de mantenimiento para atender la limpieza y mantenimiento de las quebradas y canalizaciones, en completa coordinación con la UE y con la Secretaría General de las Subprefecturas (SEGESP).
- d) La precalificación, licitación y contratación de empresas contratistas para la ejecución de las obras de canalizaciones y vías públicas.
- e) La absolución de consultas formuladas por eventuales oferentes, durante el procesamiento de las licitaciones.
- f) La administración y control del cumplimiento de los contratos que se formalicen para la ejecución de las obras.
- g) La realización de las pruebas y ensayos de campo y laboratorio que sean necesarios para lograr la debida ejecución de las obras y el correcto mantenimiento posterior.
- h) La aceptación o rechazo de la entrega de materiales así como también de la construcción de las obras e instalación de algunos componentes prefabricados.
- i) La verificación de metrados, cubicaciones y avance de obra para el trámite de las planillas de pago de los contratistas.
- j) El asesoramiento y recomendaciones, cuando sea necesario, para lograr acuerdos relacionados con variaciones de costos debidas a circunstancias imprevistas durante la ejecución de las obras.
- k) La ejecución de las pruebas finales, procesamiento de la entrega-recepción de las obras tanto provisional como

definitiva y realización de las liquidaciones correspondientes.

- 1) La actualización de los planos del proyecto, en la forma en que fueron construidas las obras.

3. Asesoramiento Técnico en Areas Específicas

Bajo este rubro están incluidas:

- a) La formulación de recomendaciones y acciones correctivas, cuando sea requerido, para mantener la ejecución de las obras y del proyecto dentro de los plazos, presupuestos y documentación técnica aprobados por la PMSP y el BID.
- b) Podrá participar, si solicitado por la Unidad Ejecutora, en las soluciones más adecuadas para los programas de reubicación de las familias de menores ingresos (favelados) que serían afectados con las obras, de manera oportuna para evitar demoras en la ejecución de cada una de las 12 obras integrantes del Programa, y con estrecha colaboración de la Secretaría Municipal de Habitación (SEHAB).
- c) Recomendar a la PMSP sobre las medidas complementarias que deberían realizar la Secretaría Municipal de Servicio y Obras (SSO) para que en las 12 cuencas hidrográficas donde se ejecutaron las obras del Programa se evite o disminuye el lanzamiento de basuras en las quebradas o canales abiertos y se incrementa el nivel de recolocación de la basura en tales cuencas a niveles del 80% o mayor, o un cronograma que incremente dichos niveles gradualmente hasta alcanzar niveles cercanos al 90% de la basura que se genere en las respectivas cuencas hidrográficas.
- d) Recomendar a la PMSP sobre las acciones adicionales que debería efectuar la Secretaría General de los Subprefecturas (SEGESP) para alcanzar un nivel satisfactorio de mantenimiento y limpieza de las quebradas, sea revestidas o no, el equipamiento y personal adicional para realizar esas tareas adicionales, determinación de los sitios más adecuados para disponer de los sedimentos, basuras, arbustos y otros materiales que son retirados de las quebradas y una definición, de la longitud de quebradas, no revestidas y revestidas, que debería atender la SEGESP con su propio equipo y las Empresas Particulares que ha venido contratando en los últimos años.

II. PRINCIPIOS DIRECTORES

Las actividades de asesoría y supervisión deberán realizarse:

- a. Dentro de las directrices, normas y reglamentos de la PMSP, la legislación nacional vigente y las estipulaciones del Contrato

de Préstamo No. suscrito entre la República Federativa de BRASIL y el Banco Interamericano de Desarrollo.

- b. En estrecha coordinación y colaboración con la Unidad Ejecutora dependiente de la SVP, se establece que las decisiones en relación a cambios, que pudieran surgir durante el período de ejecución de las obras, deberán ser aprobadas previamente por la SVP y el BID.

III. CONDICIONES GENERALES

- a. La Firma Consultora o Consorcio al someter su Propuesta Técnica, deberá especificar que acepta los Términos de Referencia, las condiciones Generales y las Condiciones Especiales.
- b. En caso de discrepancias durante la prestación de los servicios, la Firma Consultora o Consorcio y la PMSP tratarán de resolver los puntos en conflicto. De no alcanzarse acuerdos, las discrepancias se someterán al arbitraje, según las leyes de la República Federativa del BRASIL. De estos particulares se notificará al BID, con la debida oportunidad.
- c. Serán causales para la rescisión del contrato, las que establecen las leyes pertinentes de la República Federativa de Brasil y las que se estipulen en dicho contrato.
- d. Junto con la Propuesta Técnica y como un anexo a ésta, se presentará en sobre aparte la propuesta de Costos. Se hace énfasis en que la Propuesta Técnica no deberá contener los costos de los servicios. Dichos costos serán objeto de negociación después de que la Propuesta Técnica haya sido considerada, evaluada y aceptada por la PMSP y cuente con la anuencia del BID.
- e. La Propuesta de Costos deberá estar íntimamente relacionada con el programa de trabajo detallado que presentará la Firma Consultora o Consorcio en la Propuesta Técnica y deberá justificar cada rubro del presupuesto explicando la forma como fue calculado. En el rubro correspondiente a cada uno de los servicios debe indicarse el nombre del profesional o técnico y su alterno responsable, por especialidad, estructura del costo unitario, el número de los meses/experto y los costos por actividades. Además deberá presentarse un detalle de otros gastos previstos para el debido cumplimiento de los servicios de asesoría y supervisión, que incluye el gerenciamiento de las obras del Programa.

IV. CONDICIONES ESPECIALES

- a. La Firma Consultora o Consorcio someterá su Propuesta Técnica de acuerdo con los Términos de Referencia, las Condiciones Generales y las Condiciones Especiales. En la Propuesta Técnica se deberá:

1. Definir la metodología procedimientos y personal a ser empleado para cubrir cada una de las partes de trabajo descrito en los Términos de Referencia, todo lo cual deberá contar posteriormente con la aprobación de la Prefectura Municipal de Sao Paulo y el Banco Interamericano de Desarrollo. Se incluirá, más específicamente:
 - a) Una descripción detallada de los servicios de consultoría ofrecidos y el plan de trabajo con la suficiente desagregación por actividad y tareas previstas.
 - b) Informaciones y curriculum vitae del personal profesional y técnico principal que será utilizado en forma directa para la realización de los trabajos y del eventual alterno, especificando el cargo y responsabilidades de cada uno y un cronograma de su intervención.
 - c) Diagramas de apoyo consistentes con las descripciones hechas en los incisos anteriores.
 - d) Descripción de los trabajos de similar naturaleza efectuados por la Firma Consultora o Consorcio proponente, indicando la magnitud características y los años en los que fueron ejecutados.
 - e) Descripción de los trabajos de similar naturaleza y magnitud que en la actualidad la Firma Consultora o Consorcio proponente está ejecutando, junto con la declaración de que si resultare escogido, el volumen de trabajo adicional no sería obstáculo para el debido cumplimiento del nuevo compromiso de asesoría y supervisión, que incorpora el gerenciamiento de las obras del programa.
 - f) Los costos de cada uno de los proyectos a ser descritos conforme a los literales precedentes en (d) y (e) y los correspondientes a otros servicios prestados por la Firma Consultora o Consorcio proponente en los últimos cinco años.
 - g) Una recomendación sobre la forma en que preferiría le sean pagados sus servicios.
 - h) De la Firma Consultora o Consorcio juzgarlo apropiado, comentarios y sugerencias en lo concerniente a los Términos de Referencia y demás documentos utilizados para la formulación de su Propuesta Técnica, con un análisis expreso de los beneficios que podría obtenerse durante la ejecución del Programa de Microdrenaje de Sao Paulo si se propusiesen modificaciones.

2. Tomar en cuenta las recomendaciones formuladas y los acuerdos alcanzados entre la PMSP y el BID sobre el alcance del proyecto y los ajustes y modificaciones a los diseños básicos y/o ejecutivos.
 3. Establecer que la Firma Consultora o Consorcio adquiere responsabilidad completa sobre la revisión de los planos y documentos de licitación del proyecto teniendo en cuenta los diseños básicos y/o ejecutivos y la documentación técnica preparada por la PMSP con la colaboración de consultores individuales, velando porque los trabajos de asesoría y gerenciamiento se lleven a efecto dentro de las más eficientes y aceptadas normas de la ingeniería.
 4. Declarar que la Firma Consultora o Consorcio dispondrá en todo momento de personal idóneo, suficiente y capaz de dar soluciones en forma expedita y adecuada a los diversos problemas que podrían surgir durante la ejecución del proyecto.
- B. Otras condiciones especiales para la contratación de los servicios de consultoría son:
1. Los términos y condiciones de las propuestas que someta la Firma Consultora o Consorcio deberán considerarse sujetos a negociación en sus elementos técnicos y de costos. Los cambios a los Términos de Referencia, sugeridos por la Firma Consultora o consorcio proponente en su Propuesta Técnica, serán incorporados al contrato, si hubiesen recibido la aprobación de la PMSP y el BID.
 2. La Firma Consultora o Consorcio deberá someter a la aprobación de la PMSP y del BID la lista del personal profesional y técnico principal y alterno para la realización de los servicios de consultoría.
 3. No podrán formar parte del cuerpo de consultores de la Firma Consultora, funcionarios que laboren en la PMSP y en cualquier otra entidad que esté vinculada con el Proyecto o Programas PMSP-BID.
 4. De resultar favorecida la propuesta presentada por un Consorcio de Firmas Consultoras, el Consorcio entregará a la PMSP copia del convenio de asociación debidamente protocolizado, al momento de la suscripción del pertinente contrato.
 5. Será competencia de la PMSP, a través de la Unidad Ejecutora, dependiente de la SVP aprobar los trabajos realizados por la Firma Consultora o Consorcio, al concluir cada una de las etapas de la ejecución de las obras.

6. La PMSP y el BID se reservan el derecho de solicitar a la Firma Consultora o Consorcio, cuantas veces estimen oportuno, cualquier información que se considere conveniente con el objeto de efectuar un adecuado seguimiento e inspección de los trabajos especificados en los Términos de Referencia.

V. PERSONAL BASICO REQUERIDO

A. Ingeniero Consultor Principal

Actuará como Director Técnico durante la ejecución del programa de Microdrenaje de Sao Paulo hasta su conclusión. Deberá tener una buena preparación académica a nivel de post-grado y una experiencia profesional mínima de 10 años en manejo de personal técnico y administrativo, administración de contratos, gerenciamiento y supervisión de obras urbanas de canalizaciones y vías públicas. Para este experto se anticipa una contratación por 48 meses.

B. Consultores en Areas Especificas

Según los requerimientos de ejecución del Programa, los Consultores en áreas específicas actuarán por períodos variables. Todos estos consultores deberán tener una experiencia profesional mínima de 10 años en sus respectivas especialidades. Los Consultores requeridos son:

	Plazo estimado		En US\$ Miles	
			Honorarios/mes	Valor Total
1. Director del Programa	48	x	2.600	124,8
1. Ingeniero Hidráulico y/o Hidrólogo	48	x	2.500	120,0
3. Ingeniero Sanitarios	48	x	2.500	360,0
3. Ingeniero de Transportes y/o Civiles	48	x	2.500	360,0
1. Ingeniero Estructurales	36	x	2.500	90,0
1. Ingeniero Geólogo	36	x	2.200	79,2
1. Ingeniero en Mecánica y Suelos	36	x	2.200	79,2
1. Ingeniero de Costos y Especificaciones	48	x	2.200	105,6
1. Ingeniero de Programación y Control de Costos	48	x	2.200	105,6
Otras Especialidades	36	x	2.200	79,2
2. Administradores	48	x	1.300	62,4
2. Contadores	48	x	1.500	72,0
2. Técnicos	48	x	1.000	48,0
2. Brigadas de Topografía	48	x	1.260	60,5
3. Dibujantes	48	x	0,520	25,0
10. Personal Administrativo y de Apoyo	48	x	0,400	19,2

Costo Estimado

1.1. Emolumentos de la Firma Consultora
incluye honorarios, costos directos,
equipo y gastos generales: 4.477

1.9 Otros: 323
Total: 4.800

VI. INFORMES

La Firma Consultora o Consorcio deberá presentar a la PMSP, con dos copias al BID, los siguientes informes principales:

- Informe Inicial incluyendo el programa de trabajo con la suficiente desagregación por actividades y tareas previstas.
- Informes Mensuales sobre el progreso de la ejecución física de las obras, incluyendo además, entre otros aspectos, los gastos incurridos y los pronósticos de flujo de caja para el siguiente mes.
- Informe Final de la Asesoría y Supervisión, como máximo un mes luego de que se hayan: (a) efectuado las pruebas de funcionamiento; (b) terminado los trámites de entrega-recepción de las obras del proyecto; y (c) concluido la actualización de los planos en la forma en que fueron construidas las obras.
- Los informes se presentarán con todos sus anexos.

ANEXO IVMUESTRA REPRESENTATIVA

La Prefectura dispone de 4 proyectos de propósito múltiple (canalizaciones y vías públicas) con estudios de ingeniería y socio-económicos terminados y que satisfacen los criterios de selección del Banco, incluido tasas internas de retorno (TIR) superiores al 12%. Tales proyectos son:

	Longitud en en metros	Vías
	Canalización	Públicas (m)
i) Quebrada Lauzane	2.885	2.800
ii) Quebrada Mooca	1.975	1.900
iii) Quebrada Morro de "S"	6.140	5.100
iv) Quebrada Itaquera/Itaqueruna	5.010	4.700
	16.010	14.500

Tales cuatro proyectos componen la muestra representativa analizada por el Banco que representa en valor el 39% del total de los costos directos. Para los restantes nueve proyectos cuyos estudios están contratados y/o en proceso de contratación se utilizarán los criterios de selección convenidos con el Banco y serían concluidos dentro de los primeros 18 meses a partir de la vigencia del eventual contrato de préstamo.

En la quebrada Lauzanne se construirán galerías de hormigón armado, de aguas arriba hacia abajo, de las siguientes secciones y longitudes:

El proyecto de canalización de la quebrada Lauzane se extiende por 2,8 km entre las calles General José de Almeida Botelho y Fortunato Minozzi. Su desagüe a la quebrada Mandaquí ya se encuentra canalizada, a través de galerías celulares. El trazado del proyecto en planta se aleja en ciertos tramos del lecho natural de la quebrada, interfiriendo con algunas edificaciones existentes. En los primeros 620 metros la galería fue proyectada con 2,3 m de base y 2,0 m de altura; los siguientes 680 m la galería será de 3,35 m de base por 2,55 m de altura; luego 1040 m con galería doble con sección cuadrada de 2,55 m de lado y el último tramo de 545 m, la galería doble pasa a tener sección rectangular con 3,2 m de base y 2,55 m de altura. A lo largo de toda la canalización fueron propuestos escalones de fondo, de manera a disminuir la pendiente y, consecuentemente, la velocidad de la masa líquida.

El proyecto vial comprende la construcción de una vía con una extensión de 2.800 m. El primer tramo de aproximadamente 485 m a partir del inicio del proyecto tendrá una calzada de 9,00 m de ancho con aceras de 2,50 m. El segundo tramo de 480 m tendrá 2 calzadas separadas de 7,00 m de ancho cada una, con aceras de 2,50 m. El tercer tramo de 1.780 m comprende la construcción de una calzada de 14,00 m de ancho y aceras de 3,00 m. El último tramo de 55 m tendrá una calzada de 7,00 m de ancho con aceras de 2,00 m. El segundo y el tercer tramo tendrán pavimento

proyectados para tráfico del tipo pesado y los dos otros tramos tendrán pavimento para tráfico del tipo leve. Las nuevas vías mejorarán la accesibilidad de los barrios Lauzane y Mandaquí acortando las viajes al centro de la ciudad. Más adelante de este informe son presentadas las características de los tipos de pavimentos adoptados por la Prefectura.

En cuanto a la faja de terreno necesaria para la construcción de la obra existe la reserva garantizada por Ley de una franja de 20 metros de ancho a lo largo de toda la extensión del proyecto.

En la Quebrada Mooca:

El tramo de la quebrada de Mooca que será canalizado tendrá una extensión de 1,9 km, prolongándose desde la calle Francisco Marinho hasta la calle Cibeles de Carvalho. Su trazado en planta sigue aproximadamente el lecho natural de la quebrada. En una longitud de 1395 m la galería de hormigón armado moldeado en situ será cuadrada de 2,1 m x 2,1 m y los restantes 580 m tendrán una sección de 1,7 x 1,7 m. Fueron proyectados escalones en varios segmentos de la galería de manera de disminuir la declividad y reducir la velocidad del agua a valores aceptables. Existe ley reservando una faja de 42 m de ancho a lo largo de todo el trecho de la quebrada de Mooca a ser canalizada, la cual es suficiente para las construcciones previstas.

El proyecto vial comprende la construcción de una vía de 1.900 m con dos calzadas de 14,00 m cada una divididas por una faja divisoria central de 6,00 m y con aceras de 4,00 m. Esta obra complementa la Avenida Luis Ignacio de Anhaia Mello y hace su conexión con la Avenida Sapopemba, uniendo la Región de San Mateo en el Area Central. Esta obra fue prevista en todos los planos viales de la ciudad y eliminará una importante discontinuidad física de la red primaria. Tendrá un pavimento proyectado para tráfico del tipo pesado.

En la Quebrada Morro de S:

El proyecto de canalización de esta quebrada abarca un trecho de 6,1 km entre la calle para Itapevírica de Serra y el río Pinheiros. Su trazado en planta sigue aproximadamente el desarrollo natural de la quebrada. Actualmente la quebrada se encuentra en su estado natural con excepción del tramo final de 1,2 km ya canalizado con galería doble de hormigón armado de 3,0 x 3,0 m. La sección transversal adoptada para el tramo aguas arriba es trapezoidal de 5,0 m de base, 15,50 m en la parte superior y 3,5 m de altura con longitud de 2530 m y con sección de 8,0 m de base, 18.50 m en la parte superior, y 3,5 m de altura con longitud de 2220 m. En el trecho aguas abajo se previó una duplicación de la galería existente, adjuntando 2 secciones adicionales de 3,0 x 3,0 m en hormigón armado. En cuando a la franja de terreno necesaria la construcción de la canalización y las vías de la avenida marginal, en el tramo de galería ya esta prevista por Ley una faja de 20 m de ancho; en el tramo aguas arriba no existe terreno reservado por ley, debiéndose tramitar la adquisición de una faja de 40 m de ancho.

Las obras viales incluyen la construcción de una vía de 5100 m con un primer tramo de 4620 m con dos calzadas marginales al canal con 7,00 m cada una y aceras de 1,50 y 3,00 m. El segundo tramo sobre las galerías tendrá una calzada de 14,00 m y aceras de 3,00 en una longitud de 480 m. El pavimento fue proyectado para tráfico del tipo pesado. Para el cauce sobre el canal de calles perpendiculares se preve la construcción de siete puentes, cuatro con 16,00 m de longitud y tres con 19,50 m. Estas vías terminarán con las condiciones de congestionamiento de tráfico en la Estrada de Itapecerica, acortando y dando mayor seguridad a los viajes entre El Barrio de Itapecerica y el Area Central.

En la Quebrada Itaquera/Itaqueruna:

El tramo del riachuelo Itaquera a ser canalizado tiene una longitud de 3,5 km, prolongándose desde la Avenida Nordestina hasta la calle José Artur de Nova. El proyecto de canalización se desarrolla en planta aproximadamente al lecho natural del riachuelo. La sección del canal será trapezoidal con paredes revestidas de hormigón; el fondo será revestido de gabiones con acabado de argamasa, asfalto o en placas de hormigón; las dimensiones serán de 15,5 m de base, 25,10 m en la parte superior por 4,8 m de altura.

Para evitar velocidades de escurrimiento excesivos, debido a las elevadas pendientes naturales, fue necesario introducir escalones de fondo en el canal. En cuanto a la franja de tierra necesaria para la construcción de las obras de vías y de canalización, existe la reserva de la faja suficiente, a lo largo de todo el tramo, garantizado por Ley.

El tramo de Itaqueruna a ser canalizado tiene extensión de 1,5 km, a partir de la desembocadura del riachuelo Itaquera. Su trazado en planta sigue aproximadamente su lecho natural. Partiendo de aguas arriba, el primer tramo de 40 m será una tubería de Ø1,0 m, los siguientes 430 m serán tubería de Ø1,2 m; luego 230 m de tubería de Ø1,5 m; luego se proyecta galería de hormigón armado moldeada con longitud de 320 m con sección cuadrada de 1,5 m por lado; los siguientes 160 m tendrán sección rectangular de 1,7 m de base y 1,5 m de altura; luego 140 m de galería con 1,9 m de base y 1,5 m de altura, y finalmente, los últimos 180 m tendrán 2,2 m de base por 1,6 m de altura. Para evitar velocidades de escurrimiento excesivos, debido a las elevadas declividades naturales, fue necesario la introducción de peldaños entre los varios tramos de la canalización.

La longitud de vías a construir y pavimentar con este proyecto es de 4,700 m. Para la Quebrada Itaqueruna y para la Quebrada Itaquera desde la Avenida Nordestina hasta la Avenida Marechal Tito, el proyecto preve la construcción de vías con dos calzadas de 10,50 m de ancho cada una y aceras de 3,00 m. Esta obra unirá la Avenida del Emperador con la Avenida Marcechal Tito y fue prevista en los planos viales para retirar el tráfico de paso del centro de San Miguel. El pavimento esta proyectado para tráfico del tipo pesado. Para las márgenes del canal Itaquera después de la Avenida Marcenal Tito, fueron previstas vías con una calzada de 7,00 m de ancho y aceras de 2,50 m para la atención del tráfico local (pavimento leve) y vías no pavimentadas, con 5,00 de ancho, para el mantenimiento del canal. El proyecto incluye también la

construcción de 6 puentes para proporcionar el cruce de vías perpendiculares sobre el canal. De estos puentes, cinco tienen 19,50 m de longitud y uno tiene 22,00 m.

Las áreas necesarias para la ejecución del proyecto no se encuentran reservadas por Leyes Específicas, sin embargo teniendo en cuenta las calles laterales y áreas libres existentes, la expropiación necesaria será pequeña.

Zona de Influencia del Programa

El área de influencia de las cuatro canalizaciones de la muestra representativa es de aproximadamente 3.840 hectáreas y de los restantes ocho tramos de quebradas a ser canalizados e identificados preliminarmente tendrían un área adicional de 8.280 hectáreas; es decir, el total del área de influencia con el programa alcanzaría a 12.120 ha, que representa el 14% del área urbanizada del Municipio de São Paulo de 900 km².

Para las cuatro cuencas hidrográficas donde se ubican los cuatro tramos de canalizaciones de la muestra representativa se presenta de manera condensada su respectiva descripción:

Cuenca de la quebrada Lauzane

La cuenca de esta quebrada es contribuyente a la quebrada Mandaqui, tiene un área de aproximadamente 5 km² y de forma ligeramente alargada. Se localiza en la parte norte del municipio de São Paulo.

La quebrada Lauzane tiene sus cabeceras en las inmediaciones del Huerto Forestal, recorre cerca de 3.5 km en sentido NE-SO y desagua, por la margen derecha, en el canal de Mandaqui, en el Jardín San Miguel Imirim entre la Casa Verde y Mandaqui. Atraviesa los barrios de Lauzane Paulista, Villa Basilea y Villa Nova Cachoeirinha. Sus principales afluentes están en su margen derecha y drenan áreas variando entre 0,5 y 1,4 km².

Las mayores elevaciones (cotas) ocurren en sus límites NE, alcanzando hasta 813 metros sobre el nivel del mar (msnm). Los terrenos aguas arriba, próximos a la Sierra de Cantareira son bastante inclinados; a medida que se aproxima a su desembocadura, la topografía se va volviendo más suave; al desaguar a la quebrada Mandaqui sus márgenes llegan a la cota 713 msnm; la quebrada Mandaqui desemboca al río Tieté, en su margen derecha.

En resumen, se puede afirmar que la cuenca en estudio posee un elevado índice de ocupación.

Cuenca del riachuelo Itaquera

Tiene un área de cerca de 50 km², forma alargada con su parte aguas arriba un poco más ancha. Se localiza en el extremo este de São Paulo alcanzando tierras del vecino municipio de Ferraz de Vasconcelos. El riachuelo Itaquera se desarrolla en sentido norte-sur; tiene cerca de 16

km de extensión y desague en la margen izquierda del río Tiete, un poco aguas arriba de San Miguel Paulista. Sus principales afluentes son los riachuelos Rodeio y Barra Branco. Por la margen derecha tiene como principales afluentes los riachuelos Guaratiba e Itaquera Mirim y por la margen izquierda, el Lajeadozinho.

Las mayores elevaciones de la cuenca ocurren en su límite suroeste alcanzando hasta 950 m; para el norte los terrenos bajan en forma suave pero continua; al llegar al río Tieté, las márgenes del Itaquera tienen elevaciones de 725 m.

La cuenca hidrográfica del Itaquera abarca áreas con grados de ocupación diferentes, una vez que alcanza regiones ya hoy razonablemente pobladas y otras aún bastante vacías y con pocas posibilidades de volverse densamente ocupadas, por sus características topográficas. Considerando las posibilidades de aprovechamiento de los terrenos ofrecidos por la ley y del hecho que la cuenca del Itaquera viene absorbiendo una parte de la explosión demográfica de los barrios de la zona del este de la ciudad de São Paulo y considerando las características topográficas del área, se establecieron algunos criterios para la distribución de la futura población dentro de la cuenca, con tasas o razones variables de impermeabilización de los terrenos.

Según esos criterios las varias zonas contribuyentes fueron enmarcadas dentro de los valores extremos de 40% y 80% de terrenos impermeabilizados. Merece señalarse que las subcuencas de aguas arriba, de los formadores del Itaquera, los riachuelos Barro Branco y Rodeio; en ellos se vienen construyendo proyectos de viviendas de la COHAB y otros similares en fase de programación. Consecuentemente se escogieron los valores apropiados para las tasas de impermeabilización en las zonas consideradas.

Cuenca de la quebrada Morro do "S"

La quebrada Morro do "S" es formada por las quebradas de la Moenda y de Capao Redondo. La de Moenda tiene sus nacientes en la región suroeste del municipio de São Paulo junto a la cima de la montaña que sirva de divisoria con el municipio de Itapeverica da Serra; se extiende en el sentido sur-norte. Su divisoria de aguas del lado este lo separa de la cuenca de Capao Redondo. Cerca de 700 m antes de alcanzar la calle de Itapeverica ellos reúnen sus aguas para formar el llamado riachuelo de Morro do "S", tomando el curso SO-NE, el alcanza el canal del río Pinheiros, en las proximidades del puente de la avenida Joao Dias.

Sus principales afluentes están en su margen derecha; ellos son la quebrada de Freitas, de Cachoeira y aquel que corre por el fondo de valle paralelo a la Avenida María C. Aguiar. Por la margen izquierda, merece mención aquel que se desarrolla a lo largo de la avenida Giovani Gronchi.

La cuenca del Morro do "S" tiene forma rectangular; se trata de una faja de casi 3 km de ancho en la cual se desarrolla el fondo de valle principal, de casi 10 km de extensión, conformando un área un poco mayor de 23 km².

Las mayores elevaciones de la cuenca hidrográfica ocurren en sus límites sudoeste, llegando hasta 870 m. En su dirección a la desembocadura, por toda su extensión de la faja drenada, los terrenos van bajando de manera suave pero continua. Al llegar al río Pinheiros, las márgenes del Morro de "S" descienden a 735 m.

Dentro de esta cuenca están situados algunos barrios muy poblados, tales como: Villa Suzana, Villa de la Bellezas, Jardim São Luiz, Jardim Umuarama, Jardim Ipe, Capelinha y Capao Redondo. La mayor parte de los terrenos de la cuenca son clasificados como predominantemente residenciales; exceptuando una área pequeña, clasificada como Zona industrial, situada en el Jardim São Bento en la subcuenca de la quebrada Moenda, casi todos los otros terrenos están clasificados en la categoría residencial de la ley de zonificación vigente en el Municipio de São Paulo.

Quebrada de Mooca

La quebrada de Mooca, aguas arriba de la calle de Oratorio con extensión aproximada de 6,5 km recibe numerosas afluentes y galerías provenientes de Villa Ema y Calle de Sapopemba y, además, algunos del lado de la parte superior de la calle de Oratorio.

Esta quebrada es uno de los pequeños afluentes al río Tamanduatei, no obstante que se trata de una cuenca que se está urbanizando rápidamente sus contribuciones de aguas pluviales son significativas.

El fondo de valle de la quebrada de Mooca es bastante acentuado en su mayor parte en el tramo considerado. Este hecho tiene la habilidad de salvaguardar en gran parte las áreas ribereñas que, al contrario de muchas otras quebradas del municipio, fueron ocupadas por construcciones que estorban al libre curso de las aguas pluviales.

La parte aguas arriba de la calle de Oratorio es caracterizada por fuertes pendientes, promoviendo la erosión en los márgenes, por ahora prácticamente estabilizados. Las calles de Villa Ema, Sapopemba y Oratorio siguen, más o menos, paralelas al eje de la quebrada de Mooca, de manera que los problemas de drenaje no son difíciles de resolver. La cuenca se encuentre bastante poblada y, por tanto, se consideró una tasa de terrenos impermeabilizados de 70%; la extensión de la cuenca es de 7,9 km² hasta la calle de Oratorio.

Los primeros 4,5 km de la quebrada hasta su desembocadura al drenaje de Brooklin fueron canalizados recientemente y con este proyecto sólo se canalizaría, mediante galerías de hormigón armado cerradas, los 2,0 km aguas arriba.

PROGRAMA DE CANALIZACIONES Y VIAS PUBLICAS
MUNICIPALIDADES DE SAO PAULO
(BR-0077)

<u>A. Muestra Representativa</u>		<u>Longitud en Metros</u>	
		<u>Canalizaciones</u>	<u>Vías Públicas</u>
<u>Quebradas</u>			
1.	Lauzane	2.885	2.800
2.	Itaquera/Itaqueruna	5.010	4.700
3.	Morro Do "S"	6.139	5.100
4.	Mooca	1.974	1.900
Sub-total (1)		16.008	14.500
<u>B. Resto del Programa</u>			
5.	Tiquatira	2.465	2.500
6.	Gamelinha	5.000	5.000
7.	Jaguare	3.165	4.100
8.	Cordeiro	2.805	3.300
9.	Tabao	4.405	4.000
10.	Cabucu de Baixo	802	800
11.	Tremembe	6.510	4.000
12.	Mongagua	2.300	2.800
Sub-total (2)		27.452	26.500
Totales		43.460 =====	41.000 =====

Costo de Supervisión y Administración

	<u>Honorario/mes</u>	<u>Total en 4 años</u>
1. Grupo Básico de 5 funcionarios Unidad Ejecutora	20,8	1.000
2. Personal de la Secretaría de Vías Públicas (75 personas) (4 de la Superintendencia de Proyectos y 71 de la Superintendencia de Obras).	150,0	7.200
3. Firma Consultora	<u>100,0</u>	<u>4.800</u> 13.000

Costo de Estudios y Diseños

1. Estudios y Diseños de Ingeniería y Socio Económicos (4,5% de 122.400).	<u>5.500</u>
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Grupo Básico de la Unidad Ejecutora

1. Gerente o Coordinador de la Unidad Ejecutora	4,8
2. Ingeniero para el Control Físico de las obras	4,0
3. Profesional contable para el Control Financiero del Programa.	4,0
4. Profesional Administrativo para el Control de los procesos de licitación	4,0
5. Profesional Sociólogo con amplia experien- cia en SEHAB para formular y hacer un seguimiento continuo de los programas de reubicación de favelas afectados por las obras.	<u>4,0</u>
Total	20,8

Parámetros de Diseño para las Canalizaciones

1. Para cuencas hidrográficas con áreas menores a 50 hectáreas se utilizó el método Racional y para áreas mayores de 50 has. el método de Ven Te Chow.

a) La fórmula del método racional fue $Q = CIA$, donde:

Q = en litros por segundo (l/s)
 C = Coeficiente de escurrimiento superficial
 i = Intensidad de la lluvia en l/s x ha
 A = Area drenada en hectáreas

Se utilizó una lluvia de diseño para un período de retorno (T) o de recurrencia de 25 años y la fórmula de García Ochipintí e.P. Marques dos Santos que establece:

$$i = \frac{0,112 \cdot 27,96 T}{0,86 T - 0,0144 (t + 15)} \quad \text{Expresado en mm/minuto}$$

b) La fórmula de Ven Te Chow indica:

$Q = 0.278 AXYZ$ donde:

Q = Caudal en m³/s
 A = Area drenada en Km²
 X = Factor de defluvio (derrame de las aguas)
 Y = Factor climático = 1.0 para la ciudad de Sao Paulo
 Z = Factor de reducción de pico (disperción de la lluvia)

Los valores de X se determinarán de ábacos en función del tiempo de ascensión (t_p) en horas, mediante fórmula con variables la longitud de la quebrada y la declividad media.

El valor Z se determina mediante ábacos para diversos valores para t , obteniéndose la relación t/t_p y luego en ábacos.

2. Velocidades Máximas y Mínimas

Velocidad máxima en canales de hormigón:	6,0 m/s
Velocidad máxima en canales revestidos de gaviones con argamasa y/o asfalto:	5,0 m/s
Velocidad máxima en canales de tierra:	0,8 m/s
Velocidad mínima en canales de hormigón:	0,6 m/s
Velocidad mínima en canales revestidos de gabiones con argamasa y/o asfalto:	0,8 m/s
Velocidad mínima en canales de tierra:	0,3 m/s

3. Pendiente Máxima y Mínima

Las pendientes máximas serán las correspondientes a velocidades máximas.

Las pendientes mínimas serán las correspondientes a velocidades mínimas.

4. Parámetros de Ingeniería para las Vías del Programa

El Cuadro presenta el pavimento-tipo adoptado por la Prefectura para cada tipo de tráfico:

PAVIMENTO-TIPO Capas de Pavimento	Espesor por Tipo de Tráfico en Centrímetros			
	Pesado	Medio	Leve	Periférico
Macadam Hidráulico	15,0	15,0	15,0	10,0
Macadam Betuminoso	7,5	7,5	5,0	5,0
Binder	5,0	-	-	-
Concreto Asfáltico V.Q.	5,0	4,0	3,0	-
C.A. Pre-mezclado en Caliente	-	-	-	3,0

Fuente: SVP

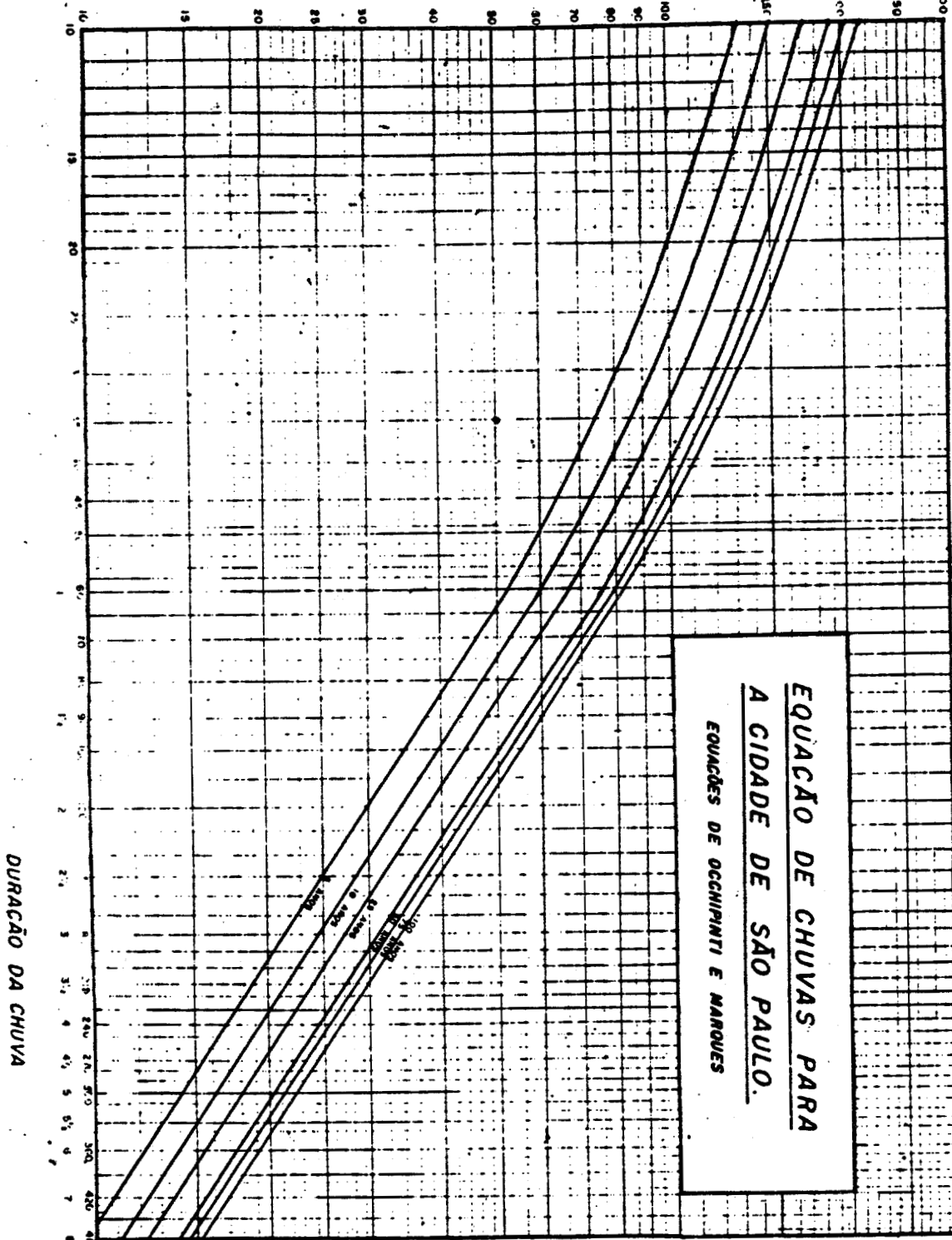
ECUACION DE LLUVIA
 $t \leq 60$ minutos

$$i = \frac{0,112 \cdot 27,96 T}{0,86 T - 0,0144 (t + 15)} \text{ mm/min.}$$

ECUACION DE OCCHIPINTI MARQUES

T. Minutos	T= 5 años L= 1/s x ha	T= 10 años L= 1/s x ha	T = 15 años i = 1/s x ha	T = 25 años i = 1/s x ha
7	416	461	490	530
8	400	444	472	510
9	386	429	456	493
10	373	414	440	476
11	361	401	426	460
12	350	389	413	446
13	340	377	401	433
14	330	366	390	421
15	320	356	379	409
16	312	346	369	399
17	304	337	359	288
18	296	329	350	379
19	289	321	342	369
20	282	313	333	361
21	275	306	326	352
22	269	299	318	345
23	263	292	311	337
24	257	286	305	330
25	252	280	299	323
26	247	275	293	317
27	242	269	287	311
28	237	264	281	305
29	232	259	276	299
30	228	254	271	293
31	224	249	366	288
32	220	245	261	283
33	216	241	257	278
34	212	237	252	274
35	209	233	248	269
36	205	229	244	265
37	202	225	240	261
38	199	222	237	257
39	196	218	233	253
40	193	215	229	249
41	190	212	226	245
42	187	209	223	242
43	184	206	220	238
44	181	203	216	235
45	179	200	213	232
46	176	197	211	229
47	174	195	208	226
48	172	192	205	223
49	170	190	202	221
50	168	187	200	218

INTENSIDADE DE CHUVA em mm/hora



**EQUAÇÃO DE CHUVAS PARA
 A CIDADE DE SÃO PAULO.
 EQUAÇÕES DE OCCHIPINTI E MARQUES**

$$\frac{\text{mm}}{\text{hora}} \times \frac{1}{360} \rightarrow \frac{\text{m}^3/\text{s}}{\text{Ha}}$$

EQUAÇÕES DE OCCHIPINTI E MARQUES

1) Para duração máxima de 1 hora e 100 mm

$$i = \frac{C}{(1+15)^n}$$

onde: i é a intensidade média máxima em mm/hora
 C é o coeficiente de chuva em mm/hora
 n é o coeficiente de chuva em mm/hora
 C = 46,87 para n = 0,05
 C = 32,00 para n = 0,10

2) Para duração máxima de 1 hora:

$$i = \frac{C}{t^n}$$

onde: i é a intensidade média máxima em mm/hora
 C é o coeficiente de chuva em mm/hora
 n é o coeficiente de chuva em mm/hora
 C = 46,87 para n = 0,05
 C = 32,00 para n = 0,10

EQUAÇÃO DE CHUVA PARA A CIDADE DE SÃO PAULO

1) Para duração máxima de 1 hora e 100 mm

$$i = \frac{C}{(1+15)^n}$$

onde: i é a intensidade média máxima em mm/hora
 C é o coeficiente de chuva em mm/hora
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PROCEDIMENTOS PARA LICITAÇÕES DO PROGRAMA DE EXPANSÃO DO
SISTEMA DE TRANSMISSÃO DE 750 Kv. REGIÃO SUL-SUDESTE.
FINANCIADO PELO BANCO INTERAMERICANO
DE DESENVOLVIMENTO (BID)

- I. MODALIDADES E OBRIGATORIEDADES
- II. NATUREZA
- III. REQUISITOS DE NACIONALIDADE
- IV. HABILITAÇÃO PRELIMINAR
- V. PUBLICIDADE
- VI. REQUISITOS DO EDITAL
- VII. REQUISITOS DAS PROPOSTAS EM
LICITAÇÕES INTERNACIONAIS
- VIII. ABERTURA DAS PROPOSTAS
- IX. EXAME E JULGAMENTO DAS PROPOSTAS
- X. ADJUDICAÇÃO
- XI. DISPENSA DE LICITAÇÃO

I. MODALIDADES E OBRIGATORIEDADE

1.1 As licitações que tenham por objeto compras ou obras previstas para a execução do Programa ou Projeto poderão revestir as seguintes modalidades:

- (a) concorrência na qual, através de convocação da maior amplitude, se admitirá a participação de qualquer licitante que preencha os requisitos de nacionalidade adiante estabelecidos no item 3.1 e que venha a ser considerado qualificado na fase mencionada no item 4.1; e
- (b) tomada de preços a qual será realizada entre interessados previamente registrados pela entidade executora do projeto ou programa (a seguir designada "Executor") e que preencham os requisitos de nacionalidade adiante estabelecidos no item 3.1, observada a respectiva habilitação. O registro pela entidade executora do projeto ou programa será aberto a toda firma estabelecida em um país membro do BID durante qualquer época do ano.

1.2 Realizar-se-á licitação quando se tratar de compras ou obras cujo valor seja igual ou superior ao equivalente a US\$200.000 (duzentos mil dólares dos Estados Unidos da América), sendo a concorrência obrigatória para compras ou obras cujo valor seja igual ou superior a US\$500.000 (quinhentos mil dólares dos Estados Unidos da América).

- 1.3 Abaixo dos limites estabelecidos no item 1.2 precedente e nos demais casos não expressamente previstos no Contrato de Empréstimo, caberá ao Executor aplicar, no que couber, o disposto nas disposições legais e regulamentares específicas.

II. NATUREZA

- 2.1 A menos que o BID e o Executor hajam convencionado de forma diversa, as licitações serão:
- (a) internacionais - quando tenham por objeto compras ou obras que devam ser total ou parcialmente financiadas com os recursos do empréstimo em divisas; e
 - (b) nacionais - quando tenham por objeto compras ou obras que devam ser totalmente financiadas com recursos de contribuição local e com recursos em moeda nacional do empréstimo.
- 2.2 As licitações nacionais serão regidas pelo que dispuser a legislação nacional que for aplicável.

III. REQUISITOS DE NACIONALIDADE

- 3.1 Poderão participar nas licitações internacionais as empresas brasileiras e as firmas estrangeiras que sejam nacionais de qualquer dos países membros do BID.

PARÁGRAFO ÚNICO: A nacionalidade das empresas licitantes será caracterizada cumulativamente de acordo com os seguintes critérios:

- (a) que a empresa licitante esteja constituída ou organizada em país membro do Banco;
- (b) que sua sede principal esteja localizada em país membro do Banco;
- (c) (i) que mais de 50% de seu capital pertença a empresa ou empresas situadas em país ou países membros do Banco (devendo estas também qualificar-se no tocante à nacionalidade) ou a cidadãos comprovadamente residentes em tais países; e (ii) que a empresa faça parte integrante da economia do país onde esteja localizada;
- (d) que não exista entendimento algum pelo qual qualquer parte substancial dos lucros líquidos ou de quaisquer outros benefícios do ativo da empresa seja creditada ou paga a pessoas que não sejam cidadãos ou residentes comprovados de países membros do Banco; e
- (e) que pelo menos 80% de todos aqueles que, de acordo com o contrato, trabalharão no país onde a construção será executada, quer se trate de pessoas diretamente contratadas pelo executante dos serviços de construção, quer sejam contratadas por sub-contratante sejam cidadãos de país membro do Banco. Para cômputo dessa percentagem, em se tratando de firma de país distinto daquele onde

se realizam os trabalhos, não serão levados em conta cidadãos ou residentes permanentes do país onde será executada a construção.

IV. HABILITAÇÃO DE INTERESSADOS

- 4.1 Nas concorrências haverá, obrigatoriamente, uma fase inicial de habilitação preliminar, destinada a comprovar a plena qualificação do interessado para a realização do fornecimento ou para a execução da obra programada, em que lhe será exigida a apresentação de documentação relativa à sua personalidade e capacidade jurídicas, à sua capacidade técnica e administrativa e à sua idoneidade e capacidade financeiras, respeitadas sempre as disposições legais brasileiras pertinentes. Os interessados estrangeiros não estabelecidos na República Federativa do Brasil apresentarão documentos hábeis de seu país de origem e demais documentação de habilitação devidamente traduzidos para o português, por tradutor juramentado e a declaração expressa de que renunciam a qualquer reclamação por via diplomática.
- 4.1.1 O Executor poderá exigir que a documentação acima referida, destinada a comprovar a personalidade e capacidade jurídicas, a capacidade técnica e administrativa e a idoneidade e capacidade financeiras dos interessados, seja por estes apresentada em envelope fechado:
- (a) em data anterior à estabelecida para a abertura da concorrência, através de chamada pública, cuja divulgação, com a antecedência mínima de 15 (quinze) dias, será feita pelos meios adiante previstos nos itens 5.1 (a) e 5.2, devendo, nesta hipótese, o convite para apresentação de propostas, bem como o envio da respectiva comunicação às embaixadas mencionadas no item 5.2, serem efetuados, com antecedência ali prevista, após julgada a habilitação preliminar e comunicado o respectivo resultado aos interessados;
 - (b) concomitantemente com as propostas, na data estabelecida para a abertura da concorrência.
- 4.1.2 Na abertura dos envelopes contendo a documentação acima aludida e no julgamento da habilitação preliminar seguir-se-ão trâmites e observar-se-ão formalidades semelhantes às previstas para a abertura e julgamento das propostas. Caso a apresentação da referida documentação deva ser feita concomitantemente com a das propostas, marcar-se-á, na própria sessão pública de abertura da concorrência, o novo dia, hora e local em que serão estas abertas. Na última hipótese aqui mencionada, as propostas dos concorrentes não qualificados serão a eles devolvidas fechadas, tal como recebidas.
- 4.2 Para a realização de tomadas de preço, o Executor manterá registros cadastrais de habilitação de firmas, periodicamente atualizados e consoantes com as qualificações específicas estabelecidas em função da natureza e vulto dos fornecimentos e obras.
- 4.2.1 Serão fornecidos certificados de registro aos interessados inscritos.

- 4.2.2 O Executor que incidentalmente não disponha de registro cadastral poderá socorrer-se de outra entidade da mesma natureza que exerça atividades semelhantes.

V. PUBLICIDADE

5.1 A publicidade das licitações será assegurada:

- (a) em se tratando de concorrência, mediante publicação, em órgão oficial e na imprensa diária, em 2 (dois) jornais locais de grande circulação no Brasil, pelo menos por 3 (três) vezes, a última delas com antecedência mínima de 30 (trinta) dias, de notícia resumida de sua abertura, com indicação do local em que os interessados poderão obter o edital e todas as informações necessárias; e
- (b) em se tratando de tomada de preços, quando a licitação for internacional, com antecedência mínima de 30 dias, mediante a publicação em órgão oficial e na imprensa diária em um jornal de grande circulação no Brasil assim como afixação de edital, em local acessível aos interessados, na sede do Executor, e comunicação às entidades de classe que, na República Federativa do Brasil, os representem.

- 5.1.1 O prazo de 30 (trinta) dias referido nas alíneas (a) e (b) deste item poderá ser ampliado por exigência do BID, quando a natureza do projeto ou o valor da compra ou da obra o justificar.

5.2 Sem prejuízo do disposto no item 5.1 anterior, a publicidade das licitações internacionais será assegurada pelo envio, com a mesma antecedência de 30 (trinta) dias, de comunicação de sua abertura às embaixadas dos países membros do BID.

5.3 Para contratos importantes cujo valor seja superior ao equivalente a US\$5.000.000 (cinco milhões de dólares dos Estados Unidos da América), no caso de compra de equipamentos, e a US\$10.000.000 (dez milhões de dólares dos Estados Unidos da América), no caso de obras, deverão ser publicados anúncios em revistas técnicas reconhecidas, no suplemento da "Business Edition" do Development Forum, periódicos de ampla circulação internacional com suficiente antecedência à data de abertura da licitação, para dar aos proponentes interessados tempo suficiente para solicitar as especificações e preparar suas propostas.

VI. REQUISITOS DO EDITAL

6.1 No edital de licitação incluir-se-á uma descrição sucinta e precisa desta e indicar-se-á, pelo menos:

- (a) Dia, hora e local do recebimento e abertura das propostas.
- (b) Quem receberá as propostas.

- (c) As condições de apresentação de propostas e da participação na concorrência, inclusive no que tange à nacionalidade dos proponentes.
- (d) O critério de julgamento das propostas, incluindo-se os principais fatores ou bases que se levarão em conta na avaliação e comparação das propostas.
- (e) O local em que serão prestadas as informações necessárias ao perfeito conhecimento do objeto da concorrência.
- (f) Os prazos máximos para o fornecimento dos bens e serviços.
- (g) A natureza dos seguros, cauções ou garantias exigidas.
- (h) As eventuais penalidades por descumprimento de garantias técnicas ou de prazos de fornecimento de bens.
- (i) A notícia de participação do BID no financiamento.
- (j) Cláusula estabelecendo fórmula de reajuste de preços.
- (l) Indicação da moeda ou moedas a serem utilizadas no pagamento, de acordo com o que for estabelecido no Contrato de Empréstimo.
- (m) A ressalva de que o Executor se reserva o direito de recusar qualquer das propostas, ou todas em conjunto.
- (n) As especificações técnicas do equipamento a ser adquirido e dos serviços correlatos.
- (o) Que a adjudicação estará sujeita à aprovação do BID.

PARÁGRAFO UNICO. Antes de enviar o edital às firmas qualificadas, o Executor o submeterá à aprovação do BID.

- 6.2 Se previsto, em determinada licitação internacional, que a proponente estrangeira não estabelecida na República Federativa do Brasil, caso vencedora, deva aí estabelecer-se para executar o respectivo contrato, incluir-se-á, no respectivo edital, cláusula estipulando que configurada essa hipótese, deverá a mesma, no prazo de 5 (cinco) dias a contar da correspondente comunicação do Executor, comprovar haver requerido ao Governo Federal a necessária autorização para funcionar no país e apresentar, dentro de 30 (trinta) dias a partir da obtenção desta, os documentos que comprovem o cumprimento dos demais requisitos e formalidades exigidas pela lei brasileira, sob pena de eliminação.
- 6.3 Nas licitações internacionais que tenham por objeto a compra de bens, os editais deverão, cumulativamente, conter cláusula estabelecendo ou aceitando fórmula de reajuste de preços, que permita repor o valor do cruzeiro em face dos eventuais aumentos dos custos internos, e atender aos seguintes requisitos:

- (a) as cauções e/ou garantias não serão de natureza mais restritiva à participação de interessados do que a das normas e práticas usuais nos países de nacionalidades dos interessados, inclusive na República Federativa do Brasil;
- (b) as eventuais penalidades por falta de cumprimento de garantias técnicas e de prazos de entrega não serão mais severas do que aquelas tradicionalmente aceitas no mercado internacional e deverão ser limitadas a um valor proporcional ao dos bens a serem fornecidos;
- (c) as condições de pagamento deverão ser estabelecidas de modo compatível com a prática usual de fornecimento pelos fabricantes brasileiros em licitações internacionais, de acordo com o programa de dispêndios decorrentes da fabricação dos bens.

6.4 O Executor, antes de dar publicidade ao edital de licitação, submetê-lo-á, juntamente com quaisquer outros documentos que sejam necessários, à aprovação do BID.

VII. REQUISITOS DAS PROPOSTAS EM LICITAÇÕES INTERNACIONAIS

7.1 Nas licitações internacionais, as propostas serão consideradas:

- (a) estrangeira - quando apresentadas por empresa ou consórcio de empresas estrangeiras;
- (b) nacionais - quando apresentadas por empresa ou consórcio de empresas brasileiras, ou estabelecidas no Brasil, sempre que os bens oferecidos sejam de origem nacional;
- (c) mistas - quando apresentadas por consórcio de empresas em que uma seja estrangeira e outra seja nacional, ou estabelecidas no Brasil, sempre que os bens por esta oferecidos sejam de origem nacional.

7.1.1 Um bem será considerado de origem nacional quando o custo dos materiais, da mão-de-obra e dos serviços locais empregados em sua fabricação representem, no mínimo, 50% (cinquenta por cento) do respectivo custo total, reduzindo-se esta percentagem a 40% (quarenta por cento) nos casos de equipamentos para os quais sejam definidos índices de nacionalização de acordo com plano aprovado pelo Governo Federal.

7.2 Nas licitações internacionais para a compra de bens, o Executor, no edital, deverá exigir que as propostas sejam apresentadas de acordo com as seguintes normas:

- (a) a proposta estrangeira deverá indicar:
 - (i) em divisas - o preço CIF, no porto nacional de desembarque ou na fronteira do País, exclusive direitos de importação,

despesas consulares e/ou portuárias, dos bens de origem externa oferecidos e, se for o caso, o preço de eventuais serviços de montagem e instalação ou outros serviços correlatos;

- (ii) em cruzeiros - o preço, na fábrica brasileira, de bens complementares de origem nacional porventura oferecidos e, se for o caso, o preço de eventuais serviços de montagem e instalação ou outros serviços correlatos que devam ser executados por pessoal nacional;
- (iii) O preço final de comparação será obtido acrescentando-se ao montante apurado pela forma prevista nos incisos anteriores:
 - (1) a quantia que resultar da conversão em cruzeiros, com base na taxa de câmbio mencionada em 9.2(a)(i), do preço dos serviços a que também se alude em 7.2(a)(i);
 - (2) o preço em cruzeiros de bens complementares de origem nacional, referido em 7.2(a)(ii);
 - (3) o preço em cruzeiros dos serviços referidos em 7.2(a)(ii);
 - (4) o custo do transporte dos citados bens de origem externa e de origem nacional, respectivamente, do porto de desembarque ou da fronteira do País e da fábrica brasileira ao local da entrega (local de execução do projeto ou programa);
- (b) a proposta nacional deverá indicar em cruzeiros o preço, na fábrica brasileira, dos bens oferecidos, com menção discriminada aos direitos de importação sobre matérias-primas principais ou componentes manufaturados importados e aos impostos sobre produtos industrializados (IPI) e sobre circulação de mercadorias (ICM) incorporados ao custo dos mesmos bens, e, se for o caso, o preço de eventuais serviços de montagem e instalação ou outros serviços correlatos;
- (c) a proposta mista deverá indicar:
 - (i) em divisas - com observância do disposto no inciso (i) da alínea (a) supra, o preço da parcela de origem externa dos bens e, se for o caso, dos eventuais serviços de montagem e instalação ou outros serviços correlatos.
 - (ii) em cruzeiros - com observância do disposto na alínea (b) supra, o preço da parcela de origem nacional dos bens e, se for o caso, dos eventuais serviços de montagem e instalação ou outros serviços correlatos.

7.2.1 Os proponentes deverão também comprovar:

- (a) no caso de proposta estrangeira - que os bens e, se for o caso, os serviços oferecidos são originários ou provenientes de países membros do BID ou por ele considerados elegíveis, de acordo com o Contrato de Empréstimo;
- (b) no caso de proposta nacional - que os bens e, se for o caso, os serviços oferecidos são de origem nacional;
- (c) no caso de proposta mista - que os bens e, se for o caso, serviços oferecidos pela empresa estrangeira e pela empresa nacional integrante do consórcio são respectivamente, originários ou provenientes de países membros do BID e originários da República Federativa do Brasil.

7.2.2 A proposta apresentada por empresa nacional, seja individualmente, seja em consórcio com outra empresa nacional ou estrangeira, deverá ainda ser acompanhada do comprovante ou demonstrativo dos direitos e impostos a serem deduzidos.

7.3 Nas licitações internacionais para obras, o Executor, no edital, deverá exigir que os preços das propostas sejam indicados:

- (a) em divisas, no caso de proposta estrangeira;
- (b) em cruzeiros, no caso de proposta nacional;
- (c) em divisas quanto à parte das obras que ficaria a cargo da empresa estrangeira integrante do consórcio e em cruzeiros quanto à parte das obras que ficaria a cargo da empresa nacional integrante do consórcio, no caso de proposta mista.

VIII. ABERTURA DAS PROPOSTAS

8.1 As propostas serão abertas precisamente no dia, hora e local, para isso estabelecidos, com a presença dos licitantes que desejarem assistir ao ato, pelo Presidente da Comissão de Licitação indicada pelo Executor, o qual as lerá em voz alta.

8.2 Aos licitantes será facultado examinar as propostas, podendo rubricá-las juntamente com o Presidente da Comissão de Licitação.

8.3 Ao final da sessão, lavrar-se-á a competente ata, na qual deverão ser consignadas eventuais ressalvas ou reclamações interpostas por quaisquer dos licitantes. Após lavrada, será a ata assinada pelo Presidente da Comissão de Licitação e pelos licitantes presentes.

IX. EXAME E JULGAMENTO DAS PROPOSTAS

9.1 A Comissão de Licitação examinará, julgará e classificará as propostas, assim como elaborará um relatório de suas conclusões, em que se exponha

as razões que as determinaram, especifique os incidentes ocorridos e as providências tomadas no curso da licitação, encaminhando-o à autoridade competente do Executor, para aprovação.

- 9.2 Nas licitações internacionais para a compra de bens, os preços das propostas, para efeito de comparação, serão computados com observância das seguintes normas:

(a) proposta estrangeira:

- (i) o preço CIF, em divisas, dos bens de origem externa de que trata o inciso (i) da alínea (a) do item 7.2 será convertido em cruzeiros, com base na taxa de câmbio que seja aplicável, de acordo com o Contrato de Empréstimo;
- (ii) à importância assim apurada em cruzeiros, serão acrescidos, em se tratando de bens transportados do exterior por via marítima, despesas realizadas para o desembarque do material no porto de desembarque no Brasil;

(b) margem de preferência

No caso de aquisição de bens mediante licitação internacional, poderão ser aplicadas as seguintes margens de preferência:

(i) margem de preferência nacional

Quando nas licitações participem fornecedores brasileiros, tais fornecedores terão direito a uma margem de preferência nacional que será reconhecida desde que utilizados os seguintes critérios:

- (1) Na aplicação da margem de preferência nacional um bem será considerado de origem brasileira quando o custo dos materiais, mão de obra e serviços locais empregados em sua fabricação representem pelo menos 50% do produto terminado.
- (2) Ao total obtido pela aplicação do disposto nos incisos anteriores, será acrescentada, a título de margem de proteção ao produto nacional, uma quantia correspondente a 15% (quinze por cento) do mesmo total, de acordo com o inciso II, parágrafo único, do Art. 17 do Decreto-Lei No. 37, de 1966; a aplicação dessa percentagem, em se tratando de bens transportados do exterior por via marítima, obedecerá à seguinte fórmula:

$$P^o = (1 + t) (P + D)$$

Em que:

- P° = preço final para efeito de comparação
- P = preço CIF, convertido em cruzeiros, conforme o disposto no inciso (a)(i) supra;
- D = despesas realizadas para o desembarço do material no porto de desembarque no Brasil, a que alude o inciso (a)(ii) supra;
- t = porcentagem de 15%, correspondente à margem de proteção.

(ii) margem de preferência regional

Nos casos em que, havendo avaliado todas as ofertas de acordo com os procedimentos para a aquisição de bens em licitação pública internacional, esta não tiver sido adjudicada a um fornecedor nacional, poderá o Mutuário, aplicar uma margem de preferência regional igual à estipulada para fornecedores locais para os países membros da Associação Latino-Americana de Integração ALADI, nas seguintes condições:

- (1) Considerar-se-á que um bem é de origem regional quando for produzido em um país membro da ALADI e atenda os requisitos estabelecidos nos instrumentos jurídicos que governam a ALADI, quanto à origem e outros aspectos vinculados com os programas de liberalização do comércio regional.
- (2) O valor localmente acrescentado não é inferior a 40% do custo total do produto.
- (3) Para fins de comparação de propostas, ao preço CIF do produto serão acrescentadas as despesas realizadas para o desembarço do material no porto de desembarque do Brasil e de transporte do porto ou local fronteiriço de entrada no país até a obra.
- (4) Para fins de comparação de preços de bens originários de países membros da ALADI e de bens originários de países que não sejam membros da ALADI, observar-se-á o seguinte:
 - (aa) serão convertidos a seu equivalente em cruzeiros os preços expressos em moeda estrangeira, sobre a base de cálculo estabelecida no Contrato de Empréstimo; e
 - (bb) acrescentar-se-á ao preço dos produtos originários de países que não sejam membros da ALADI uma margem de preferência de 15%, ou a

diferença entre os direitos aplicáveis a bens originários desse mercado e os direitos aplicáveis a bens não originários do mesmo, qualquer que seja o menor.

- (5) Quando, aplicadas as normas anteriores, resultar que a oferta do produto originário de um país membro da ALADI é mais conveniente que a do produto originário de um país que não seja membro da ALADI, poderão ser utilizadas na sua aquisição as divisas que façam parte do Empréstimo.

(c) proposta nacional

- (i) do preço em cruzeiros dos bens, de que trata a letra (b) do item 7.2, serão deduzidos os direitos de importação sobre matérias-primas principais ou componentes manufaturados importados, bem como os impostos sobre produtos industrializados (IPI) e sobre circulação de mercadorias (ICM) incorporados ao custo dos mesmos bens;
- (ii) o preço final de comparação será obtido acrescentado-se ao montante apurado pela forma prevista no inciso anterior:
- (aa) a quantia correspondente ao preço dos serviços a que também alude a letra (b) do item 7.2;
- (bb) o custo do transporte dos citados bens, da fábrica brasileira ao local de entrega (local de execução do projeto ou programa);

(d) proposta mista

- (i) os preços das parcelas de origem externa e de origem nacional dos bens e serviços, de que tratam os incisos (i) e (ii) da alínea (c) do item 7.2, serão apurados de modo separado, com observância, respectivamente, das normas estabelecidas nas letras (a), (b) e (c) supra, no que couberem;
- (ii) o preço final de comparação será obtido pela soma dos preços mencionados no inciso precedente.

9.3 Origem dos Bens: A origem dos materiais e equipamentos a serem adquiridos se define como sendo a do país no qual o material e/ou equipamento foi extraído, cultivado ou produzido seja por manufatura, processamento ou montagem. A origem do artigo "produzido" necessariamente se define sendo a do país no qual, o referido processamento, manufatura ou montagem, resulta em outro artigo comercialmente reconhecido, que difere substancialmente em suas características básicas, no seu propósito ou finalidade de qualquer de seus componentes importados. O critério para a determinação da

nacionalidade de um bem fabricado em um determinado país é o do local onde o referido bem é manufaturado em estabelecimento permanente e não o da nacionalidade dos acionistas da empresa que o fabricou.

- 9.4 Nas licitações internacionais para obras, os preços em divisas, quer de proposta estrangeira, quer de proposta mista, esta no que se refere à parte das obras que ficaria a cargo da firma estrangeira do consórcio, serão, para efeito de comparação, convertidos em cruzeiros com base na taxa de câmbio mencionada no inciso (i) da letra (a) do item 9.2.
- 9.5 No julgamento e classificação das propostas a Comissão de Licitação deverá escolher a que oferecer o mais baixo preço, a menos que outras razões de preferência, inclusive relativas a prazos de fornecimento ou de execução de obras, que tenham sido expressamente previstas no edital ou que motivos ponderáveis, devidamente justificados pela Comissão, aconselhem a adoção de outro critério.
- 9.6 A aprovação do relatório da Comissão de Licitação será considerada definitiva após haver o BID a ele manifestado a sua concordância, quando então será tornado público o resultado da licitação, mediante comunicação aos licitantes.

X. ADJUDICAÇÃO

- 10.1 A adjudicação, após comunicado aos licitantes o resultado da licitação, será procedida mediante a assinatura do contrato, observadas as condições estabelecidas no edital.
- 10.2 O contrato de adjudicação, cuja minuta deverá ser previamente aprovada pelo BID deverá incluir cláusulas que assegurem o cumprimento das condições constantes do Contrato de Empréstimo, especialmente as relativas à origem de bens e de serviços, ao direito de inspeção que compete ao BID, à publicidade sobre a fonte de financiamento, e se for o caso, ao transporte marítimo de bens.
- 10.3 A cessão total ou parcial a terceiros dos direitos decorrentes do contrato de adjudicação e a sub-rogação em obrigações deste decorrentes somente serão autorizados pelo Executor se a elas houver o BID, previamente, manifestado sua concordância.

XI. DISPENSA DE LICITAÇÃO

- 11.1 A licitação, quando prevista no Contrato de Empréstimo, para compras e obras, somente poderá ser dispensada com prévia e expressa autorização do BID, nas seguintes hipóteses:
- (a) em casos de guerra, graves perturbações da ordem ou calamidade pública;
 - (b) quando não se apresentarem proponentes à licitação realizada com o mesmo objeto, devendo neste caso serem mantidas as condições pré-estabelecidas;

- (c) em se tratando de aquisição de materiais, equipamentos ou gêneros que só possam ser fornecidos por produtor exclusivo;
- (d) em se tratando de compra ou locação de imóveis; e
- (e) em casos de emergência, caracterizada a urgência do atendimento de situação que possa ocasionar sérios prejuízos ou comprometer a segurança de pessoas, obras, bens ou equipamentos.

CALENDARIO DE INVERSIONES (US\$ Miles)

	<u>AÑO 1</u>	<u>AÑO 2</u>	<u>AÑO 3</u>	<u>AÑO 4</u>	<u>TOTAL</u>	<u>PORCENTAJES</u>
I. <u>Ingeniería y Administración</u>	<u>5.350</u>	<u>5.110</u>	<u>4.600</u>	<u>3.440</u>	<u>18.500</u>	<u>8,9</u>
1.1 <u>Estudios</u>	2.050	1.510	1.400	540	5.500	
1.2 <u>Supervisión y Administración</u>	3.300	3.600	3.200	2.900	13.000	
II. <u>Costos Directos</u>	<u>22.100</u>	<u>42.720</u>	<u>35.840</u>	<u>26.240</u>	<u>126.900</u>	<u>61,2</u>
2.1 <u>Obras</u>	20.100	40.220	35.840	26.240	122.400	
2.2 <u>Equipos</u>	2.000	2.500	-	-	4.500	
III. <u>Costos Concurrentes</u>	<u>11.200</u>	<u>20.800</u>	<u>-</u>	<u>-</u>	<u>32.000</u>	<u>15,4</u>
3.1 <u>Expropiaciones y Servidumbres</u>	11.200	20.800	-	-	32.000	
IV <u>Gastos Financieros</u>	<u>2.390</u>	<u>5.880</u>	<u>9.560</u>	<u>12.270</u>	<u>30.100</u>	<u>14,5</u>
4.1 <u>Interese</u>	1.413	4.982	8.943	11.932	27.270	
4.2 <u>Comisión de Crédito</u>	770	690	410	130	2.000	
4.3 <u>FIV</u>	207	208	207	208	830	
<u>Totales</u>	<u>41.040</u>	<u>74.510</u>	<u>50.000</u>	<u>41.950</u>	<u>207.500</u>	<u>100,0</u>
<u>Porcentajes</u>	<u>19,8</u>	<u>35,9</u>	<u>24,1</u>	<u>20,2</u>	<u>100,0</u>	

CALENDARIO BRASIL

DEPARTAMENTO DE DESAPROPIAÇÕES

ESTIMATIVA DO CUSTO DAS DESAPROPIAÇÕES E No. DE IMÓVEIS ATINGIDOS

1.	-	Lausane	-	Cz\$30.000.000,00 155 imóveis
2.	-	Moóca	-	Cz\$20.000.000,00 100 imóveis
3.	-	Morro do "S"	-	Cz\$100.000.000,00 330 imóveis
4.	-	Itaquera/Itaqueruna	-	Cz\$60.000.000,00 300 imóveis
5.	-	Tiquatira	-	não há desapropiação
6.	-	Gamelinha	-	Cz\$50.000.000,00 No. de imóveis somente após preparação do projeto de Lei (350 imóveis)
8.	-	Jaguare	-	Cz\$50.000.000,00 350 imóveis (a ser revisto após conclusão do projeto do DERSA)
9.	-	Cordeiro	-	Cz\$20.000.000,00 200 imóveis
10.	-	Taboão	-	Cz\$65.000.000,00 No. de imóveis somente após preparação do projeto de Lei (350 imóveis)
11.	-	Cabuça	-	não há desapropiação

- | | | | | |
|-----|---|------------|---|-------------------|
| 12. | - | Tremembe | - | Cz\$40.000.000,00 |
| | | | | 300 imóveis |
| 13 | - | Mongaguá | - | Cz\$38.000.000,00 |
| | | | | 250 imóveis |
| 14. | - | Aricanduva | - | não há elementos |

DESAP - 10. de outubro de 1986

REGIONAIS		EQUIPAMENTO EXISTENTE										REGIONALES					EQUIPAMENTO EXIS			
EMENTO	Buzanca	Campo Linslo	Cap. do Socorro	Casa Verde	Preg.do	Itaquera Quilom.	Ipiranga	Lapa	Sao Miguel	V. Mirfa V. Guilh.	Mooca	Penha	Pirituba	Pinheiros	Perus	Santo Amaro	SE	Santana	Villa Mariana	
ONE	01	01	01	0	0	03	0	0	02	0	01	02	01	0	0	01	0	01	0	
DEIRA	03	02	01	02	01	04	04	01	05	04	03	01	03	02	02	02	01	03	03	
DEIRA LICA	01	02	01	0	04	01	02	0	02	03	01	03	03	0	0	02	0	02	01	
DE	0	01	01	01	03	04	02	01	03	03	03	03	01	0	02	02	01	03	01	
A	02	01	0	0	01	01	0	0	01	03	02	01	0	0	0	01	01	02	01	
DO NTER	02	02	01	01	02	03	02	01	01	02	02	02	01	01	01	03	01	02	01	

AR'S. Pessoal Exis tente	AR-Butan- tã	AR-Campo Limpo	AR-Cape la do Socorro	AR-Casa Verde	AR-Freg. do 6	AR-Itaque ra-Guaia nases	AR-Ipi ranga	AR-Lapa	AR-S.Mi guel Pau lista	AR-V.Ma- ria-V. Guilherme	AR-Mooca
ENGENHEIRO S	02	03	02	01	02	03	02	02	03	02	02
ENCARREGADOS	01	02	02	01	02	02	01	01	02	01	01
OPERADORES DE MÁQUINAS	09	11	10	03	13	16	11	04	15	10	10
MECANICOS MOTORISTAS SERVICAS	21	23	16	12	19	21	15	14	21	18	19
TOTALES	33	39	30	17	36	42	29	21	41	31	32
AR'S. Pessoal Exis tente	AR-Penha	AR-Piri tuba-Pe ros	AR-Pinhei ros	AR-Perus	AR-Santo Amaro	AR-Sé	AR Santa na-Tucu ruvi	AR-Vila Mariana	AR-Vila Prudente	TOTAL	PROMEDIO
ENGENHEIRO S	03	02	02	01	02	02	02	02	02	42	2,1
ENCARREGADOS	02	02	01	01	01	01	01	01	02	28	1,4
OPERADORES DE MÁQUINAS	13	11	05	03	08	04	10	07	13	186	9,3
MECANICOS MOTORISTAS SERVICAS	20	16	13	14	19	18	19	17	23	358	17,9
TOTALES	38	31	21	19	30	25	32	27	40	614	30,7

QUANTITATIVOS DOS SERVIÇOS EXECUTADOS PELAS REGIONAIS

DE 01/01 a 30/09/80

REGIONAL	Penha	Pirituba	Freg, do	Itague	Guaiana	Santana	Sto Ama	C. Socor	S. Mi	Ipiran-	Perus	Se'
Limpeza de	13,69	8,43	5,44	2,35	1,76	5,0	15,9	1,4	6,2	1,1	0,35	0,0
Córregos(KM)												
Cons. de Gale	303,00	131,00	131,50	23,0	17,0	93,00	1000	335	141	121,50	-	82,80
rias(m)troca												
de tubos												
Limpeza de	2.030,00	1.739,00	4015	10.265	1947	5.409,00	3038	1466	296	2919	308	10.444
bocas de lo												
bo (unidade)												
Subst.de tan	940,0	188,00	469	500	600,0	1.620,00	950	192	160	681	44	309
pas de boca												
de lobo(un.)												
Construção	772,0	415,00	1223	23,0	23,0	834,00	390,00	-	1322	137	46	392
de												
Galerias(m)												

REGIONAL	C. Limpo	V. Prp	Butanta	Móoca	C. Verde	V. Maria	Lapa	Pinhel	V. Maria	Total
Limpeza de	8,3	0,75	7,1	1,050	-	1,1	2,4	0,3	9,76	32,46
Córregos(KM)										Km
Cons. de Gale	75	52	9,0	50,0	-	18	81,50	47,50	18,0	2.729,8
rias(m)troca										M
de tubos										
Limpeza de	1548	1106	3958	2132,0	136	2754	2668	6206	4908	69.296
bocas de lo										Unidades
bo (unidade)										
Subst.de tan	965	637	954	160,0	300	331	469	563	101	11.133
pas de boca										Unidades
de lobo(un.)										
Construção	225	290	692,5	185,0	-	85	160	50	101,50	7.366
de										M
Galerias(m)										

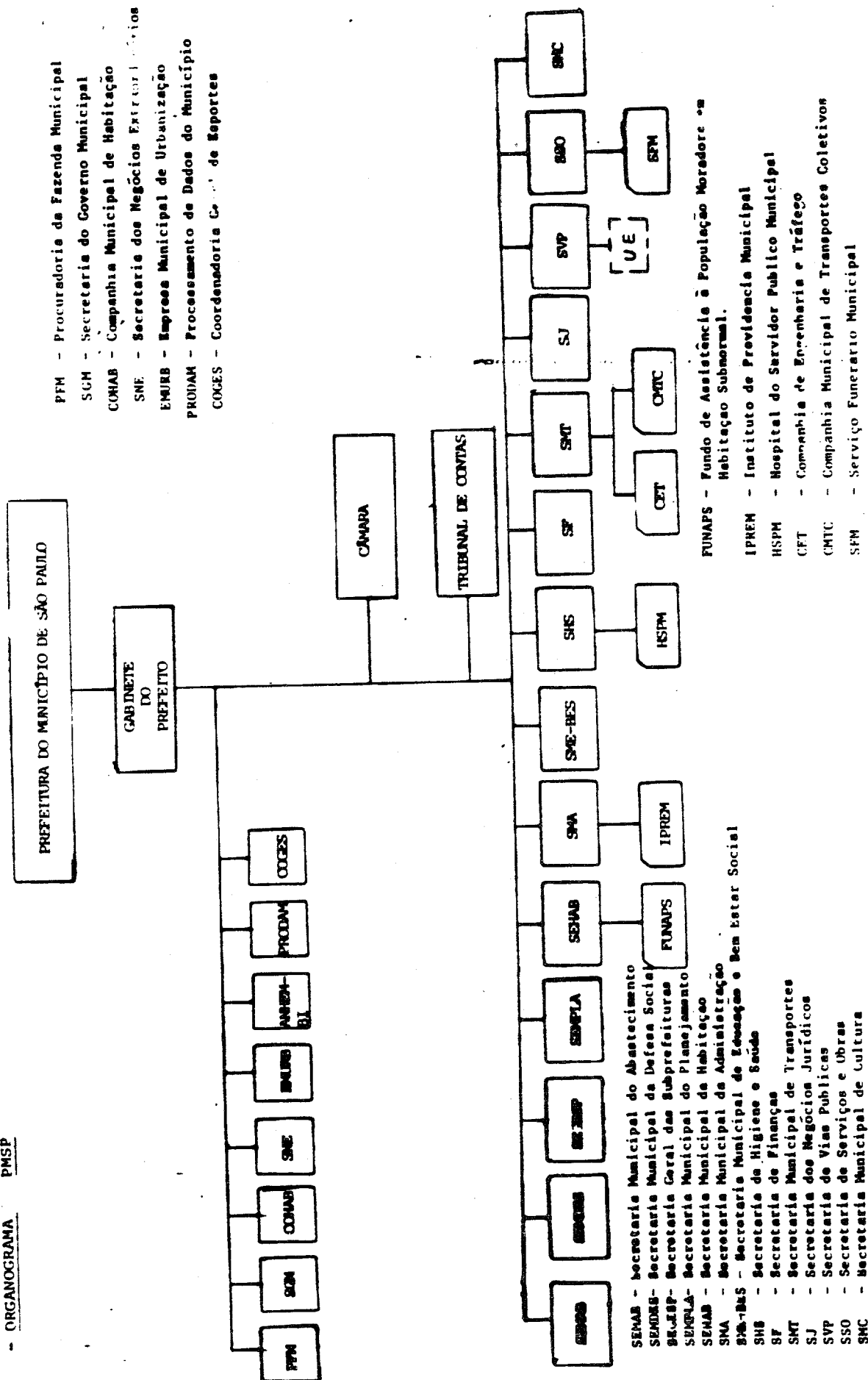
DISTRIBUIÇÃO DO EQUIPAMENTO A SER ADQUIRIDO COM O EMPRÉSTIMO

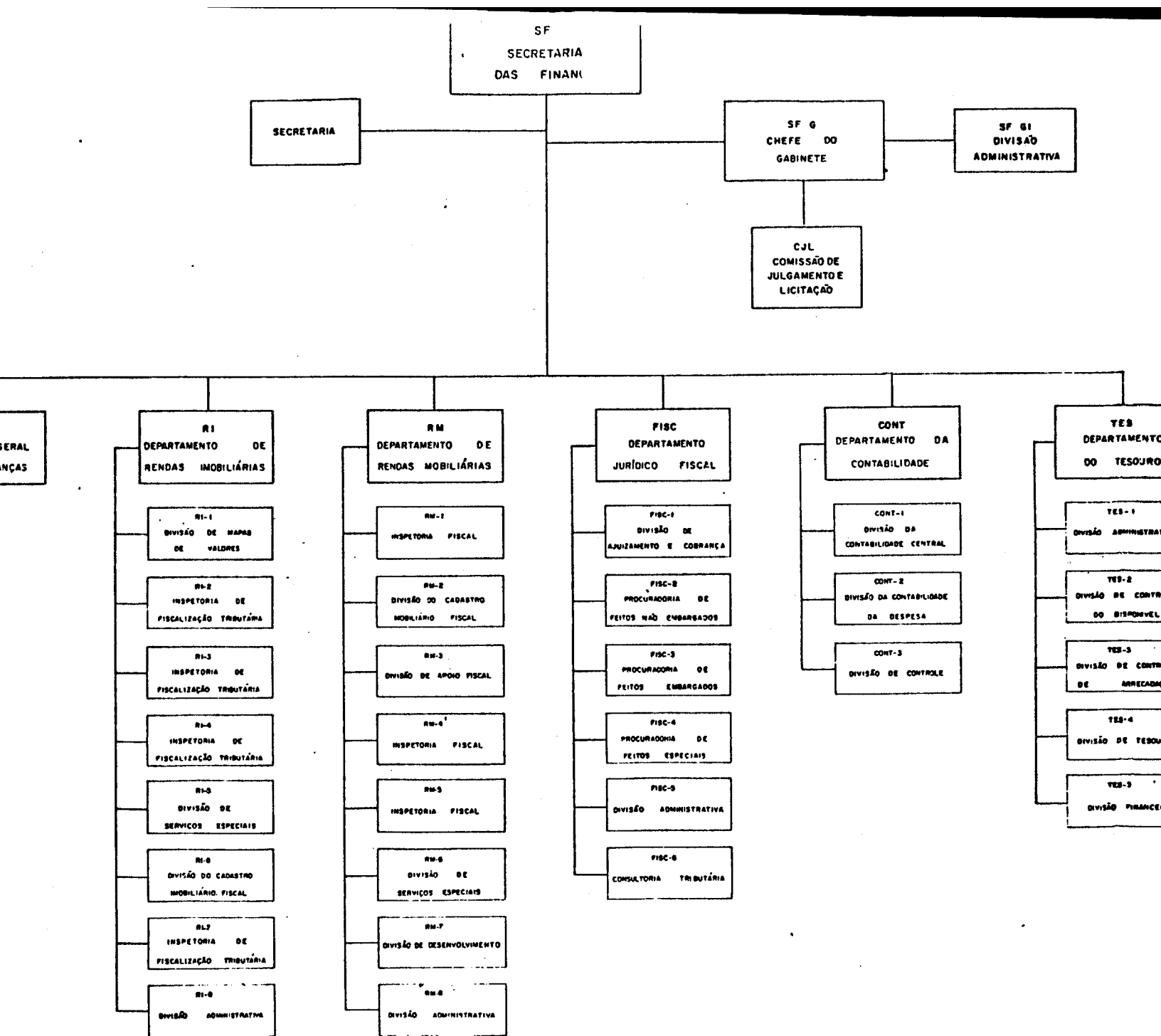
EQUIPAMENTO	Butantã	Campo Limpo	Cap.do Socorro	Casa Verde	Freg. do Ó	Itaquera Guaian.	Ipiranga	Lapa	São Miguel	V.Maria V.Guilh
TRAG-LINE	01	01	01	0	0	01	01	0	01	0
ETRO SCAVADEIRA	01	02	02	0	0	0	0	01	0	0
SCAVADEIRA IDRAULICA	0	0	01	01	0	01	0	0	0	0
RATOR DE STEIRA	01	01	01	0	0	01	0	0	01	0
ARRETA	0	0	01	0	0	0	01	0	0	0
ALINHÃO ASCULANTE	03	04	03	02	03	04	02	02	04	02

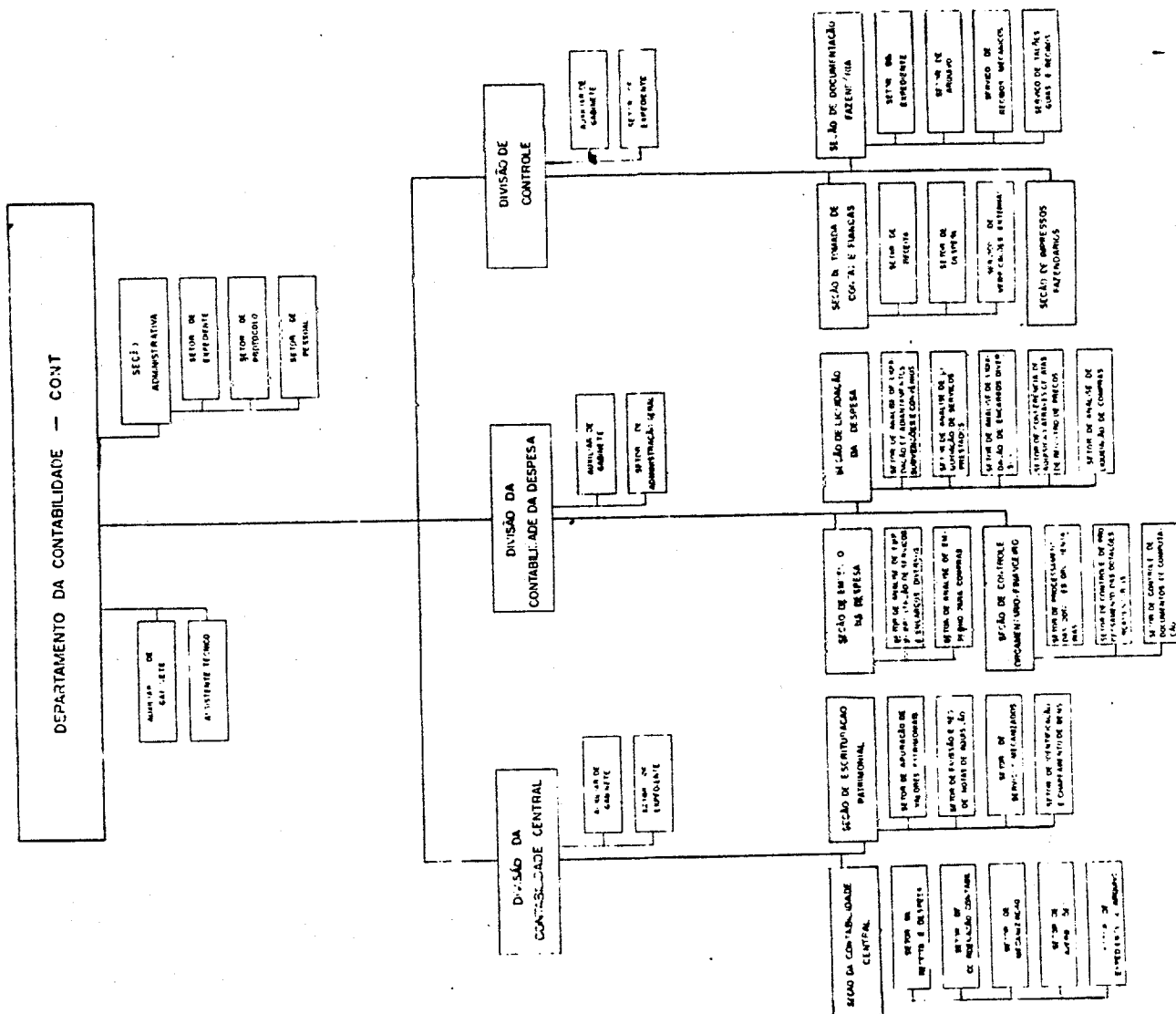
EQUIPAMENTO A SER ADQUIRIDO

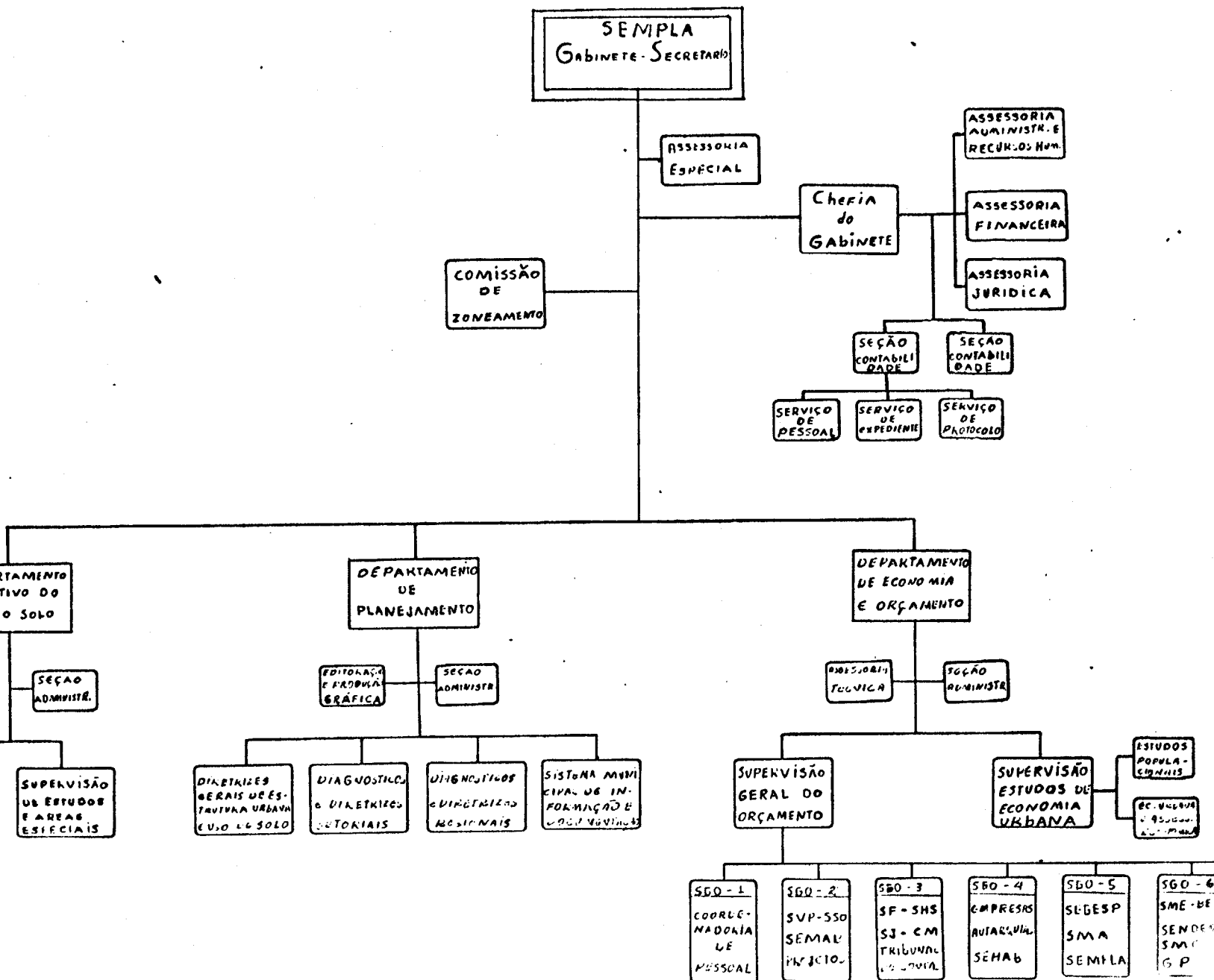
EQUIPAMENTO-	Penha	Pirituba	Pinheiros	Perús	Santo Amaro	SÉ	Santana	Vila Mariana	Vila Prudente	TOTA
TRAG-LINE	0	0	0	0	0	0	0	0	01	08
ETRO SCAVADEIRA	02	0	0	02	01	01	0	0	0	12
SCAVADEIRA IDRAULICA	0	0	0	01	0	0	0	0	0	04
RATOR DE STEIRA	01	01	0	0	0	0	0	01	0	08
ARRETA	0	01	0	01	0	0	0	0	04	04
ALINHÃO ASCULANTE	02	03	02	03	02	02	02	02	03	53

ORGANOGRAMA PMSP

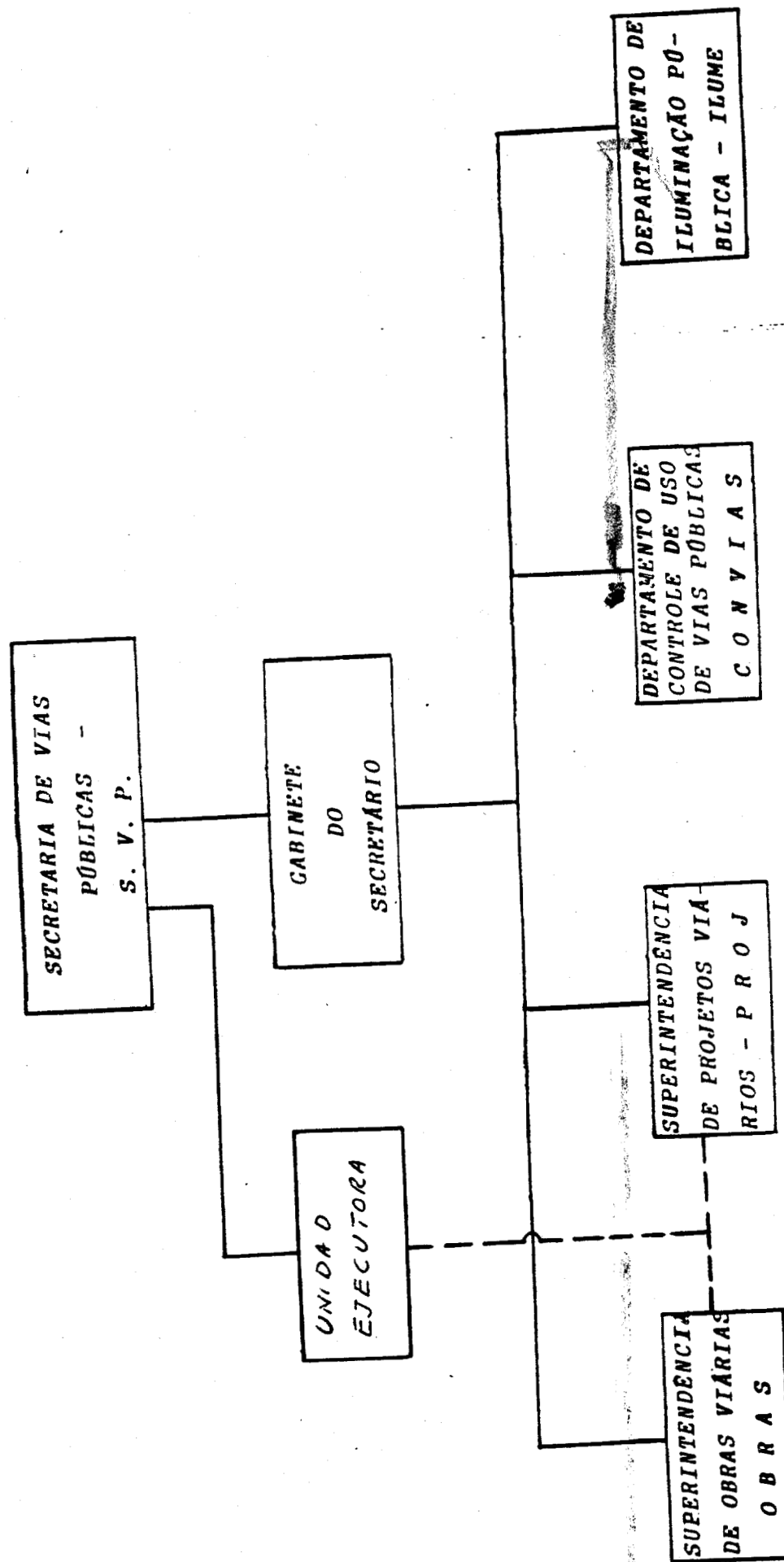




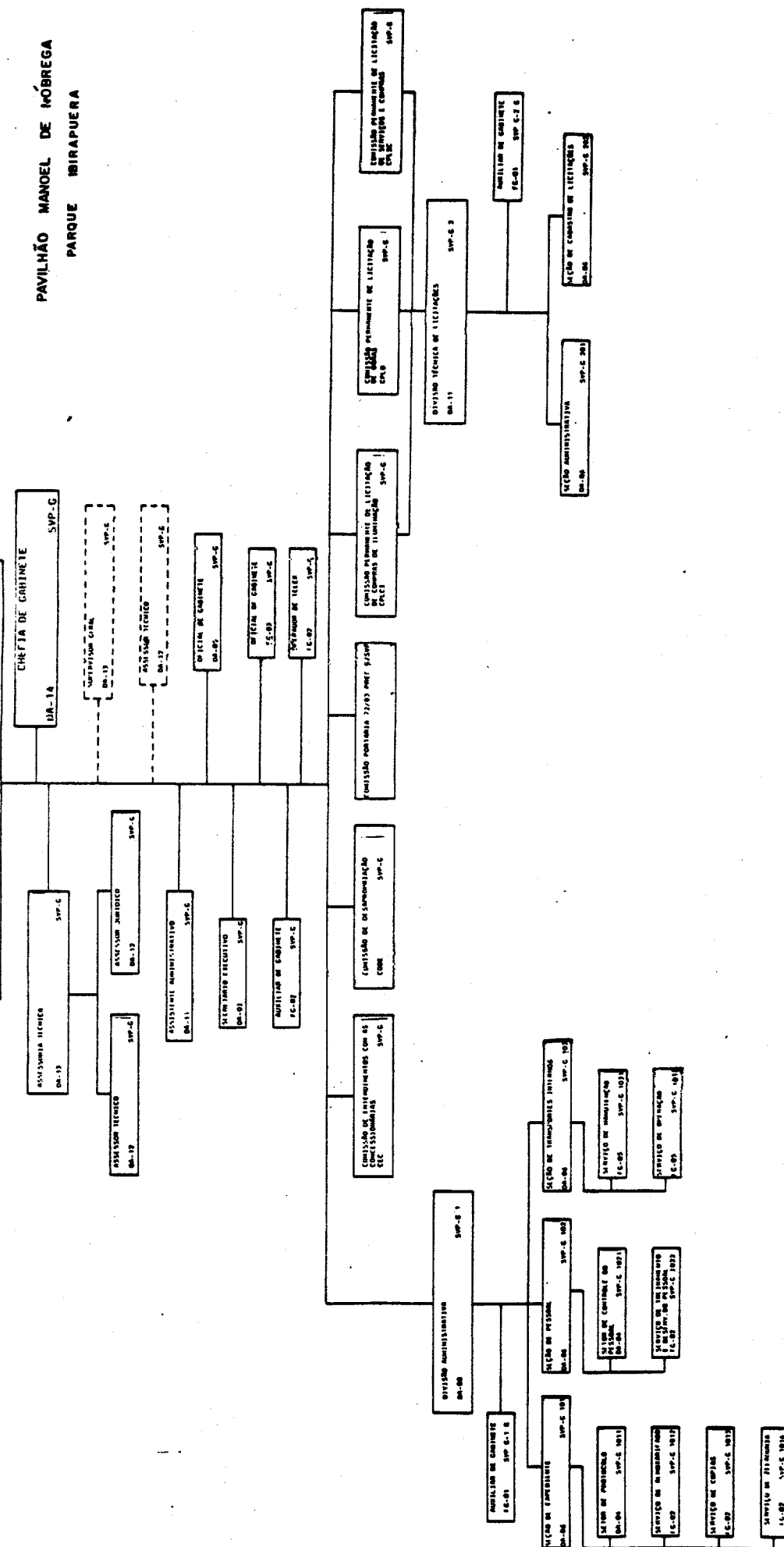




PREFEITURA DO MUNICÍPIO DE SÃO PAULO - PMSP
SECRETARIA DE VIAS PÚBLICAS

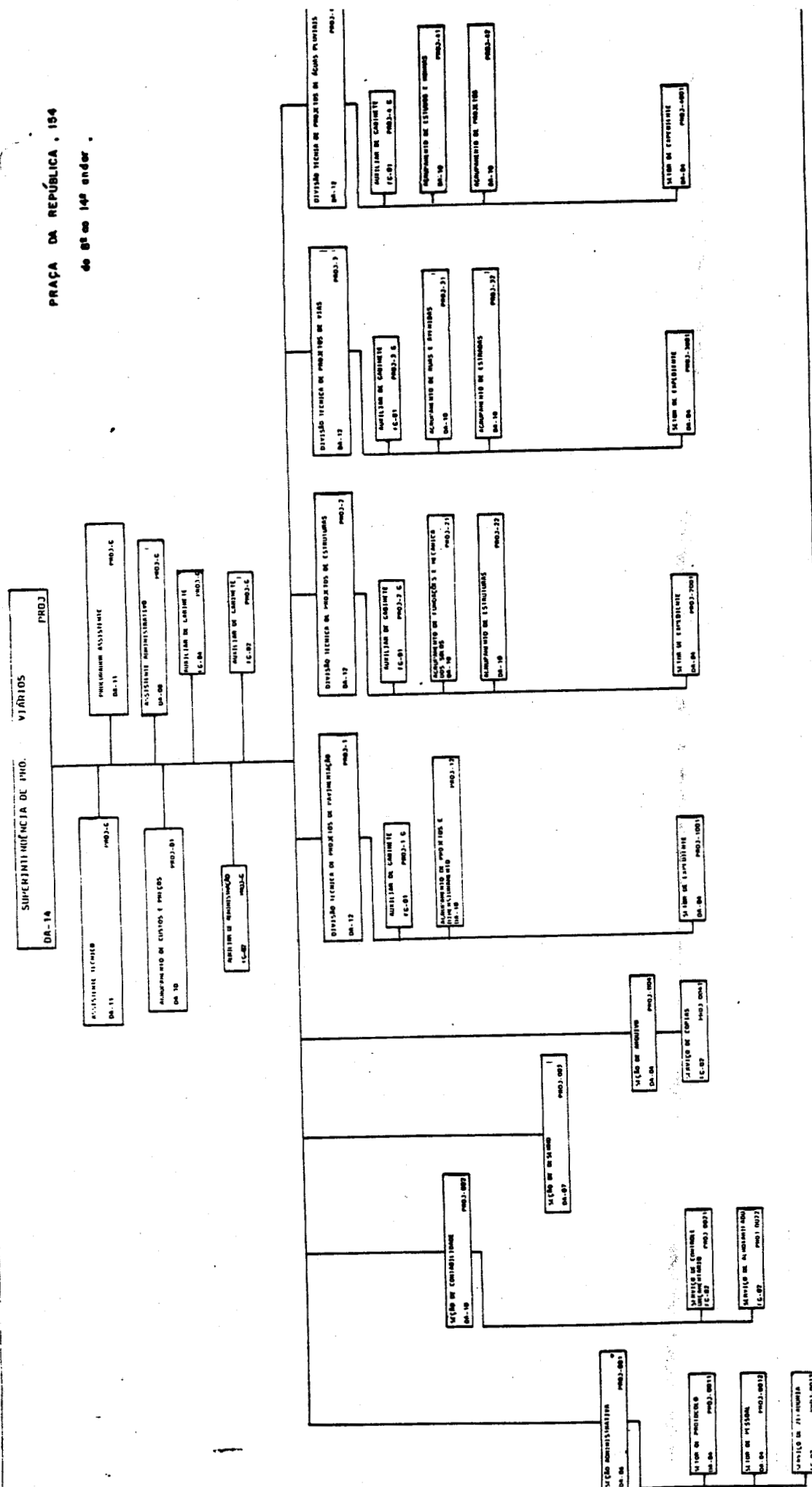


PAVILHÃO MANOEL DE MÓBREGA
PARQUE MIRAPUERA

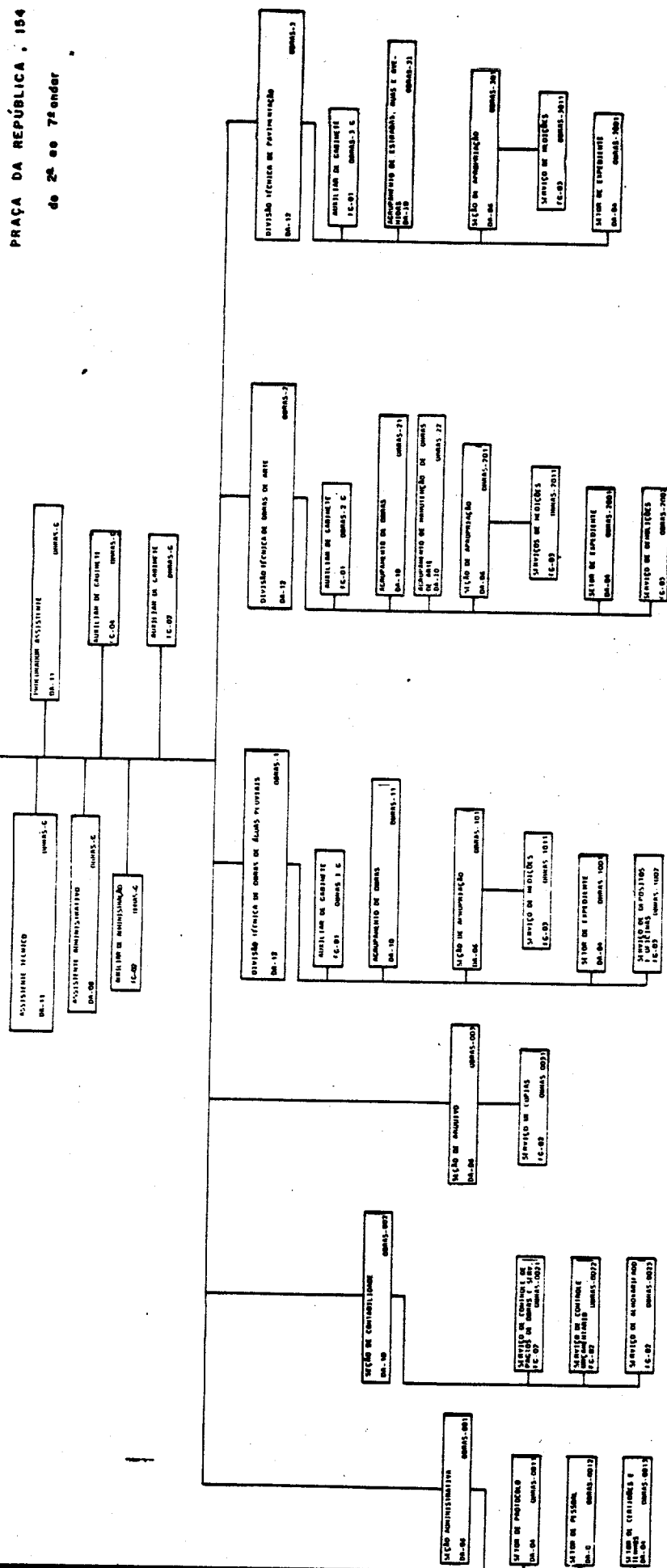


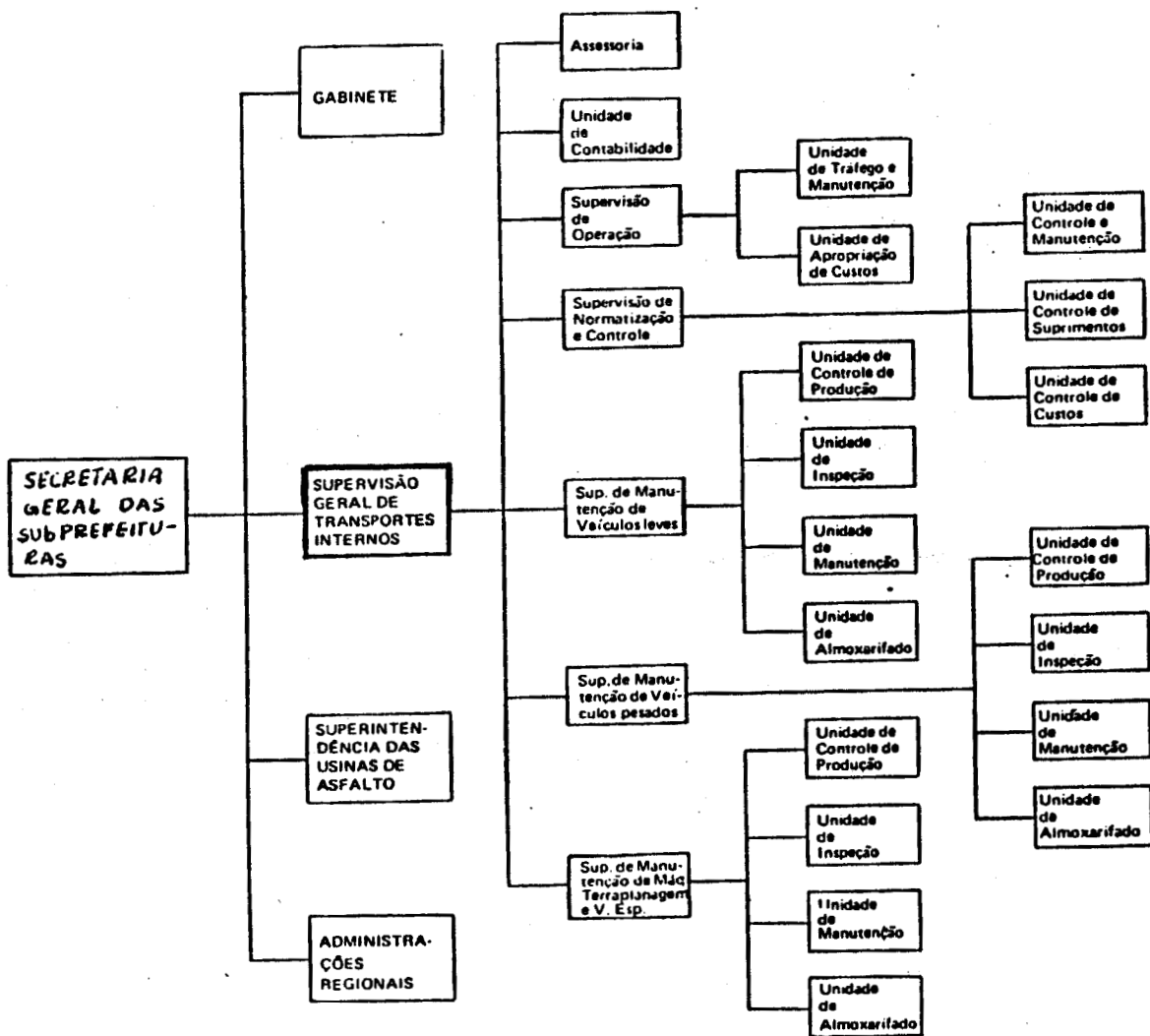
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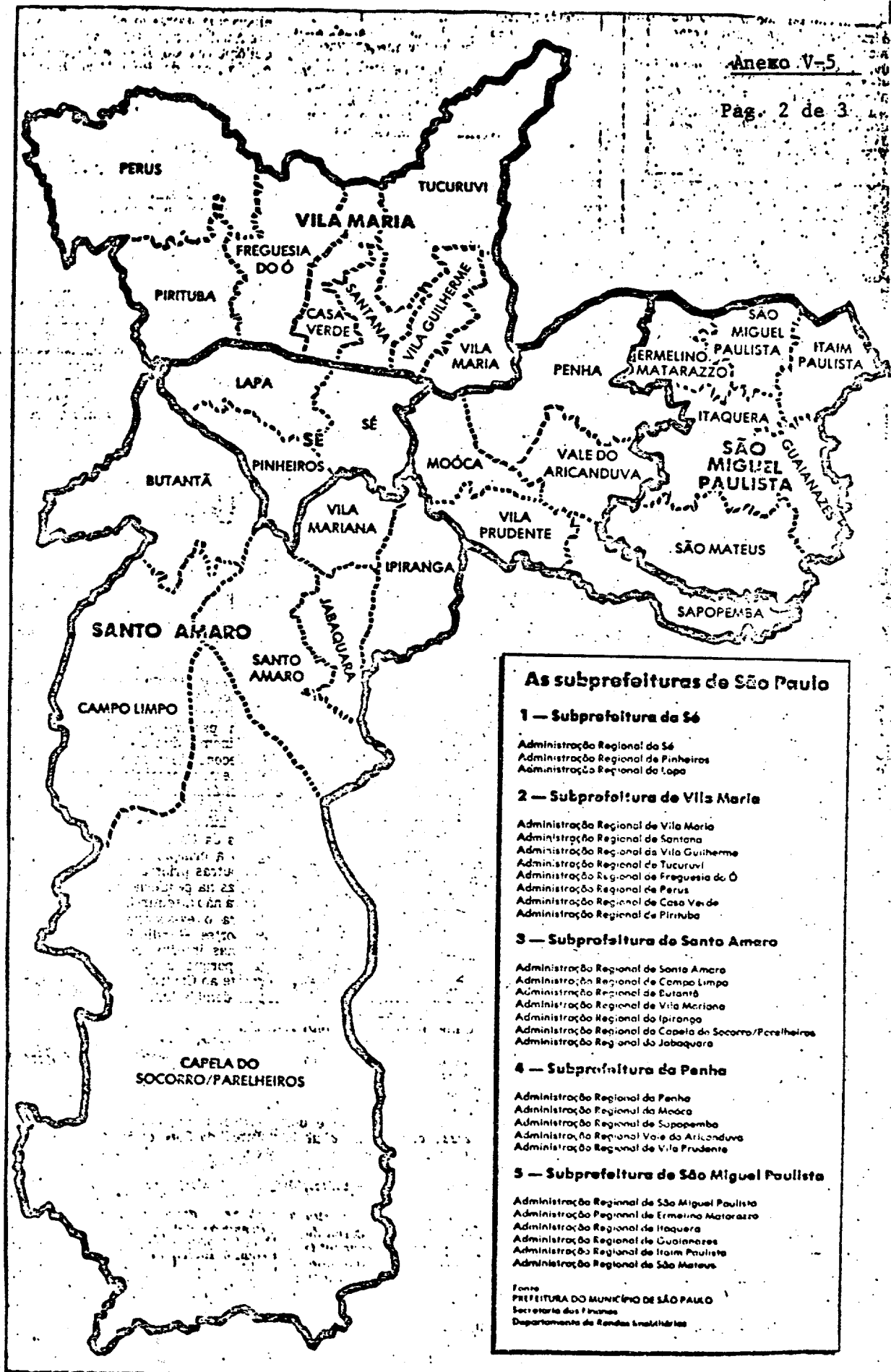
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DA-14 SUPPLEMENTO DE OBRAS 15 DINIRAS







As subprefeituras de São Paulo

1 — Subprefeitura de Sé

Administração Regional de Sé
Administração Regional de Pinheiros
Administração Regional de Lapa

2 — Subprefeitura de Vila Maria

Administração Regional de Vila Maria
Administração Regional de Santana
Administração Regional de Vila Guilherme
Administração Regional de Tucuruvi
Administração Regional de Freguesia do Ó
Administração Regional de Perus
Administração Regional de Casa Verde
Administração Regional de Pirituba

3 — Subprefeitura de Santo Amaro

Administração Regional de Santo Amaro
Administração Regional de Campo Limpo
Administração Regional de Butantã
Administração Regional de Vila Mariana
Administração Regional de Ipiranga
Administração Regional de Capela do Socorro/Parelheiros
Administração Regional de Jabaquara

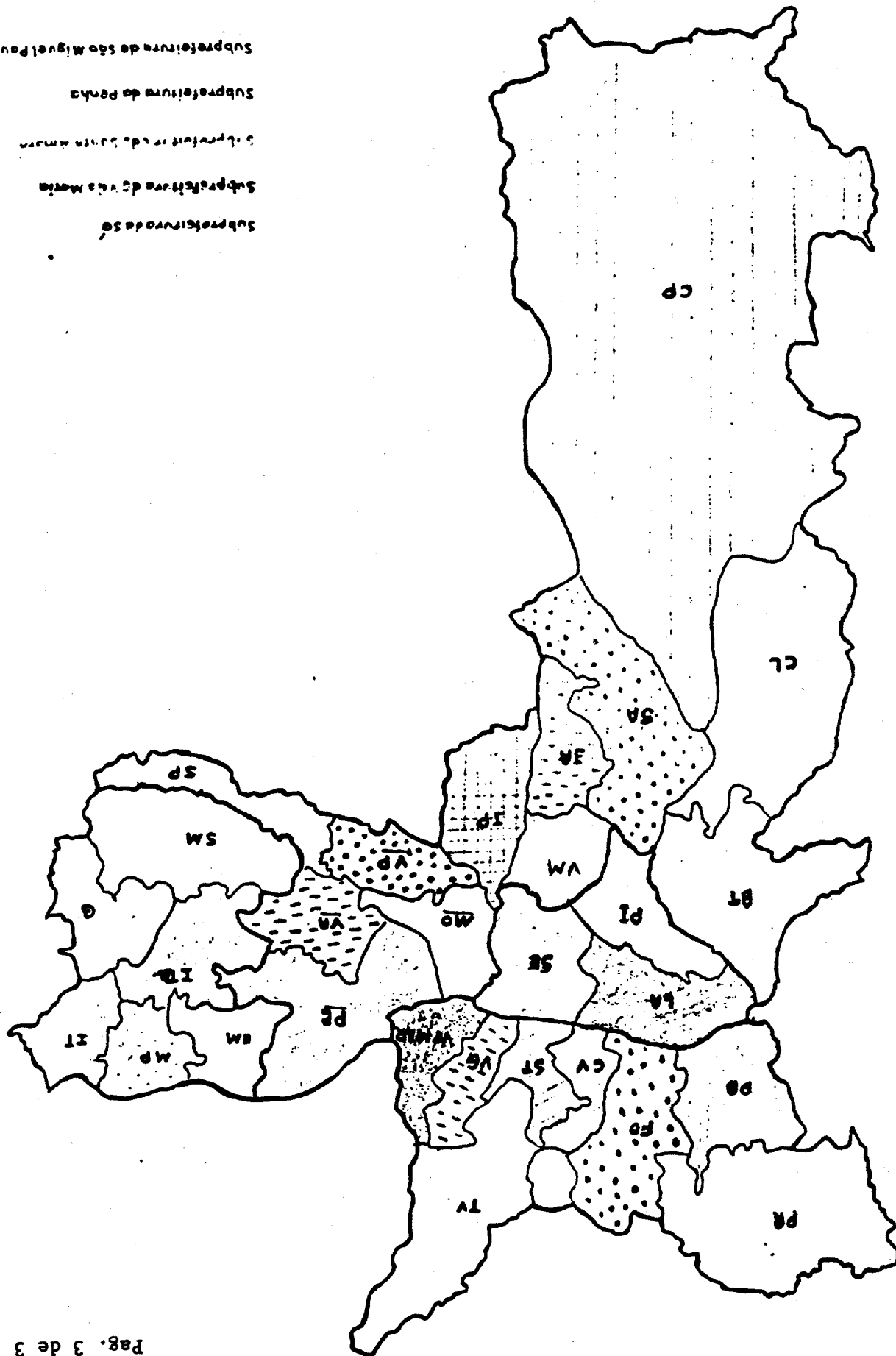
4 — Subprefeitura da Penha

Administração Regional de Penha
Administração Regional de Mooca
Administração Regional de Sapopemba
Administração Regional de Vale do Aricanduva
Administração Regional de Vila Prudente

5 — Subprefeitura de São Miguel Paulista

Administração Regional de São Miguel Paulista
Administração Regional de Ermelino Matarazzo
Administração Regional de Itaquera
Administração Regional de Guaiánazes
Administração Regional de Itaim Paulista
Administração Regional de São Mateus

FONTE:
PREFEITURA DO MUNICÍPIO DE SÃO PAULO
Secretaria dos Finanças
Departamento de Rendas Imobiliárias



Subprefeitura da Sé

Subprefeitura do Vale do Anhangabaú

Subprefeitura do Centro

Subprefeitura da Penha

Subprefeitura de São Miguel Paulista

MUNICIPALIDAD DE SAO PAULO
Ingresos Corrientes
1985-1995
(Millones de US\$ Equivalentes)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Ingresos Corrientes	750.7	940.8	1,203.8	1,341.2	1,395.1	1,462.3	1,536.5	1,615.2	1,699.1	1,799.8	1,901.3
Imp. Predial y Territorial	87.5	123.6	260.1	353.8	359.4	365.1	370.6	376.2	382.2	388.3	394.5
Imp. a los Servicios	192.3	253.8	284.7	304.6	325.9	348.7	373.1	399.3	427.2	457.1	489.2
Tasas	34.9	42.5	73.8	86.3	92.4	98.8	105.7	113.0	121.0	129.5	138.5
Imp. Circulacion de Mercad	295.6	417.7	448.0	455.2	471.8	500.1	530.1	561.9	595.7	643.3	688.4
Otros Ingresos	140.4	103.2	137.2	141.3	145.6	149.6	157.0	164.8	173.0	181.6	190.7

MUNICIPALIDAD DE SAO PAULO
Estado de Origen y Aplicacion de Fondos
(Millones de US\$ Equivalentes)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Ingresos Corrientes	750.7	940.8	1,203.8	1,341.2	1,395.1	1,462.3	1,536.5	1,615.2	1,699.1	1,799.8	1,901.3
Gastos Corrientes	765.6	919.4	1,004.9	1,073.8	1,170.7	1,189.5	1,217.3	1,239.4	1,262.3	1,285.6	1,318.5
Personal	382.9	567.8	603.4	618.9	634.4	650.2	666.6	683.2	700.2	717.7	735.7
Intereses Deuda	98.9	59.0	29.8	47.8	102.4	85.8	77.8	63.6	50.2	36.5	31.9
Otros Gastos	283.8	292.6	371.7	407.1	433.9	453.5	472.9	492.6	511.9	531.4	550.9
Ahorro Neto Ing. Corrientes	(14.9)	21.4	198.9	267.4	224.4	272.8	319.2	375.8	436.8	514.2	582.8
Gastos de Capital	267.8	367.1	417.9	387.3	329.0	321.6	319.4	375.8	436.7	514.1	582.9
Inversiones	135.3	186.4	304.2	283.1	227.3	216.8	203.5	181.3	186.9	229.9	394.4
Proyecto BID/MSP			41.0	74.5	50.0	42.0					
Otros	135.3	186.4	263.2	208.6	177.3	174.8	203.5	181.3	186.9	229.9	394.4
Expropiaciones	19.9	39.2	57.8	57.8	57.8	43.3	14.5	7.2	7.2	7.2	14.4
Amortizaciones	70.0	125.8	55.9	46.4	43.9	61.5	101.4	187.3	242.6	277.0	174.1
BID	0.0	0.0	0.0	0.0	0.0	0.0	4.8	4.8	4.8	4.8	4.8
BNH-Proyecto BID/MSP	0.0	0.0	0.0	0.0	0.0	4.3	4.3	4.3	4.3	4.3	4.3
Otras Amortizaciones	70.0	125.8	55.9	46.4	43.9	57.2	92.3	178.2	233.5	267.9	165.0
Otros Gastos	42.6	15.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Ingresos de Capital	282.6	345.8	219.4	119.9	104.6	48.7	0.0	0.0	0.0	0.0	0.0
Prestamo BID	0.0	0.0	12.6	24.9	22.4	17.6	0.0	0.0	0.0	0.0	0.0
Prestamo BNH	0.0	0.0	14.2	24.8	13.8	12.2	0.0	0.0	0.0	0.0	0.0
Otro Financiamiento	282.6	345.8	192.6	70.2	68.4	18.9	0.0	0.0	0.0	0.0	0.0

Supuestos Básicos de la Proyección Financiera
de la Municipalidad de São Paulo

En las proyecciones financieras del estado de origen y aplicación de fondos se incluye: el movimiento real del año 1985; el estimado de 1986 que incluye 9 meses reales y 3 estimados; la propuesta de gastos y recursos de 1987, ya presentada a la Cámara Legislativa del Municipio para su aprobación, y la estimación del período 1988-1995. Los principales supuestos utilizados se sintetizan a continuación:

1. Ingresos Corrientes

- (a) El Impuesto Predial y Territorial Urbano (IPTU) experimentará una importante recuperación en 1987 y 1988, como consecuencia de la actualización del valor medio del m² de las construcciones y en los terrenos, el 70% anual en promedio para el conjunto. Esta actualización de valores fue sometida a la consideración de la Cámara Legislativa Municipal, mediante una propuesta de ley que se estima quedará aprobada hacia mediados de noviembre de 1986. La mayor recaudación resultante para este impuesto forma parte de la estimación de recursos para el presupuesto de 1987, que también está siendo considerado por la Cámara Legislativa. En los años del período 1989-1995 el crecimiento promedio anual del IPTU se estima en el 1,6%.
- (b) Las tasas también experimentarán un aumento importante en 1987 con relación a 1986, por la actualización de la Unidad de Valor Fiscal (UFM), cuyo valor sirve de base para liquidar el pago de las tasas municipales. La UFM será actualizada en un 308% en moneda local. En términos de dólares equivalentes pasaría de US\$22,83 en 1986 a US\$77,67 en 1987. En los años siguientes el crecimiento será de alrededor del 8% anual en promedio.

Supuestos Básicos de la Proyección Financiera de la Municipalidad de San Pablo.

En las proyecciones financieras del estado de origen y aplicación de fondos se incluye: el movimiento real del año 1985; el estimado de 1986 que incluye 9 meses reales y 3 estimados; la propuesta de gastos y recursos de 1987, ya presentada a la Cámara Legislativa del Municipio para su aprobación, y la estimación del período 1988-1995. Los principales supuestos utilizados se sintetizan a continuación:

1. Ingresos Corrientes

- a) El Impuesto Predial y Territorial Urbano (IPTU) experimentará una importante recuperación en 1987, como consecuencia de la actualización del valor medio del m² de las construcciones y de los terrenos, de aproximadamente el 199% y 315%, respectivamente. Esta actualización de valores fue sometida a la consideración de la Cámara Legislativa Municipal, mediante una propuesta de ley que se estima quedará aprobada hacia mediados de Noviembre de 1986. La mayor recaudación resultante para este impuesto forma parte de la estimación de recursos para el presupuesto de 1987, que también está siendo considerado por la Cámara Legislativa. En los años del período 1988-1995 el crecimiento promedio anual del IPTU se estima en el 1,6%.
- b) Las tasas también experimentarán un aumento importante en 1987 con relación a 1986, por la actualización de la Unidad de Valor Fiscal (UFM), cuyo valor sirve de base para liquidar el pago de las tasas municipales. La UFM será actualizada en un 308% en moneda local. En términos de dólares equivalentes pasaría de US\$ 22,83 en 1986 a US\$ 77,67 en 1987. En los años siguientes el crecimiento será de alrededor del 8% anual en promedio.

- c) El impuesto a los servicios (ISS) y el impuesto a la Circulación de Mercaderías (ICM) se estima que crecerán entre el 6% y 7% anual, de acuerdo con el probable crecimiento de la economía. Los otros ingresos corrientes crecerían en alrededor del 5% anual. No se ha incluido ninguna recaudación de contribución de mejoras, aunque en el futuro podrá ser un recurso adicional.

2. Gastos Corrientes

- a) Los gastos corrientes totales se incrementarían en promedio a razón del 3,5% anual entre 1987 y 1995. Los gastos en personal ya experimentaron importantes incrementos en 1985 y 1986. Posteriormente, crecerían en promedio al 2,9% anual en concordancia con el incremento que ocurriría en obras y servicios, así como el mejoramiento en las actividades de mantenimiento y operación de bienes y servicios. Por igual motivo se estima un crecimiento promedio del 5% para otros gastos, los que incluyen servicios de terceros, subvenciones y gastos varios.
- b) Los intereses y comisiones a pagar son los que corresponden a la deuda existente, más el endeudamiento que se estima incrementar en el período 1987-1990.

3. Gastos de Capital

- a) La proyección financiera incluye el costo del Programa BID/MSP por un total de US\$207,5 millones, en el período 1987-1990.
- b) En 1987, aparte del Proyecto BID, se incluyen importantes inversiones en el Sector de Educación, que incluye la construcción de 18 escuelas y 10 guarderías infantiles, la reforma de 127 escuelas y 60 guarderías; en el sector de habitación y urbanismo se estima atender a 3000 familias, que moran en habitaciones subnormales, con los recursos del

FUNAPS; y promover la construcción de 17.000 soluciones habitacionales; en el Sector de Salud, terminación de obras en dos hospitales, construcción de puestos de asistencia médica; en el Sector Saneamiento, construcción de 100 kms. de pequeñas galerías; en el Sector Transporte, pavimentación de 550 kms. de calles y avenidas. En los años 1988 y siguientes, las inversiones en obras se mantienen en un nivel de aproximadamente US\$200 millones anuales en promedio.

- c) Los gastos por expropiaciones en el período 1987-1990 mantienen un nivel alto, de aproximadamente US\$60 millones por año, para reducir el pasivo acumulado por este concepto en los últimos años. A partir de 1991, el nivel de expropiaciones se reduce a un promedio anual de US\$10 millones, para atender las que ocurrirían en cada año.
- d) Las amortizaciones de la deuda interna continuarían pagándose en un 100% anual, a medida que vencen.
- e) Las amortizaciones de la deuda externa se basan en los siguientes supuestos;

<u>Año</u>	<u>Deuda Externa</u>	<u>Pago</u>	<u>Refinanciamiento</u>
1987	Acreedores Exterior	10%	90%
1987	Banco Do Brasil	25% s/saldo	-
1987	BANESPA	100%	-
1988	Acreedores Ext.	10%	90%
1988	Banco Do Brasil	30% s/saldo	-
1988	BANESP	100%	-
1989	Acreed. Ext.	30%	70%
1989	Banco Do Brasil	40% s/saldo	-
1989	BANESPA	100%	-
1990	Acreed. Ext.	20%	80%
1990	Banco Do Brasil	68% s/saldo	-
1990	BANESPA	100%	-
1991	Acreed. Ext.	25%	75%
1991	Banco Do Brasil	100% del saldo	-
1991	BANESPA	100%	-
1992	Acreed. Ext.	40%	60%
1993	Acreed. Ext.	50%	50%
1994	Acreed. Ext.	75%	25
1995	Acreed. Ext.	100%	-

f) Las amortizaciones de los nuevos financiamientos que ocurrieron de 1987 a 1990, así como los refinanciamientos de la deuda externa, se supone que serán amortizados en 7 años, con 3 años de gracia. Se estima que estos pagos se concretan a medida que vencen las amortizaciones.

g) Las amortizaciones de los eventuales préstamos BID y BNH se supone que se pagan a medida que vencen.

4. Ingresos de Capital

a) Para el financiamiento parcial del Programa BID/MSP en estudio se han supuesto dos fuentes de financiamiento, a saber:

(i) Préstamo BID

Monto: US\$ 77,5 millones

Plazo de Amortización: 20 años

Intereses: 8,25%

Comisión de compromiso: 1,25%

Período de gracia: 4 años
Período de desembolso: 4 años

(ii) Préstamo BNH

Monto: US\$ 65,0 millones
Plazo Amortización: 18 años
Intereses: 10,5% anual
Comisión Agente Financiero: 1% anual
Período de Gracia: 3.1/2 años
Período de Desembolso: 3 años (cada subpréstamo)
El desembolso se realiza en forma separada para cada uno de los 12 subproyectos.

- b) Los refinanciamientos de la deuda externa se estima que seguirán efectuándose a través del Banco Do Brasil, en forma similar a lo ocurrido hasta la fecha.
- c) Los nuevos financiamientos adicionales que harían falta en el período 1987-1990, se suponen a plazos de 7 años de amortización, con 3 años de gracia, e intereses del 9% anual.

Beneficios de Obras de Drenaje

1. En este anexo se presentan los aspectos más relevantes de la metodología utilizada para cuantificar los beneficios asociados con las obras de drenaje. Como se explicara en el texto estos beneficios fueron cuantificados según los diferenciales de arriendos de las viviendas según su cercanía o lejanía a una quebrada o riachuelo no canalizado. Las bases, supuestos y principales resultados logrados se detallan a continuación.
2. Durante el período febrero-marzo 1986 la empresa SABESP levantó una encuesta socioeconómica a unas 2.000 familias representativas de 21 cuencas hidrográficas de Sao Paulo. Estas cuencas forman parte del proyecto de alcantarillado sanitario que está bajo la consideración actual (noviembre 1986) del Banco. Un detalle de los procedimientos de muestreo, cuestionario y otros elementos de esta encuesta pueden obtenerse del correspondiente Informe de Proyecto. Basta aquí señalar que se recogió información sobre unas 41 variables asociadas con el alquiler de una vivienda, básicamente agrupadas en: (i) características del barrio en cuanto a disponibilidad de comercio y servicios (mercados, escuelas, puesto de salud, etc); (ii) características de infraestructura de la calle (electricidad, gas alcantarillado, etc) y (iii) características de la vivienda propiamente tal (tipo de casa, número de cuartos, etc.). Los datos de arriendos pagados fueron recogidos de los propios entrevistados en conjunto con las informaciones necesarias para "limpiar" esta variable de las numerosas distorsiones asociadas con el proceso de fijación de alquileres en un contexto de inflación alta como en Brasil en años recientes. En definitiva la muestra global disponible alcanzó a 1.821 observaciones.
3. Para los efectos que interesan en este análisis se destaca que se recogió información respecto de la ubicación de la vivienda

(cerca/lejos) en relación a alguna quebrada o riachuelo, así como si es que la vivienda sufría o no inundaciones. 1/

4. Para tomar en cuenta adicionalmente que el impacto de la cercanía de una quebrada sobre los niveles de arriendo es significativo solo si el tamaño de dicha quebrada o riachuelo es importante, se seleccionaron para análisis solo las 10 cuencas de porte mayor 2/, resultando en 1.117 viviendas válidas para análisis.
5. Con base en análisis de regresión multivariado se obtuvieron los siguientes resultados para predecir la variable "Arriendo Mensual" (expresada en cruzeiros de febrero de 1986):

1/ Esta variable en definitiva no fue utilizada ya que al ser relativamente pequeñas las áreas inundadas respecto del total de la cuenca el procedimiento muestral no permitió que la encuesta captara suficiente varianza para utilizarla en el análisis de regresión que sigue.

2/ Definidas según caudal de diseño de 20 m³/seg. o mayor. (Veáanse criterios de selección en otra parte de este informe). En adición tres cuencas de gran tamaño fueron excluidas por haberse levantado la encuesta en sectores ya canalizados perdiéndose por lo tanto el significado de cercanía/lejanía de una vivienda de la quebrada.

<u>Variable Independiente</u>	<u>Coefficiente</u>	<u>Estadístico t</u>	<u>Variables Independientes</u>	
			<u>Promedio</u>	<u>Desviación Estándar</u>
Cantidad de baños dentro de la casa	656.690	9,60	0,945	-0,609
Cantidad de baños fuera de la casa	367.262	4,49	0,249	0,445
Cantidad de dormitorios	256.765	4,84	1,494	0,674
Tiene alcantarillado sanitario	252.143	3,71	0,359	0,480
Tiene teléfono	731.152	6,32	0,096	0,294
Calle pavimentada	185.954	2,51	0,737	0,441
Cerca de quebrada/riachuelo	-106.690	-1,70	0,550	0,498
Constante	-438.500	-4,21		

N = 1.117

R^2 ajustado = 0,279

F = 62,82

Hay que destacar las variables incluidas así como la forma funcional corresponden con el mejor ajuste obtenido de varias especificaciones alternativas.

6. Los resultados anteriores confirman las principales hipótesis básicas de este tipo de análisis por cuanto los coeficientes de las variables incluidas, sus signos y sus varianzas están conformes con los test usuales de significancia estadística. De particular importancia, la regresión demuestra que los arriendos de propiedades vecinas a los riachuelos o quebradas experimentan una reducción equivalente a Cz\$106/mes. Este valor es tomado entonces como medida del impacto del proyecto al ser las obras de canalización propuestas fundamentales en eliminar los impactos ambientales negativos asociados con la existencia de dichas quebradas.
7. Consistente con lo anterior, la definición de área de influencia del proyecto se estableció en función de los resultados muestrales que indican que en las cuencas de Moóca e Itaquera un 21% y 57% de las

viviendas responden estar cerca de la quebrada. En los casos de Lauzane y Morro do "S", no incluidos en la encuesta, se adoptó el promedio muestral para el conjunto de ella, es decir 0,55.

Beneficios por Construcción de Vías

1. Se detallan en este anexo las principales bases, supuestos y resultados asociados con la determinación de los beneficios resultantes de expandir la malla vial de la ciudad complementando las obras de canalización para drenaje. Como ya se indicara en el texto principal estos beneficios están asociados con los ahorros de costos de operación y de tiempo de las personas en los vehículos que circulan por la malla vial afectada por el proyecto. Estos elementos se detallan a continuación.
2. Para cada vía a construir se analizó la malla vial existente en las vecindades obteniéndose datos de conteos de tráfico disponibles desde el año 1983 en la Companhia de Engenharia de Tráfego del Município de Sao Paulo (CET) y complementándose con conteos ad-hoc en aquellos segmentos sin disponibilidad histórica de datos. Adicionalmente se levantaron encuestas de origen-destino, especialmente durante horas de pico en días de semana representativos, en las principales vías en las inmediaciones de cada proyecto de la muestra representativa. En función de estos datos se determinaron los flujos de tráfico promedio día (y hora pico/no pico) en cada segmento de la malla vial a ser analizada.
2. Manteniendo la distribución de vehículos por origen/destino y por tipo se proyectaron los flujos de tráfico al año 2.000 utilizando tasas del 3,5% para automóviles, del 7,7% para buses y variables entre 2% y 7% para buses. 1/ A partir de esta situación de tráfico y utilizando las curvas de AASHO para relacionar la capacidad de la vía y el volumen de

1/ La tasa de crecimiento del tráfico de automóviles (un 90-95% del tráfico total) corresponde a la suma del crecimiento poblacional esperado en el área metropolitana (1,7%) y del índice de motorización (autos/hab.) de la ciudad. Para camiones se optó por la tasa histórica de crecimiento del consumo de diesel, mientras que para buses se aplicó la tasa de crecimiento poblacional de la región censal en que se ubica el proyecto.

tráfico existente con la velocidad promedio de éste se establecieron las predicciones de velocidad en cada segmento vial. 1/

3. Tomando en cuenta los volúmenes de tráfico señalados, y con base en las velocidades de hora pico se calculó el impacto de la nueva vía por medio de reestimar los flujos de tráfico entre cada origen/destino siguiendo la regla de minimizar el tiempo de ruta. Algunos puntos son importantes de destacar: (i) no se consideró la posibilidad de desviar rutas de ómnibus por la naturaleza diferente del servicio que prestan estos vehículos; (ii) dada una diferencia de tiempo entre la ruta actual y una nueva, se asignó solo una fracción del tráfico a ser atraído a la nueva ruta; para ello se utilizaron funciones establecidas por AASHO para tráfico urbano. 2/ Se evita con ello el tipo de asignaciones "todo o nada" utilizadas comúnmente en estos análisis y que tienden a sobreestimar los volúmenes de tráfico desviados.
4. En función de las nuevas asignaciones de tráfico se recalculan las velocidades iterando de modo de alcanzar una solución que compatibiliza los tráficos desviados con los tiempos de recorrido. Ello a su vez permite que aún los vehículos que no se desvían perciban beneficios al disminuir el congestionamiento en la ruta por la que circulan.
5. La anterior metodología se aplicó estrictamente a la situación de tráfico en hora pico del año 2.000 aplicándose proporcionalmente los volúmenes desviados a horas fuera de pico y a una simulación de la situación actual (1986) suponiendo existiera instantáneamente la nueva vía. Este procedimiento debe posiblemente sobreestimar los beneficios esperados y no ha sido factible revisar los resultados corrigiendo por

1/ Se impusieron límites inferiores de 5 km/hr aplicables a algunos casos en los cuales hacia el año 2.000 se encontrarían teóricamente saturadas.

2/ Estas funciones indican por ejemplo que a igualdad de tiempos de recorrido un 35% del tráfico se desviará a la nueva ruta; en el otro extremo, para desviar un 95% del tráfico se requiere un ahorro de tiempo de más de 60% con respecto al actual.

este factor 1/. Simultáneamente se han recalculado las velocidades de operación en la situación actual con y sin proyecto (en hora pico y fuera de hora pico) y en la situación del año 2.000.

6. Los beneficios económicos que surgen de esta reasignación de tráfico se asocian directamente con las variaciones en velocidades de los vehículos que circulan en la zona. Por una parte estas velocidades son decisivas en determinar los costos de operación de vehículos y simultáneamente en reducir los tiempos de recorrido de los usuarios. Las bases de cálculo de estos beneficios se indican a continuación.
7. Para el cálculo de costos de operación se dispone en Brasil de los resultados presentados por el DNER en su "Manual de Costos de Operación", 1976. Estos se han actualizado en cuanto a los precios unitarios a utilizar y seleccionándose los vehículos más representativos del tráfico de Sao Paulo 2/ Algunos elementos destacados se indican en el cuadro II.1 adjunto, debiendo señalarse la simplificación de algunos componentes de costos tomando en cuenta la naturaleza de los cálculos que siguen. En particular, las partidas de aceites, lubricantes, mantenimiento, etc. se han expresado como porcentajes de los restantes ítems de costos; se ha ignorado asimismo los costos de choferes de buses y camiones.

1/ Hay que destacar por otra parte que solo en unos pocos casos hay tráfico desviado resultante de la saturación de las vías existentes.

2/ Un mayor detalle de estos parámetros y otros aspectos de la metodología del DNER pueden obtenerse del documento PR-1503-A: "Programa de Mejoramiento en el Valle de Jequitinhonha, Estado de Minas Gerais", Julio 1986. De hecho los datos básicos de la tabla adjunta se obtuvieron de ese mismo estudio.

Cuadro II.1

Datos Seleccionados de Costos de Operación de Vehículos

<u>Combustible</u>	<u>Automóvil 1/</u>	<u>Bus</u>	<u>Camión 2/</u>
Velocidad óptima (km/hr)	80	54	55
Consumo (lt/km)	0,088	0,162	0,108
Precio Financiero (Cr\$/lt) <u>3/</u>	4.220	2.740	2.740
Precio Económico (Cr\$/lt)	1.730	1.534	1.534
Recargo por aceites (%) <u>4/</u>	56,0	50,8	60,0
<u>Depreciación</u>			
Valor vehículo			
-financiero (mil Cr\$)	71.806	373.495	169.306
-económico (mil Cr\$)	46.143	304.025	137.815
Costo anual (% valor vehículo)	0,4277	0,1102	0,0833
Recargo mantenimiento, repuestos (%) <u>5/</u>	113	198	186
Recargo Gastos Generales (%)	5	15	15
Costo Total (Cr\$/km)			
-financiero	1.296	2.183 <u>6/</u>	1.009 <u>6/</u>
-económico	691	1.581 <u>6/</u>	683 <u>6/</u>

1/ Automóvil medio, promedio gasolina/alcohol.

2/ Camión mediano vacío.

3/ Precios a diciembre de 1985, (Cr\$10.000/US\$).

4/ Calculado como proporción de combustibles.

5/ Calculado como proporción sobre la depreciación anual.

6/ Estos costos no incluyen salarios de conductores, ni intereses.

8. Para ajustar los costos anteriores según la velocidad de operación de los vehículos se han utilizado: (i) en el caso del combustible de automóviles los resultados de un estudio específico sobre el tema en

Brasil 1/ y (ii) para el resto de los ítems y vehículos las curvas establecidas por Jan de Weille 2/. Un resumen de los principales resultados se presenta en el Cuadro II.2 adjunto, ello muestra que los costos unitarios se incrementan de 2,5 a 3 veces al disminuir la velocidad desde la óptima a unos 10 km/hr.

Cuadro II.2

Costos de Operación de Vehículos según Velocidad
(Cr\$/km, valores económicos)

<u>Velocidad</u> <u>(Km/hr)</u>	<u>Automovil</u>	<u>Bus</u>	<u>Camión</u>
80	441	-	-
70	471	-	-
60	509	1.089	359
50	557	1.195	400
40	622	1.339	457
30	717	1.551	543
20	875	1.907	692
10	1.233	2.715	1.040

9. En términos de la valoración económica del tiempo ahorrado por los usuarios de vehículos el Cuadro II.3 adjunto presenta los principales datos y resultados. Como es usual solo se ha considerado el tiempo de las personas que viajan por motivo de trabajo, ignorando así el tiempo ahorrado por estudiantes y otros económicamente inactivos. Para valorar este tiempo ahorrado se ha tomado, en el caso de automóviles el salario mínimo requerido para adquirir un vehículo medio típico del tráfico en Sao Paulo. Para viajeros de ómnibus el salario medio se obtuvo de datos disponibles de una encuesta ad-hoc levantada por ENGEVIX/CBTU en 1985.

1/ Márcio P. de Sequeira Santos: "Estudio da variacao do consumo de combustível em relacao ao desempenho do sistema de tráfego urbano. Universidad Federal do Rio de Janeiro, Feb. 1980.

2/ Véase Jan de Weille, Cuantificación de los ahorros de usuarios de carreteras, Banco Mundial, 1986. Para ómnibus se adoptó un promedio de camión tipo I y II, para camión se utilizó el tipo I. Las funciones de consumo de combustible-velocidad estimadas son de tipo cuadrática mientras que para depreciación son doble logarítmicas.

Para establecer su contrapartida económica estos salarios de usuarios de autos y buses se mutliplicaron por los factores de conversión de mano de obra calificada y no calificada respectivamente y se dedujo adicionalmente un 50%. Los resultados establecidos en el Cuadro II.3 son por lo tanto extremadamente conservadores del valor económico del tiempo de usuarios de vehículos.

Cuadro II.3

Parámetros Básicos de Ahorros de Tiempo

	<u>Auto</u>	<u>Bus</u>
Tasa Ocupación (Personas/vehículos)	1,5	33 <u>1</u> /
Motivo Trabajo (% usuarios)	0,55	0,67
Salario Horario (Cz\$/hr) <u>2</u> /	41,0	11,5
Valor Económico del Tiempo (Cz\$/hr)	15,0	3,4

1/ Promedio ponderado de tasas de 50
personas/vehículo en hora pico y 18
fuera de hora pico.

2/ Precios de febrero de 1986.

10. Los cuadros y diagramas que se adjuntan a continuación ilustran los principales resultados de la metodología ya indicada a nivel de los segmentos en la malla vial a ser afectados por el proyecto. Un comentario general del impacto en cada malla vial se presenta en el texto principal de este informe, el cual recoge los principales resultados aquí establecidos.

Quadro II.4.1

Datos Seleccionados de Tráfico, Velocidades y Beneficios de la Via Lauzane

Segmentos	Sin Proyecto		Con Proyecto		Ahorro VOC		Ahorro Tiempo	
	Tráfico	Velocidad	Tráfico	Velocidad	(Cr\$/día)		(horas día)	
	1986 1/	1986 2/	2000	2000	1986	2000	1986	2000
Av. Caetano Alvares:								
De Imirim a Barros	34,7	29	37,5	29	16.288	36.235	497	1.487
De Barros a Zunkeler	16,8	32	18,2	32	6.499	11.187	192	344
Av. Zunkeler:								
De Lauzane a Alvares	10,5	13	8,1	28	9.287	25.587	390	1.592
Av. Moreira Barros:								
De Lauzane a Alvares	11,2	29	3,2	34	9.294	23.203	261	1.073
Corrego Lauzane:								
De Zunkeler a Barros	-	-	9,8	34	-8.498	-14.104	-232	-384
De Barros a Imirim	-	-	20,2	31	-10.090	-17.050	-280	-479
Total	73,2	-	96,9	-	22.779	65.057	827	3.632

1/ Miles vehículos promedio día.

2/ Km/hr en hora pico.

Quadro II.4.2

Datos Seleccionados de Tráfico, Velocidades y Beneficios de la Vía Morro do "S"

<u>Segmentos</u>	<u>Sin Proyecto</u>		<u>Con Proyecto</u>		<u>Ahorro VOC</u> <u>(Cr\$/día)</u>		<u>Ahorro Tiempo</u> <u>(horas día)</u>	
	<u>Tráfico</u> <u>1986</u>	<u>Velocidad</u> <u>1986</u>	<u>Tráfico</u> <u>2000</u>	<u>Velocidad</u> <u>2000</u>	<u>1986</u>	<u>2000</u>	<u>1986</u>	<u>2000</u>
Estrada Itapecírica:								
De Morro a Mass	14,4	31	18,7	27	905	2.031	25	70
De Mass a Campo Limpo	24,4	26	18,9	32	34.459	94.181	1.053	4.629
De Campo Limpo a Belezas	29,9	24	30,5	24	33.043	74.896	1.064	3.390
De Belezas a Gronchi	39,9	28	42,5	20	3.666	12.281	108	667
Av. Joao Dias:								
De Morro a Gronchi	54,5	20	43,1	19	8.038	20.733	276	1.045
Estrada Campo Limpo:								
De Morro a Itapecírica	8,9	32	21,3	13	-1.443	-4.348	-41	-209
Rua das Belezas:								
De Morro a Itapecírica	6,7	32	6,4	32	2.466	4.286	70	122
Av. Gronchi:								
De Morro a Itapecírica	24,4	30	12,1	34	7.207	13.274	207	406
Morro do "S":								
De Itapecírica a Campo Limpo	-	-	26,3	32	-27.059	-46.768	-726	-1.245
De Campolimpo a Belezas	-	-	24,1	32	-21.881	-37.815	-582	-999
De Belezas a Gronchi	-	-	29,3	30	-18.643	-32.274	-508	-874
De Gronchi a Dias	-	-	55,5	24	-13.407	-23.751	-384	-697
Total	203,1	-	328,7	-	7.351	76.725	563	6.306

Quadro II.4.3

Datos Seleccionados de Tráfico, Velocidades y Beneficios de la Vía Itaquera/Itaqueruna

Segmentos	Sin Proyecto		Con Proyecto		Ahorro VOC		Ahorro Tiempo	
	Tráfico 1986	Velocidad 1986	Tráfico 2000	Velocidad 2000	(Cr\$/día) 1986	(Cr\$/día) 2000	(horas día) 1986	(horas día) 2000
Av. Sao Miguel:								
De Imperador a Jacú	19,3	32	26,1	30	29.057	52.927	831	1.553
De Jacú a Nordestina	23,4	26	33,2	13	4.868	21.864	165	1.552
Av. Imperador:								
De Sao Miguel a Jacú	17,6	34	38,8	32	-24.603	-42.171	-665	-1.109
De Jacú a Pires do Rio	10,2	34	25,9	33	-4.710	-8.133	-127	-215
Ave. Pires do Rio:								
De Imperador a Nordestina	18,6	22	27,4	10	8.283	38.062	314	3.015
Av. Nordestina:								
De Sao Miguel a Tito	19,2	29	23,7	23	1.303	3.711	41	184
De Tito a Pires do Rio	23,0	27	34,9	11	1.380	5.226	48	353
Ave. Marechal Tito:								
De Nordestina a Itaquera	17,5	30	22,0	27	8.708	21.656	243	773
Rua Cembira:								
De Tito a Nordestina	2,8	32	3,5	32	1.553	2.857	43	79
Av. Nordestina:								
De Cembira a Itaquera	6,1	32	11,7	29	-266	-478	-8	-15
Corrego Itaqueruna:								
De Pires do Rio a Nordestina	-	-	14,4	33	-4.941	-8.411	-134	-219
De Nordestina a Itaquera	-	-	13,9	33	-4.769	-8.131	-129	-211
Corrego Itaquera:								
De Nordestina a Itaqueruna	-	-	1,4	34	-244	-413	-7	-11
De Itaqueruna a Tito	-	-	15,5	32	-18.626	-31.986	-502	-837
Total	157,7	-	292,5	-	-3.008	46.580	111	4.892

Quadro II.4.4

Datos Seleccionados de Tráfico, Velocidades y Beneficios de la Vía Moóca

<u>Segmentos</u>	<u>Sin Proyecto</u>		<u>Con Proyecto</u>		<u>Ahorro VOC</u>		<u>Ahorro Tiempo</u>	
	<u>Tráfico</u> <u>1986</u>	<u>Velocidad</u> <u>1986</u>	<u>Tráfico</u> <u>2000</u>	<u>Velocidad</u> <u>2000</u>	<u>(Cr\$/día)</u> <u>1986</u>	<u>2000</u>	<u>(horas día)</u> <u>1986</u>	<u>2000</u>
Av. Francisco Fett:								
De Vila Ema a Melo	10,6	10	18,3	5	-202	-169	-15	-10
De Melo a Oratorio	10,3	13	21,5	5	-3.433	-3.958	-261	-234
Rua J.A. Fontes:								
De Sapopemba a Melo	9,4	24	4,0	32	4.356	13.437	139	833
De Melo a Oratorio	5,5	30	3,4	33	552	990	16	31
Estrada Casa Grande:								
De Moóca a Oratorio	8,3	26	3,0	29	7.542	23.642	227	1.398
De Moóca a Sapapemba	8,3	31	23,4	6	-1.930	-7.452	-60	-485
Av. Vila Ema:								
De Fett a Sapopemba	12,5	14	21,1	5	3.179	3.811	192	201
Av. Melo:								
De Fett a Fontes	15,5	35	31,7	32	-7.682	-13.071	-216	-363
Av. Oratorio:								
De Fett a Fontes	21,2	11	30,9	5	15.781	32.618	884	1.902
De Fontes a Casa Grande	16,6	22	17,6	15	4.372	14.140	153	896
Corrego Moóca:								
De Fontes a Casa Grande	-	-	24,5	34	-20.732	-34.433	-557	-912
Av. Sapopemba:								
De Fontes a Casa Grande	19,6	15	20,9	15	19.788	50.595	815	3.148
De Fontes a Vila Ema	13,7	27	22,9	5	255	483	11	26
Total	151,5	-	243,4	-	21.846	80.635	1.327	6.430

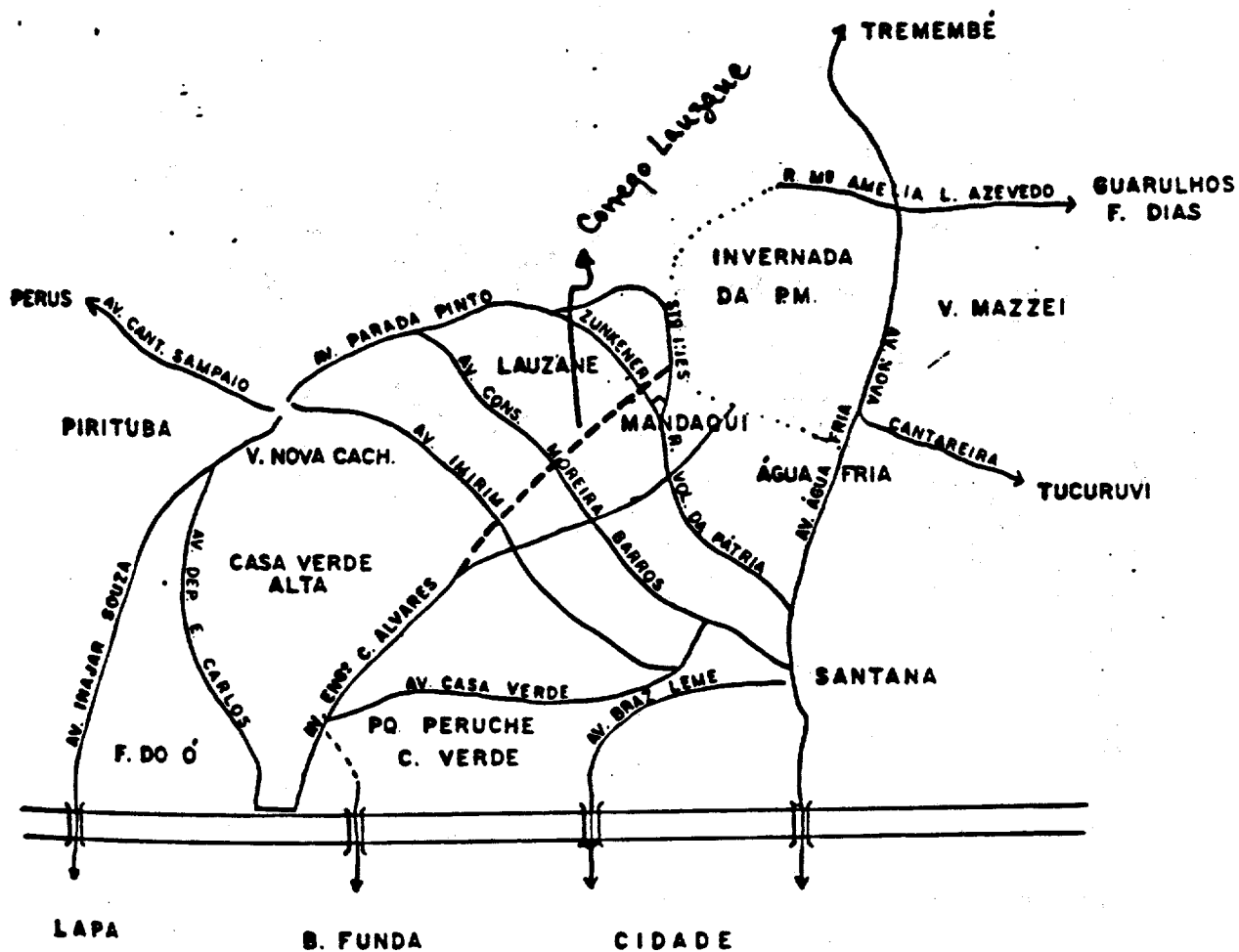


DIAGRAMA 1

RED VIAL CORREGO LAUZANE

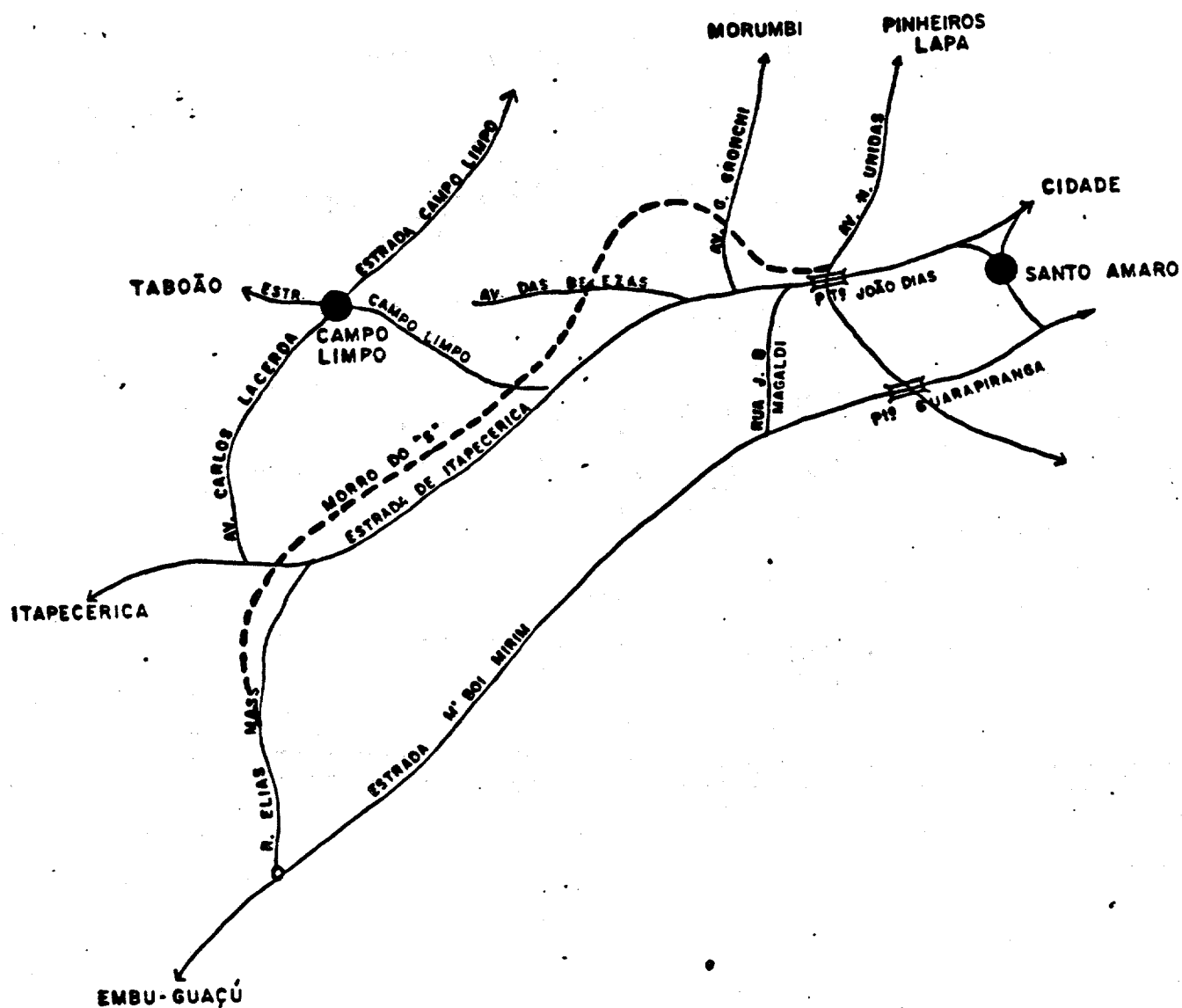


DIAGRAMA 2

RED VIAL CORREGO MORRO DO "S"

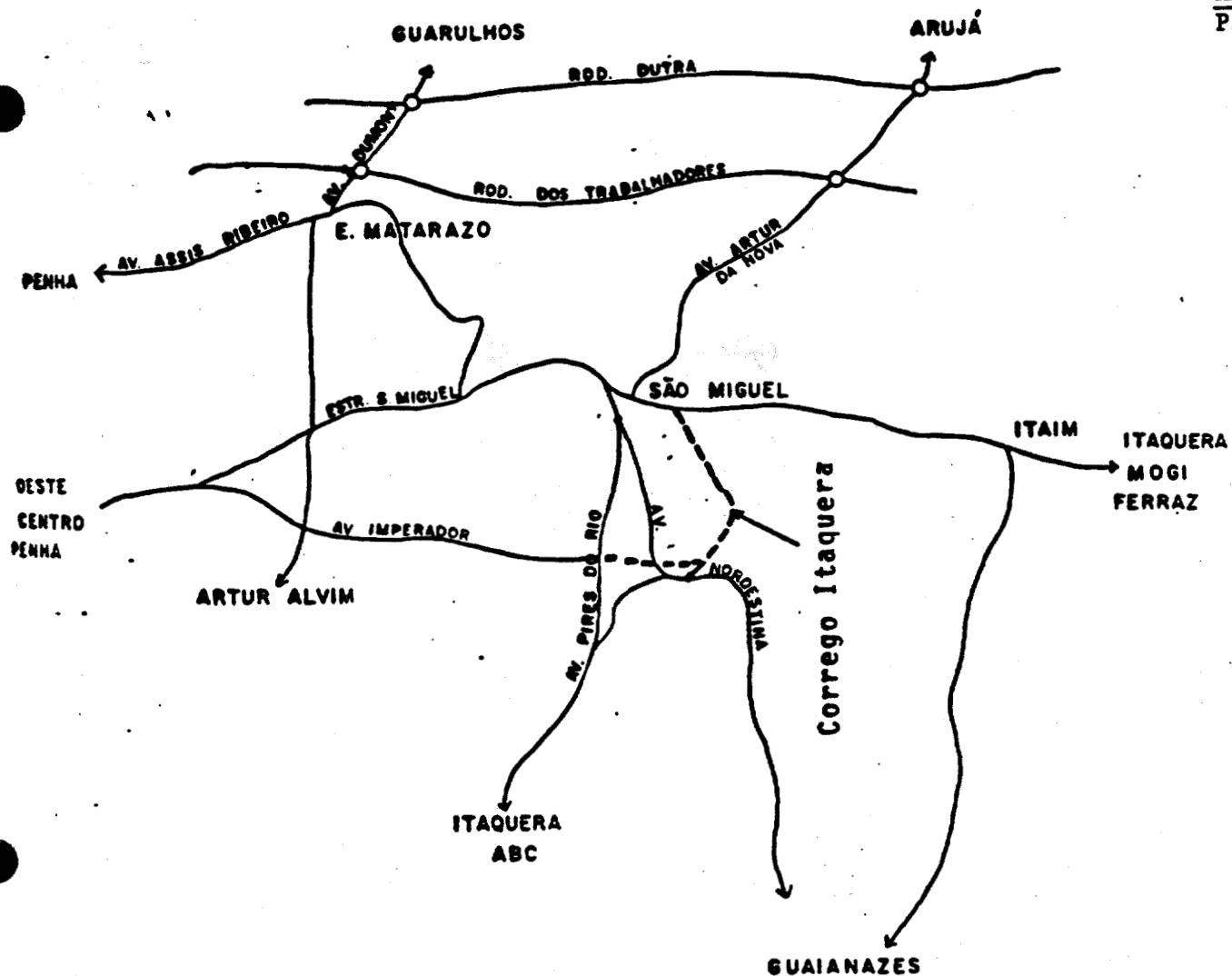


DIAGRAMA 3

RED VIAL CORREGO ITAQUERA/ITAQUERUNA

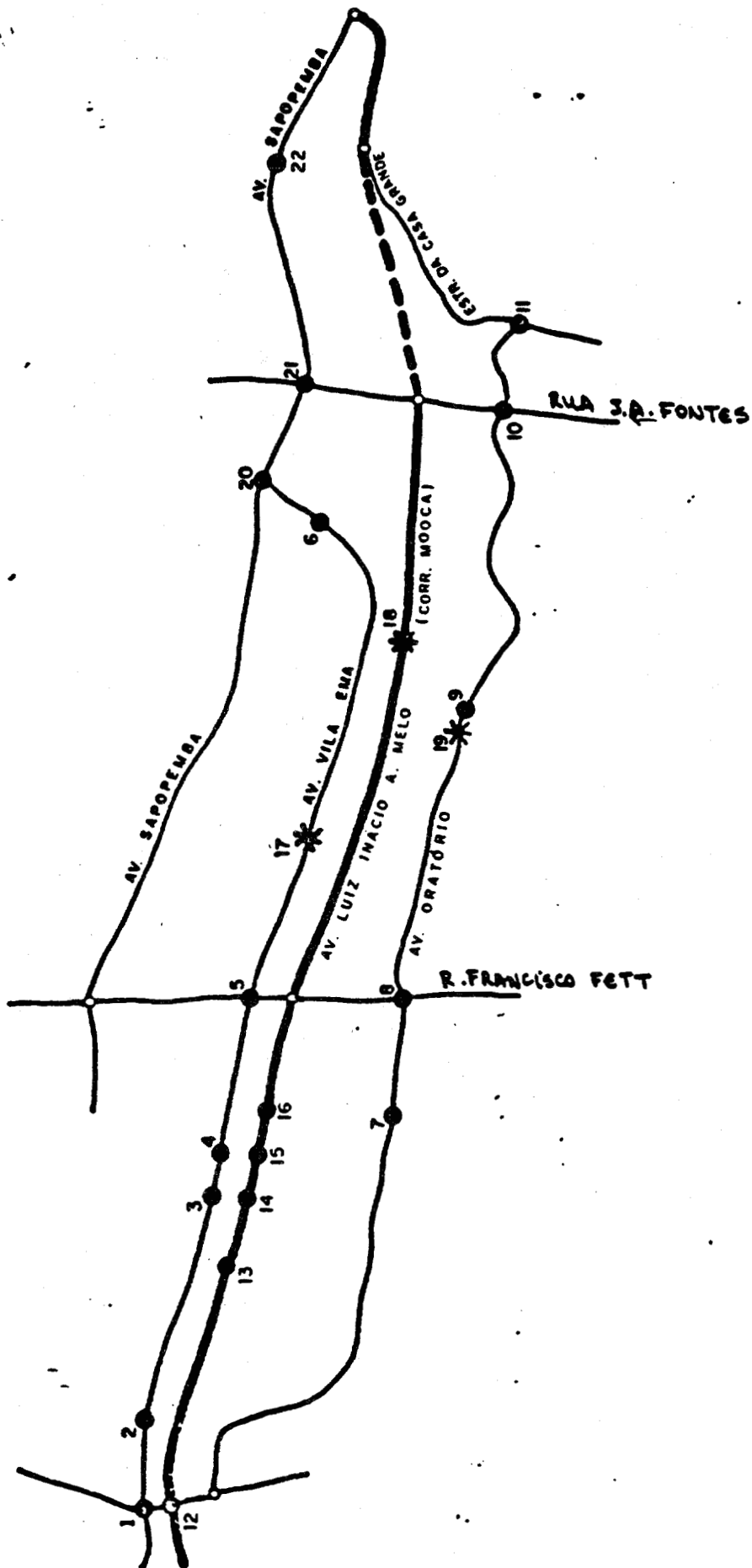


DIAGRAMA 4
RED VIAL CORREGO MOOCA